

Engineering Research Initiation (ERI): Special Topics

NSF 22-595 & NSF 23-119

Webinar

Deadline: September 15, 2023



Agenda + Housekeeping

- Welcome + Introductions
- Presentation about NSF 23-119, **Dear Colleague Letter: DOE Water Power Technologies Office and NSF Engineering Research Initiation Special Emphasis Areas**
- Q&A session

-
- Type your questions in the Q&A anytime
 - Upvote your favorites.
 - *We will answer questions about this DCL first, then address general ERI questions if time permits.*
 - **Will the slides be available?**
 - **Will a recording of this be available?**
 - Yes, we will post both to the ERI website when available.



Introductions – ERI Team

- The ERI Team includes representatives from the ENG Divisions participating in ERI.



CMMI

Laurel Kuxhaus, PhD
Kathryn Jablokow, PhD



CBET

Carole Read, PhD
Shahab Shojaei-Zadeh, PhD



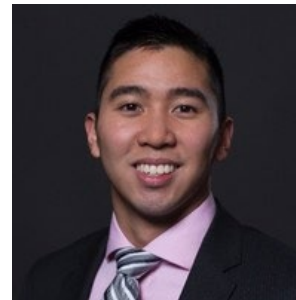
ECCS

Rosa (Ale') Lukaszew, PhD
Richard Nash, PhD



EEC

Dana Denick, PhD



With additional support by
Jonathan Kulwatno, AAAS STPF



Introductions – WPTO Team



Rukmani Vijayaraghavan, PhD



Charles Scaife, PhD



Ashley Brooks

ERI Goals

- The main goal of the ERI program is to ***broaden the base*** of scientists and engineers in academia who dedicate their careers to advancing engineering research and education in societally important fields relevant to ENG.
 - Synergistic with NSB Vision 2030
- This solicitation provides ***support for investigators who have yet to receive research funding from Federal Agencies*** to initiate their engineering research.
- NSF encourages submission by new investigators in engineering fields from ***non-PhD awarding institutions, including community colleges***.
 - ERI is limited to investigators that are not affiliated with “very high research activity” R1 institutions
- NSF strongly ***encourages participation*** in this ERI program by PIs from all underrepresented groups in engineering.



The ERI competition is different.

**Proposal Deadline:
September 15, 2023**

- Eligibility criteria
 - PIs must be at a non-R1 institution
 - No prior federal research funding (see solicitation for details)
- Project Description: 10 pages (compare to Unsolicited: 15 pages)
- Chair/Dean's letter: required
- Project Duration: 2 years
- Project Personnel
 - Senior Personnel are allowed.
 - One proposal per person per competition, as either PI or Senior Personnel.



NSF 23-119: Dear Colleague Letter: DOE Water Power Technologies Office and NSF Engineering Research Initiation Special Emphasis Areas

- Announces additional funding for areas of special interest to DOE WPTO
- All awards are NSF awards, some may be supported with these additional funds.

Increases the total number of ERI awards that can be made!



Research Priorities in DOE's Water Power Technologies Office (WPTO)

WPTO enables research, development, and testing of emerging technologies to advance **marine energy** and next-generation **hydropower** and **pumped storage** systems for a flexible, reliable grid.

Hydropower Program

FY2023: \$59M



Modernizing the Existing Fleet



Pumped Storage Hydropower



New Low-Impact Projects

Marine Energy Program

FY2023: \$120M



Wave



Tidal, River and Ocean Current



Ocean Thermal



DOE WPTO Marine Energy Program Vision and Mission

VISION: A U.S. marine energy industry that expands and diversifies the nation's energy portfolio by responsibly delivering power from ocean and river resources.

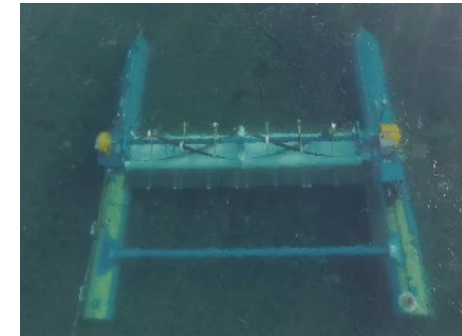
MISSION: Conduct research, development, demonstration, and commercial activities that advances reliable, cost-competitive marine energy technologies and reduces barriers to technology deployment.



