



**Semiannual Stakeholder Webinar**  
**November 5, 2019**

Alejandro Moreno, Director  
Tim Welch, Hydropower Program Manager  
Tim Ramsey, Marine and Hydrokinetics Program Manager  
Hoyt Battey, Strategy and Analysis Program Manager  
Allison Johnson, Stakeholder Engagement Lead

- If you have issues with the webinar, please send a private chat to Jenny, who will be able to assist you.
- The webinar will be recorded, transcribed, and shared in a future edition of the Water Wire.
- The webinar will conclude with a Q&A session. Please send questions by 4:15pm ET to [WaterPowerTechnologiesOffice@EE.DOE.GOV](mailto:WaterPowerTechnologiesOffice@EE.DOE.GOV).
  - We will try to answer as many questions as we can.
  - Names of individuals submitting questions will remain anonymous to our listeners.

Want **periodic updates** on water power funding opportunities, events, and publications?

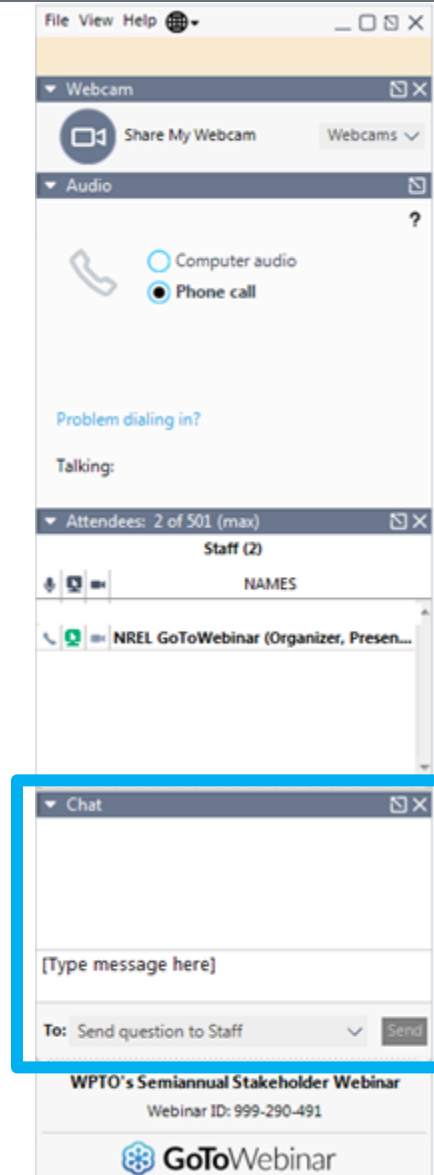


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# Today's speakers

**Strategy & Analysis  
Program Manager**  
Hoyt Battey



**Director**  
Alejandro Moreno



**Stakeholder  
Engagement Lead**  
Allison Johnson



**Hydropower  
Program Manager**  
Timothy Welch



**Marine & Hydrokinetic  
Program Manager**  
Tim Ramsey



Webinar Logistics – Allison Johnson (3:00 – 3:05)

Introduction – Alejandro Moreno (3:05 – 3:20)

- What is the Water Power Technologies Office (WPTO)?
- 2019 highlights for the Office

Hydropower Program – Tim Welch (3:20 – 3:45)

- 2019 highlights, updates since our February webinar

Marine and Hydrokinetics Program – Tim Ramsey (3:45 – 4:10)

- 2019 highlights, updates since our February webinar

WPTO's 2019 Peer Review – Hoyt Battey (4:10 – 4:30)

- WPTO's initial impressions based on public discussion at Peer Review

Questions & Answers (4:30 – 4:50)

- Please submit questions by 4:15pm to [WaterPowerTechnologiesOffice@ee.doe.gov](mailto:WaterPowerTechnologiesOffice@ee.doe.gov)

Closing (4:50 – 5:00)

The U.S. Department of Energy's Water Power Technologies Office enables research, development, and testing of emerging technologies to advance marine energy as well as next generation hydropower and pumped storage systems for a flexible, reliable grid.

WPTO invests in **early-stage research** to accelerate development of innovative water power technologies while **ensuring that long-term sustainability and environmental issues are addressed.**

WPTO supports efforts to **validate performance and grid-reliability** for new technologies, develop and increase accessibility to **necessary testing infrastructure**, and evaluate **systems-level opportunities and risks.**

WPTO aggregates, analyzes and disseminates **relevant, objective, technical information** on water power technologies and related issues to stakeholders and decision-makers.

