Office of Emerging Frontiers and Multidisciplinary Activities (EFMA)

Emerging Frontiers in Research & Innovation

FY20 Solicitation: NSF 19-599

INFORMATIONAL WEBINAR

SEPTEMBER 18TH, 2019

AGENDA: September 18th, 2019

1:00 pm	Welcome from Dawn Tilbury, Assistant Director, NSF/ENG
1:05 pm	Introduction of EFRI Team Members
1:15 pm	Overview of EFRI FY2020 Program Solicitation
2:00 pm	Questions

EFRI Team Members

EFMA Office

- Sohi Rastegar, *Head, EFMA*
- Louise R. Howe, *Program Director, EFMA*

EFRI Program Directors

DCheM: Distributed Chemical Manufacturing	E3P: Engineering the Elimination of End-of-Life Plastics
Topic Coordinator: Triantafillos Mountziaris – ENG/CBET	**Topic Coordinator:** Christina Payne – ENG/CBET
Carole Read – ENG/CBET	Bruce Hamilton – ENG/CBET
Robert McCabe – ENG/CBET	William Olbricht – ENG/CBET
William Olbricht – ENG/CBET	Steven Peretti – ENG/CBET
Karl Rockne – ENG/CBET	Khershed Cooper – ENG/CMMI
Khershed Cooper – ENG/CMMI	David Rockliffe – BIO/MCB
Brigid Mullany – ENG/CMMI	Suk-Wah Tam-Chang – MPS/CHE

Key website

Office of Emerging Frontiers & Multidisciplinary Activities (EFMA) Website:

http://www.nsf.gov/eng/efma

Please refer to this website for up-to-date information.

