U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

WATER POWER TECHNOLOGIES OFFICE

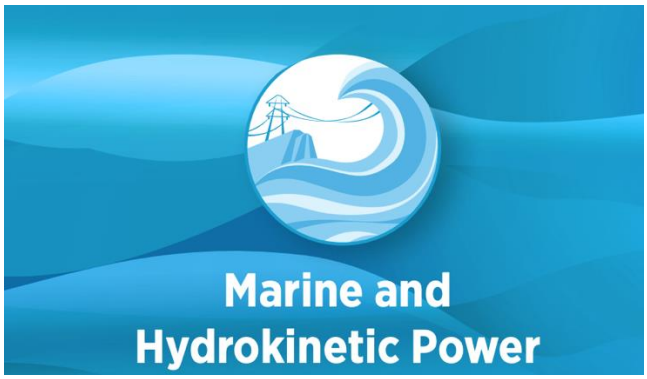
Marine Energy Laboratory Seedling Program

Request for Innovation (RFI)

Fiscal Year 2020

Marine Hydrokinetic (MHK) Program

Water Power Technologies Office (WPTO)



Key Dates	
RFI Issue Date	August 21, 2019
Submission Deadline	September 27, 2019

Summary Information	
Means of Submission	Ideas should be submitted by email to *MHKRFI@ee.doe.gov*.
Purpose	Seeking ideas to pilot a seedling fund from U.S. Department of National Laboratories and inform WPTO MHK Program activities.
Questions	Questions about the submission process may be directed to *MHKRFI@ee.doe.gov*

Section I: Description and Topic Areas

Background

The mission of the WPTO MHK Program is to invest in MHK research and development (R&D) to enable the development of a competitive MHK industry that makes significant contributions to U.S. energy needs and the U.S. economy. DOE efforts aim to generate foundational knowledge that is relevant to the industry, along with supporting early-stage development and testing of innovative components, structures, materials, controls, systems, and approaches to manufacturing. Achieving mission success requires significant R&D efforts to mature technologies, improve performance, and dramatically reduce levelized cost of energy and risks, while simultaneously addressing other barriers that inhibit testing and deployment of devices.

DOE currently plays a unique and central role in supporting the development of new, cutting-edge technologies and the establishment of a strong and competitive MHK industry in the United States. The MHK Program provides substantial financial support to researchers at a wide range of different organizations to focus on solutions to high-priority challenges that are difficult for the nascent MHK industry to rapidly address on its own. A number of different vehicles are utilized, including competitive funding opportunity announcements, prizes, cooperative R&D agreements between National Laboratories and commercial entities, activities led directly by National Laboratory researchers via Annual Operating Plan (AOP) agreements, and yearly small-business innovative research calls.

This Request for Innovation (RFI) is being released to inform the development of a new pilot program, the Marine Energy Laboratory Seedlings Program. WPTO aims to empower its National Laboratory partners to formulate and share new approaches from both a research and execution perspective. The program seeks to support projects with sums up to $50,000 - $100,000, with 12 months or less work agreement. Previous work at the National Labs have shown that with modest amounts of funding and high-level goals, they can creatively solve pressing challenges and move us closer to the MHK program's goals, and ultimately help inform future competitive solicitations and program initiatives. Recent examples of the results of lab "seed" projects include the foundation for Powering the Blue Economy Initiative and competitive solicitations like the Waves to Water Prize.

This RFI seeks to obtain information on ideas that National Labs have that would address WPTO's goals, using varying amounts of funding, and help to inform how the program could establish an MHK Lab Seedling program moving forward. The goal of the Seedling program is to encourage submission of creative and diverse concepts from the labs, including developing technologies, fostering partnerships, or conducting analysis that might address the mission critical goals identified below.

If the ideas submitted seem promising, DOE may follow up on some, none, or all of the submitted ideas, requesting a short statement of work and budget be drafted to execute on the idea(s).

Summary

The WPTO MHK Program has identified the following non-exclusive list of areas of opportunity for lab activities. The following are examples only and are intended as suggestions; they do not indicate a preference for responses around only these topics, and ideas that fall outside of the scope of these four areas are welcome.

Collaborations with Other Offices

Aligning with the Assistant Secretary's FY 2020 budget priorities, the MHK program is seeking to identify areas of R&D that strengthen the relationship between the MHK program and other EERE offices, or offices outside EERE, such as the Office of Fossil Energy, Office of Nuclear Energy, or Office of Electricity. Through this RFI, WPTO is interested in understanding what scopes of work could be conducted. This could include, but is not limited to, hybrid systems with MHK devices, subsea cabling issues, opportunities for co-design – like energy storage/MHK systems, or other research needs that leverage the expertise, personnel, or facilities from other DOE offices.

