

Notice of Intent No. DE-FOA-0001806

Notice of Intent to Issue Funding Opportunity Announcement No. DE-FOA-0001662

The Office of Energy Efficiency and Renewable Energy (EERE) intends to issue, on behalf of the Water Power Technologies Office, a Funding Opportunity Announcement (FOA) entitled “Innovative Solutions for Fish Passage at Hydropower Dams”.

Hydropower is a key component to strengthening the American economy and energy security, and DOE’s Water Power Technologies Office (WPTO) is poised to ensure that the fleet continues to generate clean electricity, provide grid stability and bulk storage, and facilitate greater integration of variable renewable energy technologies. Through its HydroNEXT initiative, the WPTO is committed to lowering the cost of hydropower deployment and significantly reducing the environmental footprint and impacts of new and existing technologies. Realizing the potential for future hydropower growth and optimization of the existing fleet in the United States, however, will require overcoming a number of key technological, environmental, and market challenges. This funding opportunity seeks to address these challenges as they relate to upstream and downstream fish passage at hydropower dams.

Fish Passage

Dams can create barriers that may disrupt river connectivity, fragment fish populations, and result in fish habitat loss. Upstream and downstream fish passage technologies at dams are critical for maintaining river connectivity which allows: adult fish access to and from spawning habitats; dispersal of juvenile fish to new habitats; fish access to feeding habitats; fish habitat selection and colonization of new habitats; and fish access to and from refugium for survival during extreme events (e.g., droughts, floods, extreme temperatures). Further, downstream fish passage technologies prevent fish from being entrained through turbines. Since entrainment can result in fish injury and mortality, hydropower operators without acceptable fish passage are forced to shut down turbine operations periodically or seasonally, reducing generation and potential revenues.

In addition, safe and effective fish passage is often a mandatory license requirement for hydropower projects regulated by the Federal Energy Regulatory Commission (FERC). These requirements are typically prescribed by resource agencies with regulatory authority such as the National Marine Fisheries Service or the U.S. Fish and Wildlife Service during licensing or

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relicensing. There are nearly 400 existing FERC-licensed hydropower projects that are expected to undergo relicensing in the next 13 years¹.

More research is needed for improving fish passage technologies, both in terms of cost and efficiency, for many fish species among different river systems. Through these topic areas, the WPTO is looking to fund research focused on innovative upstream and downstream fish passage solutions to effectively provide volitional fish passage while reducing both construction and operational costs compared to existing methods. In this context, volitional upstream passage means that fish will be migrating around a dam through a ladder, lift, or other passage system without human intervention (e.g. trap and haul). Applying innovation to fish passage technology design points, including function and modularity, can help drive the future development of devices and systems with improved environmental performance and lower costs.

It is anticipated that the FOA may include the following Topic Areas:

Topic Area 1: Testing the Effects of Innovative Fish Passage Technologies.

This topic area will cover innovative technologies that can reduce construction and/or operational costs associated with either upstream or downstream fish passage at a hydropower dam to improve efficiencies of volitional fish passage. Innovations in this context can refer to new designs for volitional fish passage technologies or techniques, as well as innovations with respect to existing volitional fish passage technologies. Technologies are considered innovative if they have the ability to reduce the cost of materials or operations compared to traditional methods or technologies. Projects would demonstrate how their technology can safely and effectively move fish either upstream or downstream of a dam and how construction and operational costs can be reduced by conducting a case study in which the proposed innovation is compared to a reference site with existing fish passage. Proposed technologies should also demonstrate broad applicability to a variety of different hydropower sites by applying concepts of modularity, adjustability, and scalability.

Technologies or methods that propose improvements to turbines for entrained fish and/or new turbine designs will *not* be considered.

Preference will be given to proposals that target species of concern such as Endangered Species Act (ESA)-listed species², adult American eel, migratory fish species, and/or utilize advanced manufacturing.

DOE/NNSA Federally Funded Research and Development Centers (FFRDCs) and DOE Government-Owned, Government-Operated laboratories (GOGOs) are not eligible to apply for

¹ National Hydropower Association. 2016. Annual Report: A Vision for Growth and Value.

² In cases where ESA species cannot be tested, a suitable surrogate should be identified.

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funding as Primes. The DOE national laboratories'³ experience and resources will be available to perform testing, and applicants are encouraged to pair with a national laboratory to achieve the goals established.

Subtopic 1: Testing Effects of Innovative Upstream Fish Passage Technologies

This subtopic will cover innovative upstream volitional fish passage technologies. This would include a plan to test the effects of the innovative upstream passage technology on fish.

Subtopic 2: Testing Effects of Innovative Downstream Fish Passage Technologies

This subtopic will cover downstream volitional fish passage technologies. This would include a plan to test the effects of the innovative downstream passage technology on fish.