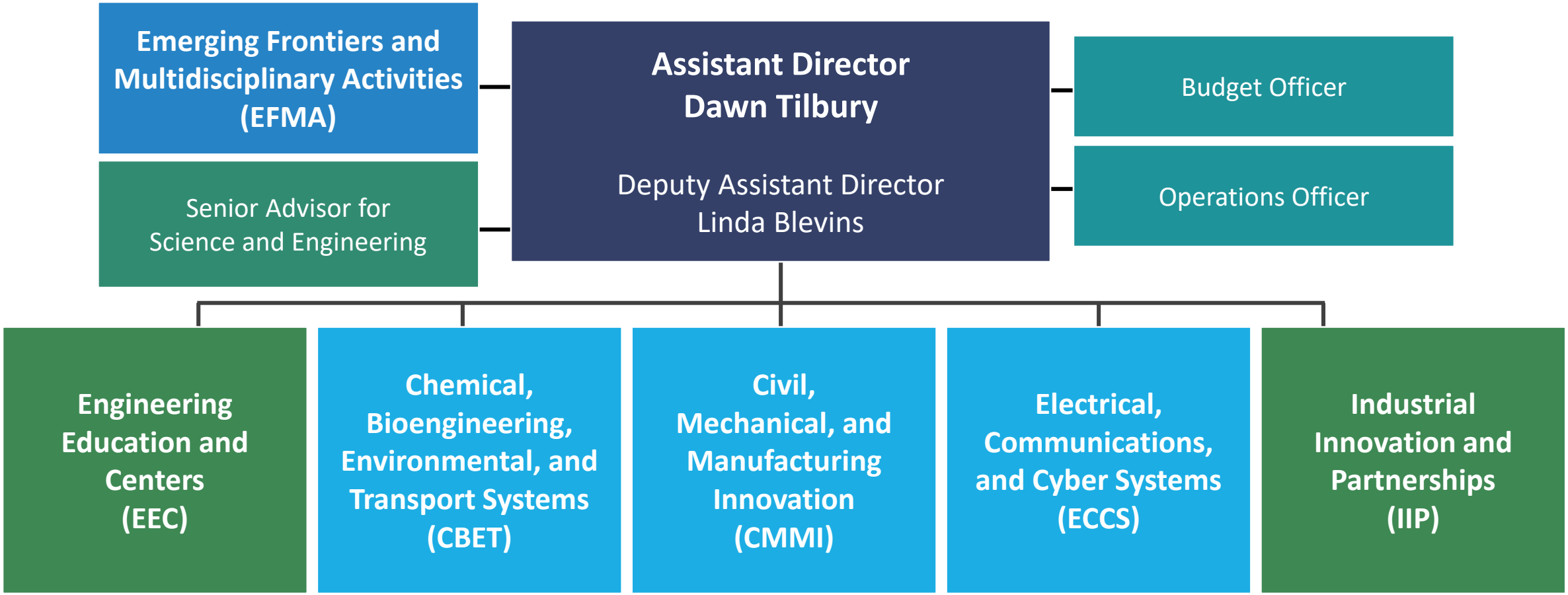
Goals of Webinar

The goals of this webinar are:

- To inform the community about the EFRI FY 2020 Program Solicitation.

- To respond to questions from potential applicants.

NSF Directorate for Engineering



The Emerging Frontiers in Research & Innovation (EFRI) Program

The EFRI Program serves a critical role in helping the Engineering Directorate to focus on important emerging areas in a timely manner.

- **Community Driven** – Engages the research community (through a DCL) as well as NSF Program Directors to identify and fund a portfolio of projects in strategic emerging, interdisciplinary areas that may not be supported through current NSF programs, and in which ENG research plays the leading role.
- Uses **Potentially Transformative** / **High risk, High reward** and **Interdisciplinary** as criteria for project selection.
- Signature midscale project-funding mechanism in ENG ($2M / 4 year projects)

EFRI Topics FY07-19

FY07 ARES: Autonomously Reconfigurable Engineered Systems
CBE: Cellular and Biomolecular Engineering

FY08 COPN: Cognitive Optimization and Prediction
RESIN: Resilient and Sustainable Infrastructures

FY09 BSBA: Biosensing and Bioactuation
HyBi: Hydrocarbons from Biomass

FY10 SEED: Science in Energy and Environmental Design
RESTOR: Renewable Energy Storage

FY11 M3C: Mind, Machines, and Motor Control
MIKS: Engineering based on Multicellular and Interkingdom Signaling

FY12/13 BioFlex: Flexible Bioelectronics Systems
PSBR: Photosynthetic Biorefineries
ODISSEI: Origami Design for Integration Of Self-assembling Systems For Engineering Innovation

FY14/15 2-DARE: 2-Dimensional Atomic-Layer Research and Engineering

FY16/17 ACQUIRE: Advancing Communication Quantum Information Research Engineering
NewLAW: New Light and Acoustic Wave Propagation: Breaking reciprocity and time-reversal symmetry

FY18/19 CEE: Chromatin and Epigenetic Engineering
C3 SoRo: Continuum, Compliant and Configurable Soft Robotics Engineering

EFRI FY 2020 Topics

Distributed Chemical Manufacturing

(DCheM)

Engineering the Elimination of End-of-Life Plastics

(E3P)

Partners:

- U.S. Department of Energy
- National Institute of Standards and Technology

TOPIC 1: Distributed Chemical Manufacturing (DCheM)

Goal: DCheM aims to revolutionize the chemical process industries by enabling the development of intensified and, where appropriate, modular process plants, which take advantage of distributed resources and/or address distributed environmental remediation needs.

DCheM will provide a path for the introduction of numerous new process technologies that will stimulate the US economy while promoting energy and environmental sustainability.

Modular processes offer flexibility in dealing with variability in both the supply rate and quality of feedstock, as well as facilitating on-stream maintenance, regeneration, and replacement of component modules.

Distributed Chemical Manufacturing (DCheM)

- DCheM-inspired research will merge expertise on chemical and physical phenomena at the molecular and process scales with models at multiple scales (from quantum mechanical and atomistic to process and enterprise levels), advanced process control/optimization methods, and data science algorithms to develop novel processes that are compact, efficient and environmentally friendly.
- DCheM applications will employ process intensification principles to carry out chemical and physical transformations of matter in compact/modular units.

DCheM Research Opportunities

- EFRI-DCheM projects should adopt a convergent research approach that engages engineers and scientists with complementary expertise to tackle challenging problems relevant to distributed chemical manufacturing, including process intensification and modular design of chemical processes.
- Projects may include fundamental studies of chemical and physical transformations of matter, multi-scale modeling of complex chemical systems, real-time optimization and control algorithms, heterogeneous data fusion methods, nanomanufacturing, environmental risk assessment, and socioeconomic studies.

