Partnerships for International Research and Education (PIRE)

PROGRAM SOLICITATION
NSF 11-564

REPLACES DOCUMENT(S):
NSF 09-505

National Science Foundation

Office of International and Integrative Activities

Directorate for Biological Sciences

Directorate for Computer & Information Science & Engineering
    Division of Advanced Cyberinfrastructure

Directorate for Education & Human Resources

Directorate for Engineering

Directorate for Geosciences
    Division of Polar Programs

Directorate for Mathematical & Physical Sciences

Directorate for Social, Behavioral & Economic Sciences

U.K. Economic and Social Research Council

UK Engineering and Physical Science Research Council

Ministry of Education and Science of the Russian Federation

Japan Science and Technology Agency

Inter-American Inst for Global Change Research

US Agency for International Development

Environmental Protection Agency

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

October 19, 2011

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

May 15, 2012

IMPORTANT INFORMATION AND REVISION NOTES

A revised version of the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG), NSF 11-1, was issued on October 1, 2010 and is

effective for proposals submitted, or due, on or after January 18, 2011. Please be advised that the guidelines contained in NSF 11-1 apply to proposals submitted in response to this funding opportunity.

Cost Sharing: The PAPPG has been revised to implement the National Science Board's recommendations regarding cost sharing. Inclusion of voluntary committed cost sharing is prohibited. In order to assess the scope of the project, all organizational resources necessary for the project must be described in the Facilities, Equipment and Other Resources section of the proposal. The description should be narrative in nature and must not include any quantifiable financial information. Mandatory cost sharing will only be required when explicitly authorized by the NSF Director. See the PAPP Guide Part I: *Grant Proposal Guide (GPG)* Chapter II.C.2.g(xi) for further information about the implementation of these recommendations.

Data Management Plan: The PAPPG contains a clarification of NSF's long standing data policy. All proposals must describe plans for data management and sharing of the products of research, or assert the absence of the need for such plans. FastLane will not permit submission of a proposal that is missing a Data Management Plan. The Data Management Plan will be reviewed as part of the intellectual merit or broader impacts of the proposal, or both, as appropriate. Links to data management requirements and plans relevant to specific Directorates, Offices, Divisions, Programs, or other NSF units are available on the NSF website at: http://www.nsf.gov/bfa/dias/policy/dmp.jsp. See Chapter II.C.2.j of the GPG for further information about the implementation of this requirement or refer to the Division of Materials Research (DMR) Data Management Plan which is available at http://www.nsf.gov/bfa/dias/policy/dmpdocs/dmr.pdf.

Postdoctoral Researcher Mentoring Plan: As a reminder, each proposal that requests funding to support postdoctoral researchers must include, as a supplementary document, a description of the mentoring activities that will be provided for such individuals. Please be advised that if required, FastLane will not permit submission of a proposal that is missing a Postdoctoral Researcher Mentoring Plan. See Chapter II.C.2.j of the GPG for further information about the implementation of this requirement.

Revision Summary

1. Only Science, Engineering, and Education for Sustainability (SEES)-focused proposals will be considered.
2. A single organization may submit only one preliminary proposal as the lead institution.
3. Full proposals will be accepted by invitation only.
4. Eliminates limit on the number of proposals on which a PI, co-PI or other Senior Personnel may appear.
5. Depending on research topic and country, additional funding for U.S. PIs or foreign collaborators may be available from these agencies: United Kingdom Engineering and Physical Sciences Research Council (EPSRC); United Kingdom Economic and Social Research Council (ESRC); Ministry of Education and Science of the Russian Federation (MES); Japan Science and Technology Agency (JST); Inter-American Institute for Global Change Research (IAI); U.S. Environmental Protection Agency (US EPA); and U.S. Agency for International Development (USAID). See section II.D. for details.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Partnerships for International Research and Education (PIRE)

Synopsis of Program:

Partnerships for International Research and Education (PIRE) is an NSF-wide program that supports international activities across all NSF supported disciplines. The primary goal of PIRE is to support high quality projects in which advances in research and education could not occur without international collaboration. PIRE seeks to catalyze a higher level of international engagement in the U.S. science and engineering community.

International partnerships are essential to addressing critical science and engineering problems. In the global context, U.S. researchers and educators must be able to operate effectively in teams with partners from different nations and cultural backgrounds. PIRE promotes excellence in science and engineering through international collaboration and facilitates development of a diverse, globally-engaged, U.S. science and engineering workforce.

This PIRE competition will focus exclusively on the NSF-wide investment area of Science, Engineering, and Education for Sustainability (SEES). The SEES effort focuses on interdisciplinary topics that will advance sustainability science, engineering and education as an integrative approach to the challenges of adapting to environmental, social and cultural changes associated with growth and development of human populations, and attaining a sustainable energy future. Additional details are provided in the Summary of Program Requirements below.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- John Tsapogas,1155 II, telephone: (703) 292-7799, email: PIRE-info@nsf.gov

- Amelia Greer,1155 II, telephone: (703) 292-8429, email: PIRE-info@nsf.gov

- Steven Burch,1155 II, telephone: (703) 292-7226, email: PIRE-info@nsf.gov

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

- 47.041 --- Engineering
- 47.049 --- Mathematical and Physical Sciences
- 47.050 --- Geosciences
- 47.070 --- Computer and Information Science and Engineering
- 47.074 --- Biological Sciences
- 47.075 --- Social Behavioral and Economic Sciences
- 47.076 --- Education and Human Resources
- 47.079 --- International and Integrative Activities (IIA)
- 47.081 --- Office of Experimental Program to Stimulate Competitive Research
- 66.509 --- Science To Achieve Results (STAR) Research Program

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant.

Estimated Number of Awards: 10 to 15 Pending the availability of funds.