*In pursuing its objectives, the Water Power Technologies Office always endeavors to:*

- *Catalyze **innovation** in technology and science*
- *Steward natural resources and support **the public good***
- *Expand **access** to affordable, reliable and secure energy*
- *Invest taxpayer funds wisely and to drive the greatest **impact***
- *Collaborate and actively seek **input** from stakeholders and partners*
- *Be **transparent** and share results widely*

## WPTO's Outreach and Engagement Strategy

**GOAL ONE – TRANSPARENCY:** Demonstrate good stewardship of taxpayer funds by persistently and transparently communicating how WPTO funds are being utilized and evaluate project impacts

**GOAL TWO – FEEDBACK:** Get feedback from stakeholders to inform and improve WPTO projects and strategy

**GOAL THREE – DISSEMINATION:** Maximize the impact of WPTO-supported research by effectively disseminating results of projects and tracking usage of various products

**GOAL FOUR – OBJECTIVE AND ACCURATE INFORMATION:** Provide access to accurate and objective information and data that can help to accelerate industry development and inform decision-makers

# Water power research programs and contacts at DOE's national laboratories



**Vladimir Koritarov**

Water Power Program Manager  
Argonne National Laboratory  
[koritarov@anl.gov](mailto:koritarov@anl.gov)



**Thomas Mosier**

Research Scientist  
Idaho National Laboratory  
[thomas.mosier@inl.gov](mailto:thomas.mosier@inl.gov)



**Albert LiVecchi**

Water Power Program Manager  
National Renewable Energy Laboratory  
[al.livecchi@nrel.gov](mailto:al.livecchi@nrel.gov)



**Brennan Smith**

Water Power Program Manager  
Oak Ridge National Laboratory  
[smithbt@ornl.gov](mailto:smithbt@ornl.gov)



**T.J. Heibel**

Water Power Program Manager  
Pacific Northwest National Laboratory  
[tj.heibel@pnnl.gov](mailto:tj.heibel@pnnl.gov)



**Peter Kobos**

Water Power Program Manager  
Sandia National Laboratories  
[phkobos@sandia.gov](mailto:phkobos@sandia.gov)



# Office highlights from 2019

2/7	WPTO conducted its first semiannual stakeholder webinar
4/1	WPTO released the <i>Powering the Blue Economy</i> report
4/1	WPTO announced the HydroWIRES initiative
4/1	Funding selections announced for Hydropower Program's FOA on SMH and PSH
5/20	WPTO awarded 7 SBIR proposals for marine energy R&D with PBE applications
6/20	Application deadline for latest hydroelectric incentives under section 242 of the 2005 Energy Policy Act
6/26	TCF selections announced - two for Hydro, two for MHK
7/22	Three EAL projects receive funding through SBIR Phase II
9/11	Application deadline for Waves to Water prize concept phase ( <i>phase I winners to be announced soon!</i> )
9/17	WPTO selected POET as Network Director for TEAMER Program
9/18	WPTO and NOAA announced the PBE Ocean Observing prize competition ( <i>competition will officially open soon!</i> )
10/7	WPTO conducted the FAST Pitch Contest and selected four winners
10/8-10/10	2019 WPTO Peer Review took place in Alexandria, Virginia ( <i>public report anticipated for early 2020</i> )
10/17	Secretary Perry announced his resignation; President Trump announced he plans to nominate Dan Brouillette, Deputy Secretary, to succeed Perry once he steps down at the end of 2019
10/31	\$24.9M in funding selections announced from WPTO's FY19 FOA for MHK and hydropower
11/1	Application deadline for the Marine Energy Collegiate Competition ( <i>participating teams to be announced soon!</i> )

Hydro & MHK
  Hydropower Program
  MHK Program
  DOE

# State of funding for WPTO in Fiscal Year (FY) 2020

Temporary funding bill set to expire November 21<sup>st</sup>. Both the House and Senate have proposed a budget increase for WPTO in FY2020.

- 9/21 House passed continuing resolution to fund multiple federal agencies, including DOE, through November 21st
- 9/26 Senate passed continuing resolution to fund multiple federal agencies, including DOE, through November 21st
- 11/21 Continuing resolution set to expire

(\$ in Millions)	FY 2019 Enacted	FY 2020 House Marks			FY 2020 Senate Marks		
			vs FY19 \$	vs FY19 %		vs FY19 \$	vs FY19 %
<b>WPTO</b>	<b>105</b>	<b>125</b>	<b>+20</b>	<b>+19%</b>	<b>160</b>	<b>+55</b>	<b>+52%</b>
<b>MHK</b>	<b>70</b>	<b>82</b>	<b>+12</b>	<b>+17%</b>	<b>115</b>	<b>+45</b>	<b>+64%</b>
<b>Hydro</b>	<b>35</b>	<b>43</b>	<b>+8</b>	<b>+23%</b>	<b>45</b>	<b>+10</b>	<b>+29%</b>