DChEM Cognizant Program Officers

Triantafillos Mountziaris (TOPIC COORDINATOR)	**ENG/CBET**	**tmountzi@nsf.gov**
Carole J. Read	ENG/CBET	cread@nsf.gov
Robert McCabe	ENG/CBET	rmccabe@nsf.gov
William Olbricht	ENG/CBET	wolbrich@nsf.gov
Karl J. Rockne	ENG/CBET	krockne@nsf.gov
Khershed P. Cooper	ENG/CMMI	khcooper@nsf.gov
Brigid A. Mullany	ENG/CMMI	bmullany@nsf.gov

U.S. Department of Energy:

Melissa Klembara	Advanced Manufacturing Office	Melissa.klembara@ee.doe.gov

DChEM Research Thrust 1

Fundamental Chemical and Physical Transformations of Matter

Research on chemical and physical processes at the molecular scale, including reaction kinetics and transport phenomena, development of new materials, such as catalysts, mass separation agents and electrochemical materials, and/or integration of alternative activation methods for chemical reactions (e.g., low-temperature plasmas, microwaves, or electrical energy).

DChEM Research Thrust 2

Process Integration and Advanced Manufacturing

Development and integration of multifunctional process units (e.g., membrane reactors, reactive distillation and extraction units, modular organic electrosynthesis units, fluidized-bed and multiphase reactors, etc.), advanced spatial and temporal process intensification strategies, and/or microfluidic and microchemical systems.

Studies that evaluate the benefits of integration on process performance (e.g., efficiency, selectivity, environmental sustainability, and process economics), scale up or scale down of process units, optimization of reactor geometries and the manufacturability of novel designs and components, including the application of advanced manufacturing techniques, are relevant to this thrust.

DChEM Research Thrust 3

Process Modeling, Optimization and Control

Development of real-time learning and decision-making algorithms, real-time optimization and control methods, predictive multi-scale process models, reduced order models, resilient (semi)autonomous and/or reconfigurable process systems, new sensors and/or sensor networks, machine learning tools, and advanced data analytics.

Examples of DCheM Applications

- Natural Gas to Liquid Technologies
- Valorization of Waste Biomass and Recycled Plastics
- Modular organic electrosynthesis
- Distributed Ammonia Synthesis
- Carbon Dioxide Capture and Conversion
- Water Purification and Desalination
- Hydrogen Production from Renewable Energy Resources
- Distributed Power Generation and Storage in Chemicals
- On-Demand Production of Specialty Chemicals and Pharmaceuticals

DCheM: Education, Workforce Development, and Responsible Innovation

DChEM projects will serve as ideal platforms for pursuing innovative educational and workforce development programs, such as curriculum development and outreach activities that increase awareness and broaden participation of underrepresented minorities in STEM careers.

DCheM research projects will create socially responsible innovations for solving complex problems with positive societal and environmental impact.

DCheM projects are expected to yield economic benefits, reduce financial risks, and increase energy and environmental sustainability.

DCheM Requirements

- Interdisciplinary team
- At least one engineering investigator
- Engaging social scientists in the interdisciplinary research team is encouraged. Collaboration with ethicists, social scientists, and economists is encouraged, as appropriate.
- Research plan is encouraged to address at least two of the three thrusts
- PIs are expected to identify the ethical, social, economic, health, legal, safety, and environmental considerations of their proposed research, and discuss how challenges resulting from these will be addressed

TOPIC 2: Engineering the Elimination of End-of-Life Plastics (E3P)

Goal: Establish requisite knowledge and methods to enable technologies that depolymerize and recapture value from end-of-life plastic materials

Chemical and/or biological depolymerization and valorization

Novel methods and processes associated with plastic manufacturing and recycling frameworks

TOPIC 2: Engineering the Elimination of End-of-Life Plastics (E3P)

To achieve effective management of end-of-life plastic waste...