Anticipated Funding Amount: $10,000,000 to $15,000,000 Annually, for all awards, pending the availability of funds; the average award size is expected to be approximately $4 million over 5 years.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- U.S. academic institutions with Ph.D.-granting programs that have awarded doctoral degrees in the 2009 or 2010 academic years in any area of research supported by NSF. Any institution not listed at http://www.nsf.gov/od/oise/pire-2012-eligible-insts.xlsx should contact PIRE Program staff regarding eligibility. Institutions that have not participated in past PIRE awards are especially encouraged to submit.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization: 1

A single organization may submit one preliminary proposal as the lead institution. Full proposals will be accepted by invitation only. There is no limit on the number of proposals on which an institution can participate as a partner.

Limit on Number of Proposals per PI or Co-PI:

There are no restrictions or limits.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required

- **Preliminary Proposals:** Submission of Preliminary Proposals is required. Please see the full text of this solicitation for further information.

- **Full Proposals:**
    - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. 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.
    - 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).

B. Budgetary Information

- **Cost Sharing Requirements:** Inclusion of voluntary committed cost sharing is prohibited.

- **Indirect Cost (F&A) Limitations:** Not Applicable

- **Other Budgetary Limitations:** Not Applicable

C. Due Dates

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

    October 19, 2011

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

    May 15, 2012

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: Standard NSF award conditions apply.

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

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I. INTRODUCTION

Recognizing the value of international partnerships in addressing critical science and engineering questions, NSF established the Partnerships in International Research and Education (PIRE) program in 2005. PIRE is an NSF-wide program that supports fundamental, interdisciplinary, international research and education in physical, living, human, and engineered systems. PIRE enables research at the leading edge of science and engineering by partnering with others nationally and internationally, by educating and preparing a diverse, world-class STEM workforce, and by fostering institutional capacity for international collaboration. This agenda is designed to encourage high-risk/high-reward activities and pursues potentially transformative ideas.

International engagement will be critical to keeping the U.S. globally competitive at the frontiers of knowledge. As science and engineering expertise and infrastructure advance across the globe, it is expected that the U.S. will increasingly benefit from international collaborations and a globally engaged workforce leading to transformational science and engineering breakthroughs. Therefore, PIRE will promote cooperation among scientists and engineers from all nations and will fund international collaborative activities through all areas of research supported by the NSF. NSF PIRE is also working with counterpart funding agencies in other countries to lower barriers to collaboration of U.S scientists, engineers and students, and encourage jointly funded, bilateral and multilateral projects.

This fourth round of the PIRE competition will focus exclusively on the NSF-wide investment area of Science, Engineering, and Education for Sustainability (SEES). A sustainable world is one in which human needs are met equitably without harm to the environment, and without sacrificing the ability of future generations to meet their needs. Meeting this formidable challenge requires a substantial increase in our understanding of the integrated system of society, the natural world, and the alterations humans bring to Earth. NSF's Science, Engineering, and Education for Sustainability (SEES) activities aim to address this need through support for interdisciplinary research and education in all fields of science and engineering. Especially encouraged is research on global sustainability issues including, but not limited to, climate change, clean energy, food security, biodiversity, and communication networks.

Fundamental to all sustainability research is the simultaneous consideration of social, economic, and environmental systems and the long-term viability of those systems. Concepts that underlie the science of sustainability include complex adaptive systems theory, emergent behavior, multi-scale processes, as well as the vulnerability, adaptive capacity, and resilience of coupled human-environment systems.

SEES activities span the entire range of scientific domains at NSF and aim to: 1) support interdisciplinary research and education that can facilitate the move towards global sustainability; 2) build linkages among existing projects and partners and add new participants in the sustainability research enterprise; and 3) develop a workforce trained in the interdisciplinary scholarship needed to understand and address the complex issues of sustainability. More information about NSF's SEES investment area may be found on the SEES webpage at: http://www.nsf.gov/sees/ and the NSF Dear Colleague Letter for the Science, Engineering and Education for Sustainability (SEES) NSF-Wide Investment Area (nsf11022).

II. PROGRAM DESCRIPTION

A. PROGRAM OBJECTIVES:

1. Support excellence in science, engineering, and education for sustainability (SEES) through international collaboration.

2. Promote opportunities where international collaboration can provide unique advantages of scope, scale, flexibility, or facilities, enabling advances that could not occur otherwise.

3. Engage and share resources and research infrastructure within and across institutions to build strong international

partnerships.

    4. Create and promote opportunities for students and early career researchers to participate in substantive international research experiences.

B. CHARACTERISTICS OF PIRE PROJECTS

PIRE partners share an ambitious research vision that integrates research and education. The project theme may involve any area of research that falls within the broad scope of the SEES initiative. PIRE projects may vary in size and exhibit diverse forms of organization, collaboration, and operation suited to their individual needs. PIRE projects must include collaboration with foreign research partners and international research experiences for students to promote a diverse internationally competitive science and engineering workforce.

NSF is committed to the principle of diversity and expects PIRE projects to involve groups traditionally underrepresented in science and engineering at all levels (faculty, students and postdoctoral researchers). Increasing the participation of a diverse U.S. citizenry by creating opportunities and enabling them to contribute is essential to the health and vitality of science, engineering, and education.

C. PRINCIPAL INVESTIGATOR

The Principal Investigator (PI) will be the director of the PIRE project. The PI is expected to provide intellectual leadership and be an essential participant in research and related educational activities. The PI will have overall responsibility for the administration of the award, for the management of the project, and for serving as the main point of contact with NSF.

D. ADDITIONAL FUNDING OPPORTUNITIES

NSF is working with counterpart funding organizations to enhance opportunities for collaborative activities in sustainability research and education between U.S. investigators and their colleagues abroad. Additional funding for international collaborators on PIRE projects may be available from: United Kingdom Engineering and Physical Sciences Research Council (EPSRC); United Kingdom Economic and Social Research Council (ESRC); Ministry of Education and Science of the Russian Federation (MES); Japan Science and Technology Agency (JST); Inter-American Institute for Global Change Research (IAI); U.S. Agency for International Development (USAID); and, U.S. Environmental Protection Agency (US EPA). Proposers are also free to negotiate with any other research funding bodies not listed.