Powering the Blue Economy

This year, WPTO formally launched its Powering the Blue Economy (PBE) Initiative to develop marine energy powered systems that address power limitations and needs of coastal communities and ocean technology end users. Expanding demand for ocean-derived food, materials, energy, and knowledge is driving rapid growth in the emerging "blue economy." Blue economy industries, such as aquaculture, are moving further offshore to take advantage of the vast scale of the ocean. However, increased distances offshore require access to consistent, reliable power untethered to land-based power grids. A new report funded by WPTO, *Powering the Blue Economy: Exploring Opportunities for Marine Renewable Energy in Maritime Markets,* explored eight blue economy opportunities that could be supported by marine and hydrokinetic technologies. Building on this report, the WPTO is exploring partnerships between the marine renewable energy industry, coastal stakeholders, and blue economy sectors to address two thematic challenges: *Power at Sea* and *Resilient Coastal Communities*.

Removing power constraints and addressing the needs of other coastal and ocean energy end users could accelerate growth in the blue economy and create new opportunities for sustained economic development. WPTO is seeking to identify research projects, analysis, or partnership building efforts that can help build on its existing PBE portfolio of work. Initial work is underway in PBE targeting near term markets such as desalination, ocean observing, and remote coastal communities. While there are significant technology barriers and R&D needs in these markets, the Seedling program is also interested in R&D concepts for higher risk R&D future markets such as offshore aquaculture, hydrogen and mineral production, and coastal resiliency. Additionally, we are interested in concepts, partnerships, technologies, or platforms that solve needs common to multiple PBE markets. Ideas proposed can be complimentary but should not be duplicative of existing work, including foundational PBE R&D at the labs, or the Waves to Water Prize.

Materials

Materials research is a foundational aspect of fundamental and crosscutting R&D for the MHK industry. Given the nascency of the MHK industry, there is still broad diversity in device archetypes, each of which requires suitable materials to achieve cost competitiveness in targeted markets while achieving and maintaining performance standards. Industry can leverage basic materials research to evaluate system and subsystem design tradeoffs, resulting in a more optimal device. Materials selection can also influence innovations in the manufacturing science and engineering of renewable technology. Decision drivers for a device developer on manufacturing strategy start with understanding fundamental performance behaviors of devices. Furthermore, materials focused R&D may enable innovative system and/or subsystem designs resulting in transformational progress within the MHK industry.

Developing research, development, analysis, and partnerships on materials for MHK also aligns with the Assistant Secretary's priorities of Critical Materials and the Circular Economy. Critical materials priorities

for EERE include addressing the technical challenges associated with upstream domestic supply capacity and midstream separation and processing of critical materials. Circular economy priorities include the design and manufacturing of new technologies for recyclability and reliability. Other areas of interest within this materials topic could include advanced manufacturing of components, design for reduction in biofouling, design for survivability, and material science applications that enable PBE markets (such as sorbent technology for seawater mineral mining, membrane technology for wave powered desalination, or electrochemical processes for direct seawater hydrogen extraction).

Technology Transfer and Commercialization

Strengthening relationships with industry and identifying promising technologies for use in the commercial sector is critical to ensuring that National Laboratory products can be effectively commercialized. DOE has several technology transfer programs operated out of the Office of Technology Transitions. This includes, but is not limited to, the Technology Commercialization Fund, Energy I-Corps, and the recent Practices to Accelerate the Commercialization of Technologies (PACT) Laboratory Call.

But WPTO recognizes that for MHK technology researchers in the labs, finding commercial partners in a nascent field can be difficult. While there are potentially new opportunities to find partners specific to PBE markets, partners on long-term projects for grid-scale applications can be difficult to find at the early stage of the MHK industry development. In addition to commercial partnerships, WPTO seeks to understand how to better equip lab researchers with entrepreneurial experience to inform current and future projects, and better connect to the larger innovation ecosystem that exists to support clean energy commercialization. Activities in this area can include, but are not limited to: (1) pre-Technology Commercialization Fund relationship building with industry; (2) prototype advancement; (3) participation in tech transfer trainings or other opportunities; or (4) collaboration with innovation ecosystem partners to strengthen the commercialization plans for technologies. WPTO also supports the development of general tools that identify and address barriers to MHK adoption in the United States.

Open Area

WPTO also is looking for ideas that fall outside of the previous listed areas.

Additional Questions - Optional

In addition to the suggested areas of interest where WPTO is looking for innovative ideas, the office is also hoping to address the following questions to help establish a Marine Energy Lab Seedling Program beyond the initial pilot stage:

1. How often should WPTO release a call for short-term projects?
2. What can WPTO do to increase the likelihood of attracting new ideas into the Seedling Program?
3. Are there areas that WPTO should consider for any future Lab Seedling Program focus areas?
4. Aside from funding, what additional resources would be helpful in this program?

Any answers to these questions do not count against the page limit of the RFI and is considered optional.