Robust physical systems and materials for plastic lifecycle management, including sensors for detection and characterization of composition and reaction dynamics, and mass separating agents for capture of plastic materials and plastic-derived molecules;

Development of novel catalysts and reaction engineering, either chemical or biological, enabling complete depolymerization and/or valorization of plastic waste; and

Systems-level integration of new plastic remediation and valorization technologies into manufacturing infrastructures, including improving efficiency and economic viability of existing recycling, remediation, and valorization technologies.

E3P Team Members

Christina Payne	**(TOPIC COORDINATOR)**	**ENG/CBET**
Bruce Hamilton		ENG/CBET
William Olbricht		ENG/CBET
Steven Peretti		ENG/CBET
Khershed Cooper		ENG/CMMI
David Rockliffe		BIO/MCB
Suk-Wah Tam-Chang		MPS/CHE

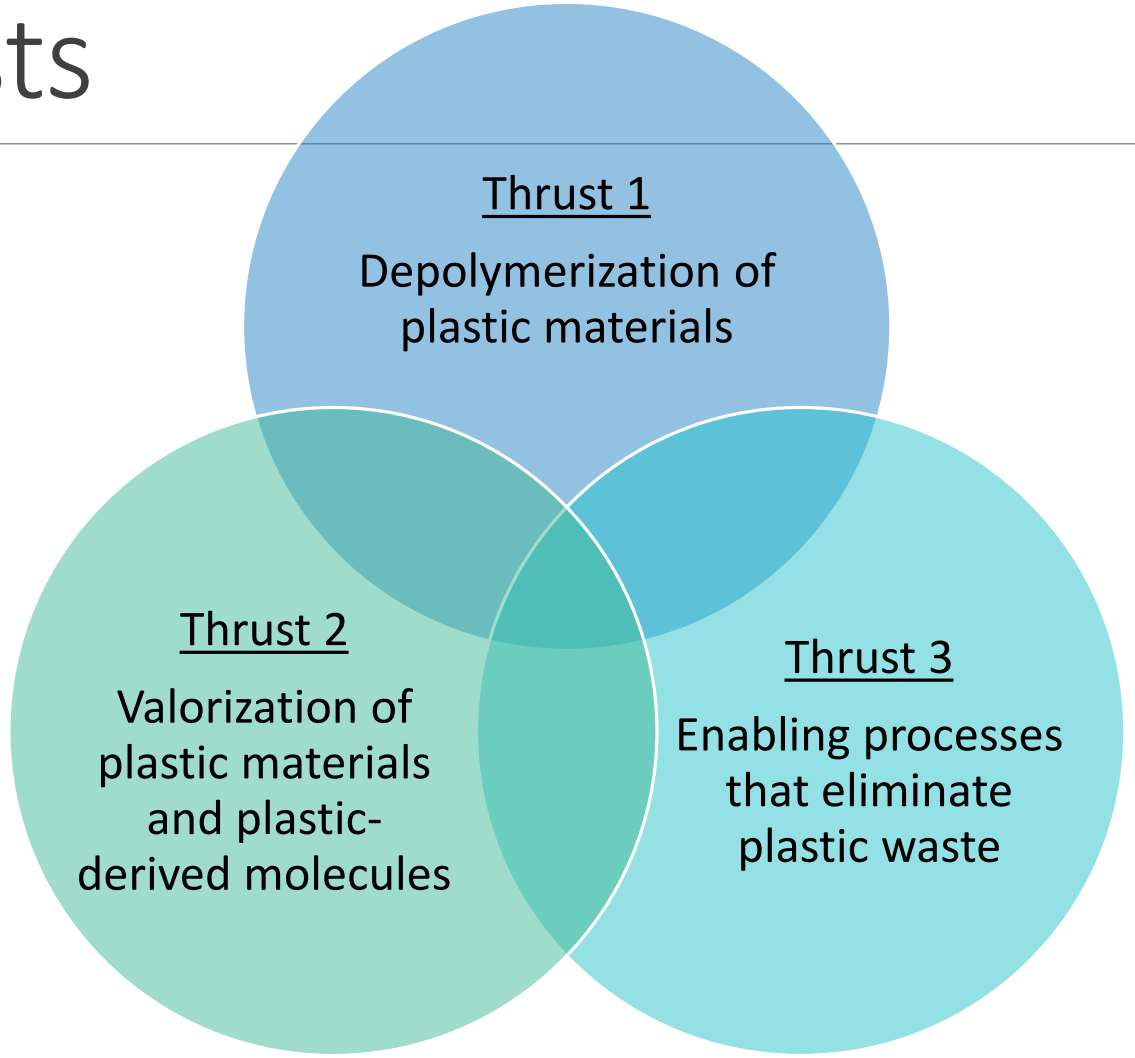
US Department of Energy

Melissa Klembara, Advanced Manufacturing Office; Nichole Fitzgerald, Bioenergy Technologies Office

NIST

Kathryn L. Beers

E3P:
Research Thrusts



Thrust 1: Depolymerization of plastic materials

Goal: Engender transformative approaches capable of depolymerizing plastics into molecular components for future use or environmentally benign disposal

- Simultaneous targeting of several polymer types is encouraged

Chemical depolymerization

- Robust catalysts capable of selective bond activation/functionalization or improved reaction rates
- Chemical reaction engineering, including reactor designs for processing polymers and deploying heterogeneous catalysts
- Understanding of complex reaction networks and mechanisms, macromolecular thermodynamics, and transport properties

Biological depolymerization

- Tailored microbial system design
- Protein engineering

Thrust 2: Valorization of plastic materials and plastic-derived molecules

Goal: Develop pathways and systems for plastics and depolymerization products to re-enter the value chain, incentivizing collection and recycling of plastic waste

- Formulation of new chemical, biological, and/or physical valorization processes and understanding of the attendant mechanisms
- Closely coupled with depolymerization processes, high-value fuels and chemical products, easily separable intermediates
- Theories, models, and tools for design and prediction of new routes to polymeric products and monomers
- Reaction design for polymer-to-polymer synthesis
- Combining modeling and experiments to understand and control molecular processes
- Reactive polymer processing methods, advanced manufacturing systems, and systems-level integration