NSF's Office of International Science and Engineering (OISE) will coordinate and manage the review of proposals jointly with participating domestic and foreign funding organizations. In some instances, additional information is required by the U.S. and/or foreign funding organizations. (See Summary Table and details in sections below.) Relevant information about proposals and reviews of proposals will be shared between the participating organizations as appropriate.

Prior to final NSF funding recommendations, PIs whose proposals are selected for PIRE awards may be asked to submit additional information, including relevant budget details, to co-funding organizations to enable completion of their co-funding decisions. Award decisions by NSF are in no way contingent upon the funding decisions of partnering agencies.

Summary Table of additional funding opportunities from PIRE partners.

Partner Agency	PIRE Activity Qualified for Funding	Funding Recipient	Research Focus	Additional Documentation Required in PIRE Application for foreign component	Review and Award Procedure
UK Research Councils (RCUK)	Foreign Partner Research and Education Activities in UK academic institutions	UK academic institution	Sustainability: Materials Engineering	Budget for UK partner institution(s)	(a)Partner agrees to accept NSF-PIRE compliance and review process; and (b)NSF and Partner will approve full panel recommendations for proposals with UK institutions
Russian Federation Ministry of Education & Science (MES)	Foreign Partner Research and Education Activities in Russian Federation academic institutions	Russian partner academic institution	Sustainability: Nanotechnology, Energy, IT	Budget for Russian Federation partner institution(s)	Partner will make funding decision after NSF panel recommendation (will fund separate proposal from Russian research university)
Japan Science and Technology Agency (JST)	Foreign Partner Research and Education Activities in Japanese academic institutions	Japanese academic institution with existing JST awards	Sustainability: Low Carbon Society, Alternative Energy and Materials, and Water Management for Climate Change Adaptation	Information on current JST award	Partner will make funding decision after NSF panel recommendation (will fund separate supplemental funding request from active awardees in select JST programs)
Inter-American Institute for Global Climate Change Research (IAI)	Foreign Partner Research and Education Activities in IAI member academic institutions	IAI member country academic institution	Sustainability: Global Change Research	Budget for IAI partner institution(s)	(a)Partner agrees to accept NSF-PIRE compliance and review process; and (b)NSF and Partner will approve full panel recommendations for proposals with IAI institutions
US Environmental Protection Agency (EPA)	PIRE US Research and Education Activities	NSF	Sustainability: Air and Water	None Required	Partner will make co-funding decision after NSF panel recommendation
US Agency for International Development (USAID)	Foreign Partner (AID country academic institution)	AID country academic institution	Sustainability: All S&E fields supported by NSF	Summary of the Research Plan from the developing country partner's proposal to USAID	Partner will make funding decision after NSF panel recommendation (will fund separate proposal from AID country academic institutions)

D.1. Collaboration with UNITED KINGDOM INVESTIGATORS

U.K. researchers who are partners in PIRE projects may be eligible for joint funding from the U.K. Engineering and Physical Sciences (EPSRC) and Economic and Social (ESRC) Research Councils. Proposals for collaboration with U.K. researchers in all areas relevant to SEES are encouraged; however, only proposals focused on topics described below will be considered for co-funding by EPSRC and/or ESRC. ESRC expects to contribute to this solicitation up to £500,000 total to co-fund between 2-5 projects, depending on quality of proposals.

1. Funding for the U.K. counterparts will be awarded through EPSRC and/or ESRC in accordance with the policies of those agencies. The Research Councils will require that costs for the U.K. element of the proposal be submitted via the RCUK's Je-S application submission system.
2. The topic for U.K. funding is **Sustainable Materials for Energy**. Research is sought to investigate:
    - Novel technologies and processes addressing resource and security of supply issues
    - Governance and regulation issues in relation to the development of new energy options and their social acceptability;
    - Economics of novel material/processing options for energy generation technologies; and,
    - Opportunity costs of adopting new materials, in particular where scarce resources are used, and how these could be mitigated.
3. **U.K. Budget.** In addition to the requirements provided in this solicitation for all PIRE proposals, invited full proposals that include collaboration with U.K. colleagues in the relevant topical area should provide U.K. budget information. Costs for the U.K. component should be entered in the Je-S system by the U.K. partner, but the completed form **SHOULD NOT** be submitted electronically to EPSRC or ESRC at this stage. Instead, a PDF version of the form should be saved and sent to the U.S. lead PI for inclusion as a **Supplementary document** in the full proposal. Full details on what is required can be obtained at: EPSRC: http://www.epsrc.ac.uk/ and ESRC: http://www.esrc.ac.uk/.

D.2. Collaboration with RUSSIAN FEDERATION INVESTIGATORS

Russian partners on PIRE projects may be eligible for funding from MES to support their participation in the PIRE project. Proposals for collaboration with Russian Federation (R.F.) researchers in all areas relevant to SEES are encouraged; however, only proposals focused on **nanoscience, energy, and information technology** will be considered for special MES funding. See http://eng.mon.gov.ru/.

1. Funding for the R.F. component will be awarded through MES in accordance with the policies of the Ministry.
2. U.S. PIs of competitively reviewed PIRE proposals will be contacted by NSF program officers and invited to work with their Russian partners to prepare and submit a separate proposal to MES.
3. MES may provide funding to Russian researchers for two years with a possibility for third year no cost extension.
4. In addition to the requirements for all PIRE proposals, full proposals that include collaboration with Russian colleagues on nanoscience, energy, and information technology should provide **R.F. budget** information. Costs for the R.F. component of the project should be provided to the U.S. lead PI in tabular form, by year, for inclusion as a **Supplementary Document** in the NSF proposal.