EERE WPTO Goals & Mission of Marine Energy Lab Seedling Program

WPTO is constantly evaluating the appropriate roles and contributions of different types of entities. While the National Laboratories have been critical to better understanding the attributes of MHK technologies, they have increasingly worked to support testing, modeling, and design of MHK devices directly with universities and industry. And to build on the last few years of work, and maximize the capabilities of the laboratory staff and expertise, WPTO is seeking to create a Marine Energy Lab Seedling Fund pilot.

We look to develop a pilot to address one or more of the following objectives:

1. Increase the number of short-term projects that deliver results in under a year;
2. Increase the number and duration of active relationships between the labs, industry, and other partners;
3. Uncover new solutions or approaches that could help achieve the MHK program's overall goals; and
4. Seed research and concepts that provide opportunities for larger initiatives in the future.

Requested Information

We ask that you put together a 2-3 page idea submission answering the following:

1. Given up to $50,000, how would you use this funding to address the opportunity areas and goals described above?
2. Given between $50,000 - $100,000, how would you use this funding to address the opportunity areas and goals described above? For projects between $50,000 - $100,000, ideally an idea should include more than one partner, if possible.

The purpose of this RFI is to determine if the labs have new and innovative ideas for addressing the MHK Program's goals. Submissions, and the ideas they incorporate, should aim to spur new activity in the labs, and not go towards existing activities or research. Submissions should also directly address at least one of the goals listed above and potentially involve creative ways of addressing multiple goals synergistically.

Responses will be analyzed with a focus on finding possible activities that:

- Have the potential to significantly impact the goals described in this RFI.
- Show a high level of creativity and innovation applied towards addressing those needs and goals.
- Are naturally structured to produce a *measurable* result/impact or to answer a specific question that is important in the development of the WPTO R&D portfolio.

Disclaimer and Important Notes

EERE will not pay for any costs associated with preparation or submission of responses.

Section II: Idea Submission Instructions and Template

Format

We request that each National Lab submit no more than 20 submissions, with one idea per response. Each response should be formatted as follows:

- Each submission may not exceed a total of 3 pages of 11pt font (any additional material over 3 pages will not be analyzed.) Each response is expected to cover three primary sections as listed below. It is at the labs' discretion on how best to allocate space.
- Sections:
  1. Idea Description
     a. Summary
     b. Background
     c. Objective
  2. Plan for implementing the idea with up to $50,000 in funding
  3. Plan for implementing the idea with $50,000 - $100,000 in funding

Any answers to the Optional Additional Questions will not count toward the page count.

3 Page Submission Format Details

Idea Title

Relevant lab(s) & other participants (if applicable)
Principal Investigator (name and contact info)
Main point of contact for any other key participants (name and contact info)

Section 1: Idea Description

Summary: 250 word count description of the idea
Background: Describe relevant background info that helps demonstrate the need for this project or programming.
Objective: Describe how, if funded, a program like this would measure success during and after the funded period.

Section 2: With up to $50,000 in funding, describe the idea and activities that could be executed.
Section 3: With $50,000 - $100,000 in funding, describe the idea and activities that can be executed.

The proposal should be submitted in PDF format.

Submission

Responses must be submitted by email to MHKRFI@ee.doe.gov by 5:00 p.m. (ET) on September 27, 2019. You should receive an email acknowledging receipt within 24 hours. Please contact Jennifer.Garson@ee.doe.gov if acknowledgement is not received.

Responses will be analyzed and DOE may reach out to responders for more information.

Proprietary Information

Because information received in response to this RFI may be used to structure future programs, respondents are strongly advised to NOT include any information in their responses that might be considered business sensitive, proprietary, or otherwise confidential. If, however, a respondent chooses to submit business sensitive, proprietary, or otherwise confidential information, it must be clearly and conspicuously marked as such in the response.

Responses containing confidential, proprietary, or privileged information must be conspicuously marked as described below. Failure to comply with these marking requirements may result in the disclosure of the unmarked information under the Freedom of Information Act or otherwise. The U.S. Federal Government is not liable for the disclosure or use of unmarked information and may use or disclose such information for any purpose.

If your response contains confidential, proprietary, or privileged information, you must include a cover sheet marked as follows identifying the specific pages containing confidential, proprietary, or privileged information:

> Notice of Restriction on Disclosure and Use of Data:
> Pages [List Applicable Pages] of this response may contain confidential, proprietary, or privileged information that is exempt from public disclosure. Such information shall be used or disclosed only for the purposes described in this RFI [Enter RFI Number]. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source.

In addition, (1) the header and footer of every page that contains confidential, proprietary, or privileged information must be marked as follows: “Contains Confidential, Proprietary, or Privileged Information Exempt from Public Disclosure” and (2) every line and paragraph containing proprietary, privileged, or trade secret information must be clearly marked with double brackets or highlighting.