Thrust 3: Enabling processes that eliminate plastic waste

Goal: Promote development of innovative materials, methods, tools, and physical systems that complement processes for the elimination of end-of-life materials and valorization of polymeric products

Separation of plastics and plastic-derived molecules from chemical process streams and water sources

- Mass separating agents for selective removal of products/monomers
- Low-energy solvent- or electrochemical-based separations
- Membranes for separation of micro- and nano-plastics from water and process effluent

Real-time detection of chemical properties and reaction dynamics, broadly defined

- High-throughput analytical techniques for characterization of municipal mixed waste streams
- Real-time, in situ reaction monitoring and control

E3P Requirements

- Interdisciplinary team
- At least one engineering investigator
- Inclusion of a physical or biological scientist is strongly encouraged
- Research plan must address at least two of the three thrusts
- PIs must consider the ethical, social, economic, health, legal, and environmental implications of their proposed research, and discuss these as appropriate
- Substantial collaborations with ethicists, environmental scientists, behavioral scientists, and/or economists are encouraged, if applicable.

Solicitation Requirements

Award Size and Information

Team Proposals Only:

- 3-5 PIs/co-PIs

Award size will depend on the type of research program proposed

Up to 4 years in duration

Up to $2M over grant lifetime (including both direct and indirect costs)

Up to $30M in FY 2020 for entire competition, subject to availability of funds

Eligibility: PIs & co-PIs

PI Limit:

- Principal Investigators (PI) must be full-time tenured or tenure-track faculty as determined by the submitting organization; or meet requirements described in the solicitation if the proposal is submitted by a non-profit, non-academic organization.
- A minimum of one PI and two co-PIs must participate.
- Maximum number of PI plus co-PIs: 5
- At least one PI or co-PI must be full-time faculty in a College or Department of Engineering

Limit on Number of Proposals per Organization: None Specified.

Limit on Number of Proposals per individual (PI or co-PI): One per topic

The PI and co-PIs may participate in only one proposal submitted to each topic described in the solicitation. It is the responsibility of the submitting institution to ensure that the PI and all co-PIs are participating in only one proposal per topic (as PI or co-PI) submitted to this solicitation.