D.3. Collaboration with JAPAN INVESTIGATORS

Japan-based partners on PIRE projects may be eligible for coordinated funding from the **Japan Science and Technology Agency (JST)**. JST may consider requests for additional funding from Japan-based partners who are involved in ongoing projects under its Advanced Low Carbon Technology Research and Development Program (ALCA) or other programs under the Strategic Basic Research Program. Proposals for collaboration with Japan-based researchers in all areas relevant to SEES are encouraged; however, only proposals focused on topics described below will be considered for additional funding by JST.

1. Funding for the Japan component will be awarded through JST in accordance with the policies of the agency.
2. The topic of sustainability, with priority on
    - Low Carbon Society
    - Alternative Energy and Materials
    - Water Management for Climate Change Adaptation
3. U.S. PIs of competitively reviewed PIRE proposals will be contacted by NSF program officers and invited to work with their JST-supported partners as they prepare and submit a separate proposal to JST.
4. JST may provide additional funding to Japanese researchers for the residual duration of their on-going projects.
5. In addition to the requirements provided in this solicitation for all PIRE proposals, full proposals that include collaboration with JST-funded researchers should provide JST support information, including award title, PI name, scale of funding, and duration of award. JST support information should be entered as a PDF document and sent to the U.S. lead PI for inclusion as a **Supplementary Document** in the proposal. Additional details can be obtained at http://www.jst.go.jp/alca/en/index.html, http://www.jst.go.jp/kisoken/en/, and http://www.jst.go.jp/kisoken/global/en/background.html.

D.4. Collaboration with investigators in member countries of the INTER-AMERICAN INSTITUTE FOR GLOBAL CHANGE RESEARCH (IAI)

Researchers from IAI member countries who are partners on PIRE projects may be eligible for joint funding from the IAI. Proposals for collaboration with researchers from IAI member countries in all areas relevant to SEES are encouraged.

1. IAI member country collaborators of NSF-funded PIRE PIs may be eligible for funding from IAI through a parallel review and funding process.
2. U.S. PIs of competitively reviewed PIRE pre-proposals will be contacted by NSF program officers and invited to work with their IAI member country partners who will prepare and submit a separate proposal for consideration by IAI. IAI funding for the IAI member country partner(s) of PIRE PIs will be allocated on a competitive basis and is not assured.
3. Funding for the IAI-supported counterparts will be awarded through IAI's grant programs in accordance with their policies. The IAI will require that costs for the IAI element of the proposal be submitted via the IAI CRN grant procedures before final sign-off.
4. The topic for IAI funding is **Global change, mitigation and adaptation in a multi-disciplinary context** that will fund science that contributes to informed decision making.
5. **IAI Budget.** In addition to the requirements for all PIRE proposals provided in this solicitation, proposals that include collaboration with IAI colleagues in the relevant topical area(s) should provide IAI budget information. Costs for the IAI component of the project should be entered onto the IAI system by the international partner, but the completed form **SHOULD NOT** be submitted electronically to the IAI at this stage. Instead, a PDF version of the form should be saved and sent to the U.S. lead PI for inclusion as a **Supplementary Document** in the NSF proposal. Full details on what IAI requires can be obtained at: http://www.iai.int/.

D.5. Collaboration with U. S. Agency for International Development (USAID)

Researchers from **developing countries** who are partners on PIRE projects may be eligible for funding from USAID. Proposals for collaboration with scientists in developing countries in all areas relevant to SEES are encouraged . A list of developing countries where USAID operates may be found at: http://www.usaid.gov/locations/.

1. Developing country collaborators of NSF-funded PIRE PIs may be eligible for funding from USAID through a parallel review and funding

process.

2. U.S. PIs of competitively reviewed PIRE pre-proposals will be contacted by NSF program officers and invited to work with their developing country partners who will prepare and submit a separate proposal for consideration by USAID. A summary of the research plan (maximum 3 pages) from the developing country partner's proposal to USAID should be included in Supplementary Documents in the NSF full proposal. As these collateral proposals will be reviewed for development impacts, USAID funding for the developing country partner(s) of PIRE PIs will be allocated on a competitive basis and is not assured.

3. USAID will manage the parallel PIRE funding opportunity via the third party manager of the USAID Partnerships for Enhanced Engagement in Research (PEER) program (PEER manager).

4. The USAID PEER manager will receive and review proposals from developing country applicants, make awards directly to the applicants' institutions, and assume responsibility for award management. This implementation will be similar to that for PEER (see Addendum I of the NSF-USAID Memorandum of Understanding).

D.6. Collaboration with U. S. Environmental Protection Agency (US EPA)

Proposals including **sustainability science and education in environmental research areas** will be considered for additional funding from the US EPA (http://www.epa.gov/).

1. US EPA may provide co-funding for selected PIRE projects, pending the availability of funds.
2. No additional proposal submission action is required by PIRE PIs to be considered for these US EPA opportunities.
3. In addition to co-funding PIRE awards, US EPA may offer to provide US EPA fellows to participate in selected PIRE projects, based on US EPA interests. These US EPA Fellows would provide additional research capacity for PIRE awardees upon mutual agreement between US EPA, PIRE PIs and relevant institutions. US EPA Fellows would not be supported by NSF. US EPA will contact selected PIs following the NSF review process with the fellowship offer. Coordination between US EPA Fellows and PIRE PIs and institutions will be distinct from the PIRE award process.

E. VISAS AND PERMITS

PIs are responsible for obtaining any required visas for foreign travel and for providing documentation through the U.S. research institution in support of U.S. visas for foreign counterpart investigators. PIs are also responsible for obtaining research permits and import/export documents where necessary. PIs should review NSF's web page "Information for U.S. Travelers", http://www.nsf.gov/od/oise/for-travelers-main.jsp.