Waves



Tides



Ocean and River Currents



Ocean Thermal Energy Conversion



Salinity/Pressure Gradients



What is Marine Energy?

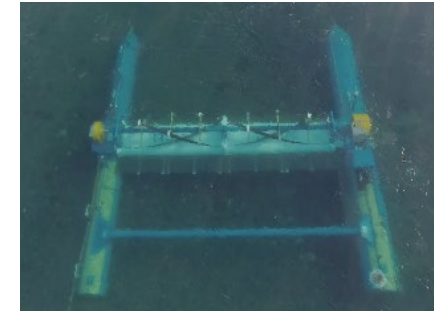
Marine energy, also known as marine and hydrokinetic energy or marine renewable energy, is a renewable power source that can be harnessed from the natural movement of water, including **waves, tides, and river and ocean currents**. Marine energy can also be harnessed from temperature differences in water through a process known as **ocean thermal energy conversion**.



Wave energy devices extract energy from waves passing through the ocean from offshore, near shore, and shore-based locations.



Tidal energy devices extract energy from the ebb and flow of tides.



River current (or instream hydrokinetic) devices extract energy from the flow of river water, while **ocean current** devices extract energy from undersea ocean currents (like the Gulf Stream).



Ocean thermal energy conversion systems harness energy from temperature differences in water.



It is also possible to harness energy from differentials in **salinity and pressure gradients**.





WPTO MARINE ENERGY

Conduct research, development, demonstration, and commercial activities that advances reliable, cost-competitive marine energy technologies and reduces barriers to technology deployment.

POWER DERIVED FROM
Waves, Tides, Ocean Current, River Current, Thermal Gradients, Salinity Gradients, Pressure Gradients

MULTIPLE MARKETS & APPLICATIONS





OCEAN OBSERVATION

- Increased uptime for better measurement continuity and longer data sets
- Decreased field service visits
- Increased observation capabilities and data accessibility
- Greater area coverage



AQUACULTURE

- Power for lighting, feeding, monitoring, and transporting



MARINE CARBON DIOXIDE REMOVAL (mCDR)

- Renewable energy for mCDR approaches
- Persistent energy for monitoring, reporting, and verification

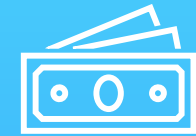


DESALINATION

- Provide water in disaster recovery scenarios and remote coastal locations
- Potential faster recovery and minimal environmental impact



BENEFITS UNLOCKED



1) Marine Energy and Powering the Blue Economy

- Marine energy has significant potential to power various markets and applications in the blue economy , for example:
 - Powering micro-grids in remote coastal communities, including those currently dependent on fossil fuels;
 - Ocean-based scientific and commercial missions currently limited by incumbent energy sources;
 - Integrate with ocean and coastal-based applications like desalination and aquaculture where marine energy can uniquely improve the resilience and economic sustainability of local communities.
- Proposals in this research area should involve new and innovative ideas that address these opportunity areas.
- Ideas may involve:
 - Addressing technology challenges,
 - Engaging end users in industry as well as the communities these technologies may be deployed in,
 - Discovering and developing new use cases for marine energy integration.
- Proposals may incorporate research frameworks to help understand and mitigate socioeconomic risks of marine energy development.
- See <https://www.energy.gov/eere/water/powering-blue-economy> and <https://www.energy.gov/eere/water> for more



DOE WPTO Hydropower Program Vision and Mission

Vision: A U.S. hydropower and pumped storage industry that modernizes and safely maintains **existing assets**; responsibly develops **new low-impact hydropower**; promotes **environmental sustainability**; and supports **grid reliability, integration of other energy resources, and energy-water systems resilience**.



Mission: Conduct research, development, demonstration, and commercial activities to advance **transformative, cost-effective, reliable, and environmentally sustainable hydropower and pumped storage technologies**; better understand and capitalize on opportunities for these technologies to **support the nation's rapidly evolving grid**; and improve **energy-water infrastructure and security**.