Eligibility: Organizations

Organization Limit:

- EFRI proposals may be submitted by a single organization or by a group of organizations consisting of a lead organization in partnership with one or more partner organizations.
- Proposals may be submitted by:
  - Institutions of Higher Education: 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.
  - Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.
- Only U.S. organizations are eligible to be the lead organization.
- For interaction with industry, when appropriate for the proposed research, the GOALI mechanism (Grant Opportunities for Academic Liaison with Industry) may be used. https://www.nsf.gov/pubs/policydocs/pappg19_1/pappg_2.jsp#IIE4

No Collaborative Proposals

For each proposed project, a single proposal should be submitted by the lead institution with subawards to partners institutions

No "Collaborative Proposals" are permitted

- *The proposal will include a budget for each of the four years proposed. FastLane will automatically provide a cumulative budget.*

- *Preliminary proposals should not include separate subaward budgets; however the budget justification should include planned levels for subawards to any partner organization(s). Enter the anticipated total level of subaward support on line G5, Subawards*

Broadening Participation Plan

ENG promotes diversity in all aspects of its programs.

As part of the EFRI 2020 Solicitation, EFRI requires all projects to include a Broadening Participation Plan.

The goal is to increase the participation of underrepresented groups in the field of engineering and in engineering research.

Promoting diversity in the human resources engaged in the EFRI projects should concomitantly expand diversity of thought, ideas, and approaches to defining and solving important research questions.

Broadening Participation Activities: Examples

- Inclusion of persons from underrepresented groups as PI, Co-PI, and/or other senior personnel, as appropriate for the project
- Inclusion of persons from underrepresented groups as graduate students, undergraduate students, and post-doctoral researchers
- Plans to apply for post-award supplements to engage undergraduate researchers and teachers, using REU & RET supplements; or to apply for REM supplements to diversify EFRI research teams
- Engagement of faculty and/or student researchers at minority serving institutions, community colleges, or high schools in the research project
- Enhancement of/collaboration with existing diversity programs at your home institution and/or nearby institutions
- Senior Personnel serving as role models and mentors for an underrepresented student population
- Providing tutoring opportunities for underrepresented middle school, high school, and undergraduate students
- Outreach activities that will interest and attract underrepresented K-12 students to engineering undergraduate programs

A Letter of Intent (LOI) Is Required
Due Date: November 4th, 2019

A Letter of Intent is REQUIRED

One Page

1. **TITLE** - Title of the EFRI proposal preceded by the words “EFRI DCheM:” or “EFRI E3P:” as appropriate
2. **TEAM** - Names, departmental and organizational affiliation, and expertise of the PI and at least two co-PIs
3. **SYNOPSIS** (**GOALS**) - Brief description of the specific goals of the proposal (maximum 250 words)

Additional Requirement (only for LOI):

- Sponsored Projects Office (SPO) Submission is **not** required
- A Minimum of 2 and Max. of 4 Other Senior Project Personnel (co-PIs)
- A Minimum of 0 and Max. of 3 Other Participating Organizations

LOIs are not merit reviewed and no feedback is provided to the submitters

A Letter of Intent is REQUIRED

Submission of multiple LOIs is NOT permitted

Preliminary Proposals Are Required
Due Date: December 2nd, 2019

Must be submitted through FastLane and meet formatting requirements in NSF Proposal & Award Policies and Procedures Guide (PAPPG) https://www.nsf.gov/pubs/policydocs/pappg19_1/index.jsp

Project Summary (one page limit)

Preliminary proposals that do not separately address both intellectual merit and broader impacts in the Project Summary will be returned without review

Project Description (five page limit) includes:

1. Vision and Goals (~1 page)
2. Approach and Methodology (~3 pages)
3. Transformative Impact (~1 page). Describe the transformative aspects of the project including how the synergy of experts from different disciplines will achieve a significant advancement of fundamental engineering knowledge and will have strong potential for long term impact on a national need or grand challenge. **Include a succinct statement of your preliminary Broadening Participation Plan.**

References Cited; Biographical sketches; Budget; Current/Pending Support

Additional Documentation: List of key personnel; Collaborators & Other Affiliations Information

Email Additional Information to NSF
Immediately After Submission of Pre-proposal

Submit via email to efri2020@nsf.gov

A single PowerPoint slide summarizing the vision of the EFRI proposal. This will be used during review panel discussions of the Preliminary Proposals.