III. AWARD INFORMATION

Anticipated Type of Award: Continuing Grant or Standard Grant

Estimated Number of Awards: 10 to 15 Pending the availability of funds.

Anticipated Funding Amount: $10,000,000 to $15,000,000 Annually, for all awards, pending the availability of funds; the average award size is expected to be approximately $4 million over 5 years.

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- U.S. academic institutions with Ph.D.-granting programs that have awarded doctoral degrees in the 2009 or 2010 academic years in any area of research supported by NSF. Any institution not listed at http://www.nsf.gov/od/oise/pire-2012-eligible-insts.xlsx should contact PIRE Program staff regarding eligibility. Institutions that have not participated in past PIRE awards are especially encouraged to submit.

Who May Serve as PI:

There are no restrictions or limits.

Limit on Number of Proposals per Organization: 1

A single organization may submit one preliminary proposal as the lead institution. Full proposals will be accepted by invitation only. There is no limit on the number of proposals on which an institution can participate as a partner.

Limit on Number of Proposals per PI or Co-PI:

There are no restrictions or limits.

Additional Eligibility Info:

Institutions holding current PIRE awards are eligible to apply only if submitted proposals are significantly different in scope from those previously awarded. Incremental expansions of funded projects do not qualify and will be returned without review.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Preliminary Proposals *(required)*: Preliminary proposals are required and must be submitted via the NSF FastLane system, even if full proposals will be submitted via Grants.gov.

PRELIMINARY PROPOSAL should present the main concept of the proposed project. *The relevance to SEES objectives, as interpreted by the PI(s), should be clearly stated, as SEES relevance is one of the review criteria (Section VI.A).*

The preliminary proposal should consist of the following elements:

1. Cover Sheet: Check the box indicating that this is a preliminary proposal. Provide an informative title that begins with "PIRE:". The proposed PIRE Project Director must be shown as the Principal Investigator. For administrative purposes, enter $2 in the Requested Amount box on the FastLane Cover Sheet. Do not enter any other budget figures in FastLane. Check the international cooperative activities box and select appropriate countries from the pull-down list.

2. Project Summary: (1 page maximum) Describe the concept of the proposed PIRE project, including why the international partnership is critical to the project success. Separately address the intellectual merit and broader impacts of the project. The summary should be informative to those working in the same or related field(s), and understandable to a scientifically or technically literate reader.

3. Table of Contents: A table of contents is automatically generated for the proposal by the FastLane system. The proposer cannot edit this form.

4. Project Description (6 page maximum): The Project Description should take the form of a concept paper that clearly outlines the research challenges being addressed or breakthroughs being sought in the proposed PIRE SEES project. The proposed approaches must be innovative and interdisciplinary, and it must be clear how they will transform or significantly impact the science of sustainability. Include the following elements:

1. **Administrative Summary** (1 page maximum) should include:
   - title of the project
   - principal investigator
   - length of study (maximum 5 years)
   - estimated total budget (does not need to be itemized)
   - lead institution
   - list of partner institutions and key researchers
   - If the proposal is to be considered for an Additional Funding Opportunity as described in Section II.D., **explicitly name the funding partner agency**.
2. **Research Summary** (3 page maximum): Summarize the main ideas and essence of the proposed research. Describe issue/topic the proposed research is trying to address within the context of SEES, the overall goal, approaches, expected outcomes, and the synergy that each participant brings to the project.
3. **Education Summary** (2 page maximum): Describe the goals of the proposed education activities, and how the integration of research and education will advance the proposed PIRE project in a way that other funding mechanisms cannot. A justification for education programs and activities should be included and described in the context of current knowledge of teaching and learning.

5. References Cited: Per NSF Grant Proposal Guide instructions.

6. Biographical Sketches: Required for PIRE director, Co-PIs, and key domestic and international partners. See NSF Grant Proposal Guide for details.

7. Required Information on Conflicts of Interests: A FastLane Single Copy Document should be provided giving an alphabetically ordered list of **Conflicts of Interests** of proposed participants in the academic or professional community who have collaborated with (within the last 48 months), or have been a Ph.D. advisee or advisor of PIRE director, Co-PIs, and key domestic and international partners. In this list, include the name of each individual in conflict and their current institutional or company affiliation.

8. Optional Supplemental Documents: Official letters of commitment are not required at the preliminary proposal stage; however, informal evidence indicating agreement to collaborate is encouraged for both U.S. and international partners. Note that partner institutions and key participants may not be changed in the subsequent full proposal.

9. Optional Reviewer Information: A list of suggested reviewers, or reviewers not to include, with a brief explanation or justification for why the reviewer should be excluded, may be submitted in the Single Copy Documents Section.

No other items or appendices are to be included in the preliminary proposal. Information pertaining to "Current and Pending Support", and "Facilities, Equipment and Other Resources" is not required for preliminary proposals and should not be included.

Preliminary proposals containing items other than those described above will be returned without review.

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained 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) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number 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.

- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of 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). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

FULL PROPOSALS WILL BE ACCEPTED BY INVITATION ONLY. Include the components described below. Consider these important notes.

- Proposals that exceed the specified page limitations given below will be returned without review.
- No additional information may be provided by links to web pages.