The program supports research, development, demonstration, and deployment to enable:



Upgrades for Existing
Hydropower

New Low-Impact
Projects

Non-Powered Dams
and Conduits

Pumped Storage
Hydropower

2) Hydropower and Climate Change Impacts

- Hydropower is an important part of the Nation's energy portfolio and currently provides about 7% of U.S. electricity generation each year, but climate change is impacting the future of hydro-power and the services it provides, including:
 - Balancing intermittent renewables like wind and solar on the grid, including through pumped storage hydro-power,
 - providing black start capabilities after extreme events like hurricanes and fire, and
 - serving as flood protection and water supply for irrigation, consumption, and recreation.
- Addressing the impact of climate change on water availability and hydroelectric generation requires researching fundamental questions in climatology and hydrology, impacts on ecosystems, and risks and opportunities for hydro-power operation and planning at basin scales or larger.
- Proposals in this research area should seek to advance climate, hydrologic, water resource, or power systems monitoring or modeling as it relates to climate change impacts at watershed or energy-shed scales.
- More details on the program are at <https://www.energy.gov/eere/water/hydropower-program>



What do I need to do if I think my proposal is aligned with one of these areas?

- Reach out to the cognizant program director of the NSF program that is most closely-aligned with your work.
 - All ERI proposals must be aligned with an NSF program!

- A proposer to the NSF ERI program solicitation does not need to take any additional steps to be considered for co-funding through this partnership.
- All ERI proposals in these topical areas will be considered for this funding, with the exception of proposals that have a DOE staff member as an unfunded partner.
 - Such collaborations could be considered for funding with NSF funds, but not with WPTO funds.



Program Fit

- Your proposal will be reviewed within the program that you choose upon submission.
 - *Caveat: if the NSF Program Director determines that the topic does not fit with the program, it may be transferred to another program for review, or returned without review.*

ENG Unit of Consideration: Research.gov users: Secondary units of consideration may be selected after the proposal is created by clicking on "Manage Where to Apply" in the proposal details section . Grants.gov users should refer to Section VI.1.2. of the NSF Grants.gov Application Guide for specific instructions on how to designate the NSF Unit of Consideration. For assistance in determining which program(s) to choose, refer to the list of ERI-eligible ENG Programs below:

CBET

- Catalysis
- Electrochemical Systems
- Interfacial Engineering
- Process Systems, Reaction Engineering, and Molecular Thermodynamics
- Biophotonics
- Biosensing
- Cellular and Biochemical Engineering
- Disability and Rehabilitation Engineering
- Engineering of Biomedical Systems
- Environmental Engineering
- Environmental Sustainability
- Nanoscale Interactions
- Combustion and Fire Systems
- Fluid Dynamics
- Particulate and Multiphase Processes
- Thermal Transport Processes

CMMI

- Advanced Manufacturing (AM)
- Biomechanics and Mechanobiology (BMMB)
- Civil Infrastructure Systems (CIS)
- Dynamics, Control and Systems Diagnostics (DCSD)
- Engineering for Civil Infrastructure (ECI)
- Engineering Design and System Engineering (EDSE)
- Foundational Research in Robotics (Robotics)
- Humans, Disasters, and the Built Environment (HDBE)
- Mechanics of Materials and Structures (MOMS)
- Mind, Machine and Motor Nexus (M3X)
- Operations Engineering (OE)

ECCS

- Electronics, Photonics and Magnetic Devices (EPMD)
- Communications, Circuits, and Sensing-Systems (CCSS)
- Energy, Power, Control, and Networks (EPCN)

Pro tip:

- Ensure that you are submitting to the right program for your research by contacting the cognizant program director well in advance!



What if my proposal is NOT aligned with one of these areas?

- All ERI proposals relevant to programs that accept ERI proposals will be given full consideration.