Topic Area 2: Advancing Innovative Methods and Technologies to Improve Fish Passage.

This topic area is focused on technological advancements and research that can improve the efficacy and efficiency of volitional fish passage. Innovations in this context can refer to improvements in detection, sorting, counting, and/or identification of fish that have the ability to improve operations and monitoring and improvements in fish attraction and/or guidance technologies. Technologies are considered innovative if they have the ability to reduce the cost of materials or operations compared to traditional methods or technologies. Awardees must demonstrate the applicability of their design and/or technology to existing or new fish passage technologies and how it will improve the efficiency and cost effectiveness of these technologies and/or designs.

The primary objective is to support technologies that can demonstrate broad applicability to a variety of different hydropower sites (e.g. via modularity, adjustability, scalability, etc.).

Preference will be given to proposals that target species of concern such as Endangered Species Act (ESA)-listed species⁴, adult American eel, migratory fish species, and/or utilize advanced manufacturing.

Subtopic 1: Improvements in Detection, Sorting, Counting, and/or Identification of Fish for Fish Passage

This subtopic relates to innovative technologies that improve the ability to remotely and/or autonomously detect, sort, count, and/or identify fish species or sizes for upstream or downstream passage. Innovations in this context can refer to new designs

³ Information on the DOE national laboratories and their capabilities can be accessed here: <https://energy.gov/eere/wind/national-laboratory-facilities-and-capabilities>

⁴ In cases where ESA species cannot be tested, a suitable surrogate should be identified.

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or techniques for volitional fish passage, as well as improvements that work with existing volitional fish passage technologies. This can include sensors for detection, counting, or sorting of non-tagged fish, or algorithms and machine learning for advanced identification and/or sorting of species, age class, and/or size, among other advancements.

Technologies or methods that utilize fish tagged with Passive Integrate Transponder (PIT), radio frequency identification (RFID), acoustic telemetry tags, and radio telemetry tags, or other electronic animal tagging technologies will *not* be considered.

Subtopic 2: Improvements in Fish Attraction and Guidance for Fish Passage

This subtopic will cover improvements in fish attraction and/or guidance to ensure passage facilities are operated in a manner that maximizes efficacy and efficiency. Facilities innovations in this context can refer to new designs or techniques, as well as improvements that work with existing volitional fish passage technologies. This can include designs or technologies that seek to improve upstream and/or downstream passage efficiencies and/or reduce the amount of water, among other advancements.

For Topic Areas 1 and 2:

Working with ESA-listed species and/or conducting fieldwork may require special permits.

EERE envisions awarding multiple financial assistance awards in the form of cooperative agreements.

This Notice is issued so that interested parties are aware of the EERE's intention to issue this FOA in the near term. All of the information contained in this Notice is subject to change. EERE will not respond to questions concerning this Notice. Once the FOA has been released, EERE will provide an avenue for potential Applicants to submit questions.

EERE plans to issue the FOA on or about September / October 2017 via the EERE Exchange website <https://eere-exchange.energy.gov/>. If Applicants wish to receive official notifications and information from EERE regarding this FOA, they should register in EERE Exchange. When the FOA is released, applications will be accepted only through EERE Exchange.

In anticipation of the FOA being released, Applicants are advised to complete the following steps, which are **required** for application submission:

- Register and create an account in EERE Exchange at <https://eere-exchange.energy.gov/>. This account will allow the user to register for any open EERE FOAs that are currently in

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EERE Exchange. It is recommended that each organization or business unit, whether acting as a team or a single entity, use only one account as the contact point for each submission.

Questions related to the registration process and use of the EERE Exchange website should be submitted to: EERE-ExchangeSupport@hq.doe.gov

- Obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number (including the plus 4 extension, if applicable) at <http://fedgov.dnb.com/webform>
- Register with the System for Award Management (SAM) at <https://www.sam.gov>. Designating an Electronic Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in SAM registration. Please update your SAM registration annually.
- Register in FedConnect at <https://www.fedconnect.net/>. To create an organization account, your organization's SAM MPIN is required. For more information about the SAM MPIN or other registration requirements, review the FedConnect Ready, Set, Go! Guide at [https://www.fedconnect.net/FedConnect/Marketing/Documents/FedConnect Ready Set Go.pdf](https://www.fedconnect.net/FedConnect/Marketing/Documents/FedConnect_Ready_Set_Go.pdf)
- Register in Grants.gov to receive automatic updates when Amendments to a FOA are posted. However, please note that applications will not be accepted through Grants.gov. <http://www.grants.gov/>. All applications must be submitted through EERE Exchange.

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