PIRE will not accept collaborative proposals for a single project submitted separately from multiple organizations.
- U.S. Project Directors are advised to make sure that their foreign collaborators consult their funding agencies to determine whether they are eligible to submit a proposal, whether separate submission to their agency is required, and the agency submission requirements.
- If the project involves **human subjects**, the Institutional Review Board (IRB) of the submitting organization must certify that the proposed project is in compliance with the Federal Government's "Common Rule" for the protection of human subjects. If IRB approval has been obtained and the date of approval is listed on the cover sheet, no other certification is required. If IRB approval is still pending, submit certification of IRB approval in electronic form as soon as approval is obtained to the cognizant program officer. (The name of this program officer will be listed in the Proposal Status module of FastLane.) Delays in obtaining IRB certification may result in NSF being unable to make an award. For more information regarding the protection of human subjects, consult http://www.nsf.gov/bfa/dias/policy/hsfaqs.jsp
- If the project involves the **use of vertebrate animals**, the project must be approved by the submitting organization's Institutional Animal Care and Use Committee (IACUC) before an award can be made. For more detail, see NSF's *Proposal and Award Policy and Procedures Guide.*
- PIs proposing work in the **Arctic or Antarctic Polar Regions** should contact the Office of Polar Programs program officer associated with the program most closely aligned with the proposed research for guidance on submission (http://www.nsf.gov/dir/index.jsp?org=OPP).

1. COVER SHEET:

- Select this PIRE solicitation number from the FastLane pull-down menu. For Grants.gov users, the solicitation number will be pre-populated by Grants.gov.
- Include the preliminary proposal number.
- Show the proposed Project Director as the Principal Investigator.
- Although NSF recognizes that international collaborators play an integral role in partnerships, list only U.S. participants as PI or co-PIs.
- Check the international cooperative activities box and select the countries involved from the pull-down list.

2. PROJECT SUMMARY (1 page maximum):

- Include project title, PI's name, and name of the lead institution.
- Provide clear and concise description of the project and relevance to SEES.
- Indicate the unique opportunities that the international partners bring to the project .
- Address NSF merit review criteria (intellectual merit and broader impacts) in separate paragraphs. (For additional instructions, see the NSF Grant Proposal Guide).
- Write a summary that is informative to those working in the same or related fields and, insofar as possible, understandable to a scientifically or technically literate lay reader.

3. PROJECT DESCRIPTION (20 page maximum): In addition to the NSF Grant Proposal Guide, standard description, the guidelines below must be followed. Note that the 20-page maximum includes tables, figures, other graphical data, and Results of Prior Support. Program Objectives (section II.A. above) should be considered in items a) through e) below.

a) List of Participants: Include names and departmental and institution/organization affiliation of PI, co-PIs, and other Senior Personnel, both U.S. and international.

b) Research Plan:

- Describe the goals of the project, scientific and technical approaches, with expected outcomes and milestones. Illustrate how this research represents important advances in the SEES investment area achievable only through international collaboration. Descriptions must be sufficiently detailed to allow adequate review.

- Explain how international collaboration will be integrated into the overall research plan. Highlight specific and unique contributions (e.g., expertise, facilities, sites, data, approaches/methods, opportunities, etc.) of each U.S. and international partner.

c) Plan for Educational Activities:

- Make clear what activities provide international research experience for students and early career researchers. Describe training and/or educational activities that take advantage of unique and specific opportunities the proposed project would provide. Broadening participation of members of under-represented groups and small colleges and universities is especially encouraged.
- Describe procedures, arrangements, and plans for recruiting, selecting, preparing, and sending student participants to international sites, including logistical arrangements (lodging, transportation, health care, safety, etc.), language and cultural issues, and administrative requirements.

d) Management Plan:

- Describe the overall structure of the partnership; plans for internal means of communication; coordination of data and information management; allocation of funds and personnel; and other specific issues relevant to the proposed activities.
- Summarize the role of each investigator. Indicate the time commitment of each key project member in the management plan, regardless of any request for his/her salary from NSF.
- Present an evaluation and assessment plan integral to the development and effective management of the project, including relevant international collaborative oversight.

International collaborative oversight may include:

- Adherence to common principles for the responsible conduct of research and misconduct, including the training of students and postdocs in an international context (for references, see NSF International Research Integrity at http://www.nsf.gov/od/oise/intl-research-integrity.jsp, and NIH Fogarty International Center materials at http://med.brown.edu/fogarty/codes.htm).
- Anticipated risks and challenges of the international collaboration.
- Compliance with regulations for the use of recombinant DNA, microbes, transgenic plants or animals, including any work involving vertebrate animals (see GPG Chapter II.D.6).
- Compliance with regulations relating to the US Agricultural Bioterrorism Act of 2002 (http://www.aphis.usda.gov/programs/ag_selectagent/).
- Financial accountability: monitoring of expenditures and reporting on outcomes, in the exceptional case of subawards to international institutions. The lead institution should also provide a description of any past experiences in dealing with subawards to foreign institutions, particularly in the country(ies) where subawards would be made in this

proposal.

e) Results from Prior NSF Support (2 page maximum): PI, co-PIs, and Senior Personnel who received NSF funding in the past five years must provide information on the prior award(s), major achievements and relevance to the proposed PIRE project. Individuals who have received more than one prior award (excluding amendments) must report on the award most closely related to this proposal. Required information is described in the Grant Proposal Guide.

4. REFERENCES CITED: Cite references relevant to both the research and educational plans.

5. BIOGRAPHICAL SKETCHES:

- Include biographical sketches of U.S. and international PIs, co-PIs, and other Senior Personnel.
- Additional individuals may be included in the List of Participants, Section V.A.3.a).
- Prepare NSF standard 2-page biosketches, **including those for international collaborators,** in accordance with the GPG.
- Each biographical sketch must include a list of recent collaborators and students advised as specified in the Grant Proposal Guide.
- Emphasize information helpful for understanding the strengths, qualifications, and specific impact the individual brings to the PIRE project.

6. CURRENT AND PENDING SUPPORT: Include current and pending support for the PI, co-PIs, and U.S. Senior Personnel.

7. FACILITIES, EQUIPMENT and OTHER RESOURCES: Describe facilities and major instruments in both the U.S. and abroad in sufficient detail to allow assessment of the adequacy of resources available to perform the effort proposed.

8. SUPPLEMENTARY DOCUMENTATION: Proposals that do not include the required supplementary documents, or that include non-required documents, will be returned without review.