ENG Unit of Consideration: Research.gov users: Secondary units of consideration may be selected after the proposal is created by clicking on "Manage Where to Apply" in the proposal details section. Grants.gov users should refer to Section VI.1.2. of the NSF Grants.gov Application Guide for specific instructions on how to designate the NSF Unit of Consideration. For assistance in determining which program(s) to choose, refer to the list of ERI-eligible ENG Programs below:

CBET

- Catalysis
- Electrochemical Systems
- Interfacial Engineering
- Process Systems, Reaction Engineering, and Molecular Thermodynamics
- Biophotonics
- Biosensing
- Cellular and Biochemical Engineering
- Disability and Rehabilitation Engineering
- Engineering of Biomedical Systems
- Environmental Engineering
- Environmental Sustainability
- Nanoscale Interactions
- Combustion and Fire Systems
- Fluid Dynamics
- Particulate and Multiphase Processes
- Thermal Transport Processes

CMMI

- Advanced Manufacturing (AM)
- Biomechanics and Mechanobiology (BMMB)
- Civil Infrastructure Systems (CIS)
- Dynamics, Control and Systems Diagnostics (DCSD)
- Engineering for Civil Infrastructure (ECI)
- Engineering Design and System Engineering (EDSE)
- Foundational Research in Robotics (Robotics)
- Humans, Disasters, and the Built Environment (HDBE)
- Mechanics of Materials and Structures (MOMS)
- Mind, Machine and Motor Nexus (M3X)
- Operations Engineering (OE)

ECCS

- Electronics, Photonics and Magnetic Devices (EPMO)
- Communications, Circuits, and Sensing-Systems (CCSS)
- Energy, Power, Control, and Networks (EPCN)

NSF 23-119 Increases
the total number of ERI
awards that can be
made!



Review Criteria

There is no change in review criteria by NSF 23-119.

1. Intellectual Merit
2. Broader Impact
3. Additional Solicitation Specific Review Criteria:
 - To what extent will the project provide the foundation for sustained scholarly contribution to engineering research?
 - To what extent will the proposed engineering research initiation activities enhance the PI's ability to maintain impactful research activities?



When to contact eri@nsf.gov?

- General ERI questions.
 - Note that we are unable to assist with Research.gov questions – there is a separate Helpdesk for that.
- Good to know:
 - eri@nsf.gov is a shared mailbox.
 - You can expect a reply within about one week.

Upcoming ERI Webinars:

- Tuesday, July 18, 2pm Eastern
- Wednesday, August 23rd, 2pm Eastern



Q&A

- Type your questions in the Q&A!
 - Upvote your favorites.
 - *Pro tip: Look to the “answered” tab to see what has already been answered.*
 - *Remember: we will prioritize questions related to NSF 23-119.*
- **Will the slides be available?**
- **Will a recording of this be available?**
 - Yes, we will post both to the ERI website when available.





Eligibility (1/2)

Institutional eligibility:

- Institution **not** currently classified as a Doctoral University with “Very High Research Activity” according to the 2021 Carnegie Classification

PI appointment:

- PI must hold an appointment at the institution.
 - Post-docs may not serve as PIs for ERI proposals.

Limits:


- One proposal per person, per deadline.
 - As either PI or Senior Personnel.
 - (Co-PIs are not allowed.)
- No Collaborative Proposals
 - As defined in the PAPPG, Chapter II.D.3.b
- Subawards permitted *only to non-R1 institutions.*



Eligibility (2/2) – PI may not have had prior federal research funding.

At the time of the proposal submission deadline, the PI may not have been a PI, Co-PI or equivalent on any current or prior *awarded* NSF research grant (including subaward) or have had research support from any other Federal Agency (within the United States or abroad), with the following exceptions:

- Conference or travel awards;
- Doctoral dissertation improvement grants and any other award made while the PI was a student, including NSF Graduate Research Fellowships;
- Postdoctoral research fellowship awards that exclusively support pre-tenure-track activities;
- Major Research Instrumentation grants (NSF MRI or equivalent) as PI or Co-PI,
- REU or RET site awards;
- I-Corps, Phase I SBIR, or STTR awards;
- Awards that originated as Federal funds but were distributed locally without naming the submitting ERI PI in the Federal funding proposal (such as: NASA Space Grant Project.); and
- Awards that originated as Federal funds but were not for research purposes (this must be described in the Chair's letter.)