Do not use Fastlane to submit this document

Full Proposals Will Be Invited By Late Jan. 2020
Submission Due Date: March 26th, 2020

Follow NSF Proposal & Award Policies & Procedures Guide or Grants.gov Application Guide

Project Summary (one page limit)

- Proposals that do not separately address both intellectual merit and broader impacts in Project Summary will be returned without review

Project Description (15 page limit)

- Must include under Broader Impacts: Key Anticipated Outcomes; Broadening Participation Plan

Additional Sections include:

- References Cited; Biographical sketches; Budget; Current and Pending Support; Facilities, Equipment, & Other Resources

Proposal budget must include funds for travel by PI and one graduate student or researcher to attend an annual EFRI grantees' meeting. Awardees will be required to attend and present their research annually at an EFRI grantees' conference for the duration of the award.

Full Proposal: Additional Documentation
Submit Via FastLane

Supplementary Documentation:

List of Key Personnel: Provide a succinct description of what each person uniquely brings to the project and how their expertise will be integrated to foster synergy (3 pages max)

Detailed **management plan** (3 pages max)

Mechanisms for sharing the outcomes of the research with the scientific community (2 pages max)

Post-doctoral researcher mentoring plan, if requesting support for post-doc(s)

Broadening Participation Plan – additional information up to 5 pages

Data management plan (2 pages, plus additional document if needed)

Single Copy Documents: **Collaborators & Other Affiliations**

NSF requires the use of a specific spreadsheet template for identifying COA information. More information on this and a link to the required NSF COA spreadsheet template can be found in the PAPPG - https://www.nsf.gov/pubs/policydocs/pappg19_1/pappg_2.jsp - IIC1e

This document must be submitted for each PI, co-PI, and every other senior project personnel member.

Review & Award Process

Required Letters of Intent due on **November 4, 2019**

Preliminary Proposals due on **December 2, 2019**

Based on the reviews, a limited number will be invited **by late January 2020** to submit full proposals.

Invited Full Proposals are due on **March 26, 2020**

Invited Full Proposals will be reviewed in **Spring/Summer 2020**

Awards are expected to be made **by September 2020**, subject to availability of funds

Review Criteria

NSB-approved Merit Review Criteria

- Intellectual Merit
- Broader Impacts

NSF Program Staff will also give careful consideration to the following:

- Integration of Research and Education
- Integrating Diversity into NSF Programs, Projects and Activities

Review Criteria:
EFRI Solicitation-Specific

TRANSFORMATIVE - Does the proposed research represent an opportunity for a significant leap or paradigm shift in fundamental engineering knowledge?

NATIONAL NEED/GRAND CHALLENGE - Is there potential for making significant progress on a current national need or grand challenge?

Is the proposal responsive to **Specific Programmatic Considerations** for each topic?

Broadening Participation Plan - Does the plan actively promote, increase, and enhance the participation of underrepresented groups in the field of engineering and in engineering research?

Effectiveness of the proposed **Management Plan.**

EFRI-2020 (NSF 19-599)
Important Solicitation Dates

Sept 18th, 2019	Informational Webinar
Nov 4th, 2019	Letter of Intent Due (required)
Dec 2nd, 2019	Preliminary Proposal Due (required)
Mar 26th, 2020	Full Proposal Deadline (by invitation only)

Frequently Asked Questions: Participation Limit

Question:

Can an investigator be PI on one proposal and co-PI on another proposal?

Answer:

Each investigator may participate as either PI or co-PI on only a single proposal submitted to each topic.

Frequently Asked Questions:
Co-PI Limit

Question:

How many co-PIs can be included on a single proposal?

Answer:

Each proposal *must* have a minimum of 2 co-PIs and a maximum of 4 co-PIs

Frequently Asked Questions: Engineer PI/co-PI

Question:

Is it required to have a PI/co-PI from Engineering?