1. **Letters of Commitment**: Include only official letters with specific commitments of resources from participating institutions, or organizations expected to receive subawards, or from organizations that will provide resources for the project. The following documents are required.
    1. Letters from international partners, co-PIs or senior administrators expressing intent to collaborate and describing the potential benefits of the project to their side of the partnership and the related support available through their institutions and funding mechanisms.
    2. A letter from a senior administrative official of the submitting institution describing how PIRE resources will be leveraged for long-lasting impact on the institution's engagement in international research and education collaborations.
    3. A letter from a senior international officer at the submitting institution describing how various institutional entities responsible for dealing with international research and education will support the proposed international activities.
2. **Data Management Plan** (2 page maximum): Describe how data and information resulting from the proposed project will be managed with details on how data will be shared among partnering researchers and institutions. See NSF *Proposal and Award Policies and Procedures Guide*, Section IV.D.4, "Dissemination and Sharing of Research Results". OISE will defer to data policy standards of relevant disciplines when such standards exist.
3. **Postdoc Mentoring Plan** (1 page maximum): If the project requests funding to support any postdoctoral researcher(s), the proposal must include a description of mentoring activities that will be provided for such individuals. See NSF's *Proposal and Award Policies and Procedures Guide*.
4. **U.K. budget:** Proposals that include **collaboration with U.K. colleagues in Sustainable Materials for Energy** must include the **U.K. budget.** Include a PDF version of the U.K. cost form, as entered by the UK partner in the Je-S system. (The completed form should **not** be submitted electronically to the EPSRC and ESRC at this stage).
5. **R.F. budget:** Proposals that include **collaboration with Russian Federation colleagues** must include the **R.F. budget.** Include a PDF version of the cost estimate for the R.F. component of the project in tabular form, by year.
6. **JST information:** Proposals that include collaboration with **Japan-based colleagues** must include a PDF file that provides the title of the active JST award, the PI's name, scale of funding, and duration of award.
7. **IAI budget:** Proposals that include **collaboration with IAI member country colleagues** must include the IAI budget. Include a PDF copy of the IAI cost form, as entered by IAI member country partner in the IAI submi**ssion syste**m. (The completed form s**hould not be submitted electronically to the IAI** at this stage).
8. **USAID research summary**: Proposals that include **collaboration with colleagues from developing countries** must include a summary of the research plan (maximum 3 pages) from the developing country partner's proposal to USAID.

9. SINGLE COPY DOCUMENTS: Provide a single, alphabetically ordered list of **Conflicts of Interests** of all participants in the academic or professional community who have collaborated with (within the last 48 months), or have been a Ph.D. advisee, or advisor of, any personnel involved in the proposed project, including members of all advisory boards. In this list, include the name of each individual in conflict, and the current institutional or company affiliation of each individual.

B. Budgetary Information

Cost Sharing: Inclusion of voluntary committed cost sharing is prohibited.

Budget Preparation Instructions:

Budget Justification (3-page limit):

- A Budget Justification should be provided (maximum 3 pages per budget and subaward budget). A careful and realistic budget that is consistent with the proposed activities will add to the overall strength of a proposal.
- Explore use of indirect off-campus rates whenever appropriate. Provide indirect cost rate calculations and the basis to which both on-campus and off-campus rates apply.

Required Costs: Include costs of travel for two project participants for one trip per year to the Washington, D.C. area to participate in a grantees' meeting.

Allowable Costs for NSF PIRE Budget:

- A significant portion of direct costs should fund **U.S. undergraduate students, graduate students, and/or early career researchers** to conduct collaborative research-related activities at foreign sites.
- **Salaries, wages, and fringe benefits for senior project personnel**: Up to two months per year for the PI and up to one month per year for other senior project personnel, within the limits established in NSF's *Proposal and Award Policies and Procedures Guide* (http://www.nsf.gov/pubs/policydocs/pappguide/nsf09_1/nsf091.pdf).
- **Salaries, wages, and fringe benefits for postdoctoral scholars, other professionals, graduate students, secretarial-clerical, or administrative staff** who will perform dedicated work on the PIRE project.
- **Participant Support Costs:** Stipends, travel, subsistence and other costs of participation for undergraduate students or K-12

teachers should be included under Participant Support Costs. Stipends for undergraduate students should be budgeted at rates comparable to those in the Research Experiences for Undergraduates (REU) program (http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5517) in addition to any travel and subsistence costs incurred while abroad. Travel, subsistence and other costs of participation in PIRE project meetings and workshops for faculty, researchers and students from non-grantee institutions (who are not included in subawards) should also be included under Participant Support Costs.

- **Travel:** Research-related travel support (i.e., airfare, lodging, meals, and incidental expenses). For living expenses abroad, applicants are encouraged to work with international counterparts to develop realistic budget requests. For example, access to university guest housing or similar facilities should be explored. Cost-effective arrangements should be made for individuals residing at the international site for extended periods and for projects involving on-going exchanges of short-term visitors. Costs for lodging, meals and incidental expenses (MI&E) should not exceed the authorized U.S. Government per diem rates, calculated at the daily rate for the first 30 days of a project visit, and 50 percent of that rate for all time after that.
- **Expenses related to project assessment:** Should include consultant fees for internal or external evaluators and costs associated with tracking participating students beyond graduation.
- **Other Direct Costs:** May include PIRE-specific items, for example, research and education communication linkages between institutions, language training, non-travel costs associated with coordination meetings, and preparation/orientation of students for living abroad.
- All expected **subawards** should be included, regardless of amount.
- **Equipment:** PIRE is not intended to support the purchase, operation or maintenance of moderate to large equipment. Only limited equipment costs can be included.
- **NSF awards normally support the U.S. portion of the collaboration.** However, when collaborators are scientists and engineers from a developing country or from a country whose currency is not convertible, limited funds may be requested to support their participation in the project. Proposers should consult the cognizant OISE program officer for the country(ies) in question (http://www.nsf.gov/od/oise/country-list.jsp). Further, U.S. PIs planning to collaborate with developing country partners are encouraged to consider the potential for IAI or USAID collateral support of their partners, as described in section II.D.4.