Note: these eligibility restrictions apply to the PI, NOT to Senior Personnel!

In essence: if you've had prior federal RESEARCH support beyond a post-doc, you are NOT eligible for ERI.

ERI History

- ERI ran for the first time in 2021.
 - Solicitation: NSF 21-574
 - 93 awards made.
- Current solicitation: NSF 22-595.
 - Next deadline: September 15, 2023
 - Previous Deadline: October 11, 2022
 - Review is ongoing.

Good to know:

- Senior Personnel Allowed
 - Catalyze partnership
- Equipment costs may be included to support research.
- Must submit to a specific participating ENG program.



More details about ERI proposals

There are required section headings within the Project Description for ERI proposals.



Project Description (1/4)

Required section: **Research goals**

- A brief description of the PI's overall research goals.

Pro tips:

- These section headings are required. Use them exactly.



Project Description (2/4)

Required section: **Research Project**

- clear description of the general plan of work
- motivation for the research and a discussion of the novelty of the work in the context of existing literature.
- mechanisms and plans for assessing success of the proposed activities. The proposed single-PI activities may include activities to catalyze partnerships.
- *If a partner (e.g., Senior Personnel) is included:*
 - Partnership activities may enable access to instrumentation or resources, activities that establish a working relationship such as formulating new and sound plans for larger-scale projects in emerging research areas, travel for the PI or trainees to strengthen the partnership, or other activities.
- *Note that Subawards to R1 institutions are not permitted.*



Project Description (3/4)

Required section: **Broader Impacts**

- A discussion of the *broader impacts* of the proposed activities.
- Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, and/or through activities that are supported by, but are complementary to the project, such as educational activities.



Project Description (4/4)

Required section: **ERI Criteria**

- ERI Criteria: Provide a brief description of how the proposed work addresses the solicitation-specific review criteria.

ERI Solicitation-specific review criteria:

- To what extent will the project provide the foundation for sustained scholarly contribution to engineering research?
- To what extent will the proposed engineering research initiation activities enhance the PI's ability to maintain impactful research activities?

One criterion is about the work and scholarly contributions;

The other is about the PI's ability to maintain such activities.



Supplementary Documents (1/2)

- **Department Chair/Dean's Letter** (required):
 - describe how the proposed research plan is aligned with the department, school, or institution's goals.
 - describe how the department or organization is committed to the professional development of the PI.
 - certify that the PI meets the ERI eligibility criteria.
 - If the PI has any non-institutional current or past support, the letter should succinctly indicate into which exempted category the support falls (see Eligibility Criteria.)

Letters that do not meet these requirements will cause a proposal to be returned without review.

Something unusual about your eligibility? This is the place for your Chair/Dean to explain it.



Supplementary Documents (2/2)

- Data Management Plan (**required**)
- Post Doctoral Mentoring Plan (**required** *if* Post Doc support is requested)
- Single Copy Document Collaborators and Other Affiliations Information (**required**)
- See PAPPG Chapter II.C.2.j for the full policy on supplementary documents.



How are ERI proposals reviewed?

- All proposals at NSF must be reviewed by at least 3 reviewers.
 - Experts in the broad field of the program that manages the proposal.
- NSF program directors must consider diversity of the panel.
 - Topical expertise within the field.
 - Career stage.
 - Institution type.
 - Geographic diversity.
 - Demographic diversity.

Most NSF proposals are reviewed by a panel. That means that the PI gets:

- Verbatim copies of at least 3 written reviews.
- A panel summary (if the proposal was discussed by the panel.)



Assessing Program Fit

- **Read** the program description.
- **Draft a one-page summary** of your proposal.
 - Pro tip: “This work will advance our understanding of <program name/area> by”
- **Email** the program director.
- **Ask** if your idea fits within the scope of the work supported by the program.
- **Interpret** the results.
 - “Yes this fits!”
 - “This somewhat fits.”
 - “This has a small bit of relevance.”
 - “This does not fit.”

When to do this?

- The sooner, the better.

Good to know:

- Most program directors are able to reply to inquiries within about a week.