Answer:

The Lead PI or one of the project co-PIs *must* be full-time tenured or tenure-track faculty within a College or Department of Engineering

Frequently Asked Questions: Industry co-PI

Question:

Can a person from industry serve as a co-PI?

Answer:

For interaction with industry, when appropriate for the proposed research, the GOALI mechanism (Grant Opportunities for Academic Liaison with Industry) may be used. See PAPPG Chapter II.E.4. https://www.nsf.gov/pubs/policydocs/pappg19_1/pappg_2.jsp#IIE4

Frequently Asked Questions:
Co-PI from a National Lab

Question:

Can a person from a National Lab serve as a co-PI?

Answer:

NSF does not normally support research or education activities by scientists, engineers or educators employed by Federal agencies or Federally Funded Research and Development Centers.

Frequently Asked Questions:
Co-PI from a non-US institution

Question:

Can a person from a non-US institution serve as a co-PI?

Answer:

The NSF Proposal & Award Policies and Procedures Guide (PAPPG) NSF19-1, Chapter I.E.6 states:

Foreign Organizations *– NSF rarely provides direct funding support to foreign organizations. NSF will consider proposals for cooperative projects involving U.S. and foreign organizations, provided support is requested only for the U.S. portion of the collaborative effort.*

Frequently Asked Questions: Consultants

Question:

Can professional engineers be consultants on an EFRI proposal ?

Answer:

Yes.

Frequently Asked Questions: Participating Institutions

Question:

How many participating institutions are allowed on an EFRI proposal?

Answer:

There is no limit to the number of participating institutions allowed on an EFRI proposal.

(Limits are imposed in the Letter of Intent purely for administrative purposes so that key individuals and organizations can be identified early on)

Frequently Asked Questions: Participating Institutions

Question:

Is there a limit on the number of EFRI proposals that may be submitted by a single organization?

Answer:

There is no limit to the number of EFRI proposals that may be submitted by a single organization.

However, the EFMA Office will not normally award more than one proposal from any one lead institution in the annual EFRI competition.

Frequently Asked Questions: LOI Format

Question:

Do you have any formatting requirements for the Letter of Intent (font, size, margins, etc)?

Answer:

Fastlane templates will walk you through submitting the Letter of Intent and automatically format the LOI.

Please prepare your text in a word-processing (or similar) program on your computer and cut and paste the required information into Fastlane.

REM: Research Experience & Mentoring Supplements for Active EFRI Awards

The goal is to provide research experiences and mentoring opportunities to STEM students and/or educators that may ultimately enhance their career and academic trajectories while enhancing EFRI-supported research.

REM supplement requests may be submitted by EFRI grantees with an active award (in response to annual DCL)

(REM supplements are also now available for Engineering Research Center (ERC) awards)

REM participants are invited to present their findings at the annual Emerging Researchers National (ERN) Conference in STEM.

Acronyms and Terminology

BIO	Directorate for Biological Sciences	**CBET**	Division of Chemical, Bioengineering, Environmental & Transport Systems
CHE	Division of Chemistry	**CMMI**	Civil, Mechanical & Manufacturing Innovation
COA	Collaborators and Other Affiliations	**Co-PI**	Co-Principal Investigator
DMR	Division of Materials Research	**DOE**	Department of Energy
ECCS	Division of Electrical, Communications and Cyber Systems	**EEC**	Division of Engineering Education and Centers
EFRI	Emerging Frontiers in Research and Innovation	**EFMA**	Office of Emerging Frontiers and Multidisciplinary Activities
ENG	Directorate for Engineering	**IIP**	Division of Industrial Innovation and Partnerships
MCB	Division of Molecular and Cellular Biosciences	**MPS**	Directorate for Mathematical and Physical Sciences
NIST	National Institute of Standards and Technology	**NSB**	National Science Board
NSF	National Science Foundation	**PAPPG**	Proposal & Award Policies & Procedures Guide
PHY	Division of Physics	**PI**	Principal Investigator
SBE	Directorate for Social, Behavioral and Economic Sciences	**SES**	Division of Social and Economic Sciences

Key Resources

Please refer to the EFMA website for up-to-date information:

http://www.nsf.gov/eng/efma

You may submit questions by E-mail:

efri2020@nsf.gov