Although reciprocal visits by international researchers and students to U.S. institutions are encouraged, NSF will not usually pay for the expenses of foreign scientists or students undertaking such visits; however, when projects involve exchanges of researchers and/or students, reciprocal arrangements for provision of housing and subsistence are encouraged, with adherence to the overall principle that each side supports equivalent costs.

C. Due Dates

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

  October 19, 2011

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

  May 15, 2012

D. FastLane/Grants.gov Requirements

For Proposals Submitted Via FastLane:

To prepare and submit a proposal via FastLane, see detailed technical instructions available at: https://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.

For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: http://www.grants.gov/web/grants/applicants.html. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

Proposers that submitted via FastLane are strongly encouraged to use FastLane to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. 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 either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with 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. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in the GPG as Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: http://nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Empowering the Nation Through Discovery and Innovation: NSF Strategic Plan for Fiscal Years (FY) 2011-2016*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the core strategies in support of NSF's mission 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 variety of learning perspectives.

Another core strategy in support of NSF's mission is broadening opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which 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.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (GPG Chapter II.C.2.d.i. contains additional information for use by proposers in development of the Project Description section of the proposal.) Reviewers are strongly encouraged to review the criteria, including GPG Chapter II.C.2.d.i., prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
    a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
    b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or

through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

To be considered by PIRE reviewers:

1. *SEES Relevance*

How well do the proposed research and education activities advance the foundations of sustainability science? How will the proposed activities advance the development of a competent sustainability workforce?

2. *Value Added through International Partnership*

To what extent is the international partnership essential to the proposed project? How does each participating institution contribute to advancement of the PIRE project? Is the whole greater than the sum of its parts?

3. *Educational Activities*

How do the proposed educational activities of the PIRE project promote educational excellence via international collaboration and development of a globally-engaged U.S. science and engineering workforce?

4. *Institutional Engagement*

How clearly presented are the roles and contributions of each participating organization? How well defined are anticipated benefits that each of the project's partners will gain in the proposed partnership?

5. *Project Management*

How well is the management structure described and how appropriate is that structure for effective management, coordination, logistics and oversight of the PIRE activities? How effective is the proposed plan likely to be in measuring project outputs and outcomes? How clear and appropriate are the proposed metrics and criteria for measuring project accomplishments according to a well-defined schedule?

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 evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will be completed and submitted by each reviewer. 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 strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

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. After an administrative review has occurred, Grants and Agreements Officers perform 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.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, 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.

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 notice, 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 notice; (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 notice. 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 nsfpubs@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.

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 prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). Within 90 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. 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 Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

More comprehensive information on NSF Reporting Requirements 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.

In addition to the standard reporting requirements described above, PIRE PIs must include information on: country(ies) visited, duration of stay, and research activity undertaken by all participants, noting career stage of each participant. Each PIRE project must also provide metrics, demonstrating progress towards achieving PIRE program goals in accordance with the proposed Assessment and Management Plan. Reporting requirements will be detailed in the PIRE award letters.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- John Tsapogas, 1155 II, telephone: (703) 292-7799, email: PIRE-info@nsf.gov

- Amelia Greer, 1155 II, telephone: (703) 292-8429, email: PIRE-info@nsf.gov

- Steven Burch, 1155 II, telephone: (703) 292-7226, email: PIRE-info@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

For questions regarding co-funding opportunities with external agencies, use the following contacts:

- **United Kingdom Engineering and Physical Sciences Research Council (EPSRC):** Jacqui Williams, jacqui.williams@epsrc.ac.uk, Phone in U.K. +44 1 793 444131, http://www.epsrc.ac.uk.
- **United Kingdom Economic and Social Research Council (ESRC):** Paul Rouse, paul.rouse@esrc.ac.uk, Phone in U.K. +44 1 793 413058.
- **Russian Federation Ministry of Education and Science (MES):** Dmitry Korotkov, korotkov@mon.gov.ru, Phone in Russia +7 495 629 5169.
- **Japan Science and Technology Agency (JST):** Takashi Ohama, ohama@jst.org, Phone in U.S. (202) 728-0007, http://www.jst.org/.
- **Inter-American Institute (IAI):** Holm Tiessen, htiessen@dir.iai.int, Phone in Brazil: +55 12 3208 6854.
- **U.S. Agency for International Development (USAID):** Annica Wayman, awayman@usaid.gov, Phone (202)-712-5977.
- **U.S. Environmental Protection Agency (US EPA):** Dale Manty, manty.dale@epa.gov, Phone (703) 347-8047.

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, "NSF Update" is an information-delivery system 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 Grants Conferences. Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on NSF's website at https://public.govdelivery.com/accounts/USNSF/subscriber/new?topic_id=USNSF_179.

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.

Other programs managed by the Office of International Science and Engineering include:

- Catalyzing New International Collaborations (CNIC)
- International Research Fellowship Program (IRFP)
- Pan-American Advanced Studies Institutes Program (PASI)
- East Asia Pacific Summer Institutes for U.S. Graduate Students (EAPSI)

Other useful information for submitting proposals to the PIRE Program is available on the PIRE Homepage.

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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 55,000 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 Arctic 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 Information Center may be reached at (703) 292-5111.

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> - **Location:**   4201 Wilson Blvd. Arlington, VA 22230
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>   (NSF Information Center)**:**
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> - **TDD (for the hearing-impaired):**   (703) 292-5090
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>   or telephone: (703) 292-7827
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> - **To Locate NSF Employees:**   (703) 292-5111

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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.

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Suzanne H. Plimpton
Reports Clearance Officer
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