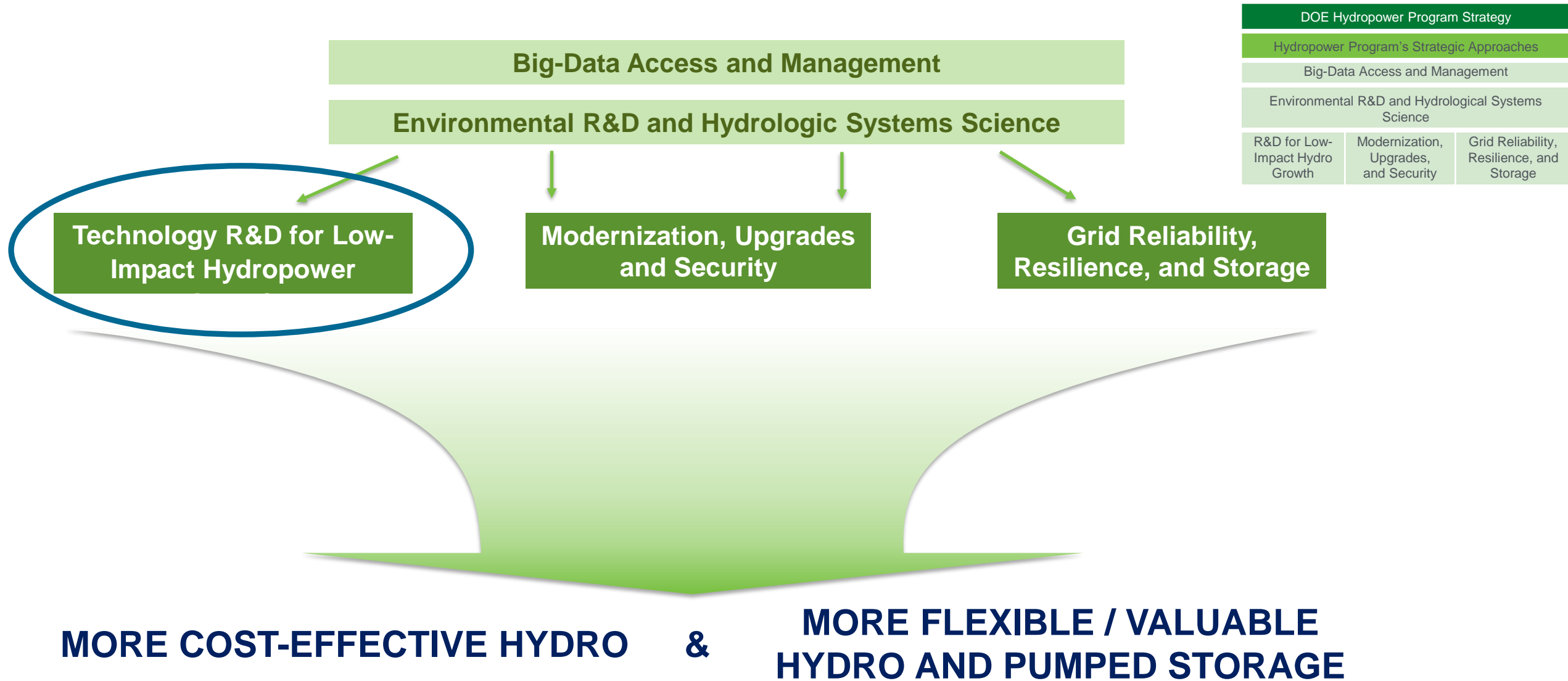
# On October 7<sup>th</sup>, WPTO selected four winners through the FAST Commissioning for Pumped-Storage Hydropower Prize

**Objective:** Attract ideas that could reduce pumped storage commissioning time from the current 10 years to less than five through:

- development of innovative design,
- new layouts,
- creative construction management,
- improved construction equipment,
- application of advanced manufacturing,
- or standardization of equipment.



Entry Title	Team	Innovation
Accelerating PSH Construction with Steel Dams	Gordon Wittmeyer, Southwest Research Institute	Presented a modular steel concept for dams that cuts costs by one-third and cuts construction schedules in half.
Modular Closed-Loop Scalable Pump Storage Hydro	Tom Eldredge and Hector Medina, Liberty University	Presented a modular closed-loop, scalable PSH system with a capacity range of 1–10 megawatt, adaptable to sites without natural bodies of water.
Reducing PSH Excavation Duration, Cost, & Risk	Tracy Livingston and Thomas Conroy, Team Livingston	Combined excavation equipment modifications and process optimizations to achieve up to 50% reduction in excavation timelines.
Use of Modern TBMs for Underground Pumped Storage	Doug Spaulding, Nelson Energy and Golder Associates	Proposed use of tunnel boring machines for underground excavation, which can decrease excavation time by 50% and reduce costs.



### Innovative Design Concepts for Low-head Hydropower

- **Natel Energy** will create a blueprint for a new generation of water power projects by using a modern low-head hydropower technology that also utilizes best practices of stream restoration and whitewater recreation.
- **Littoral Power Systems** will further develop its pre-fabricated foundation from a previous DOE funding opportunity and integrate it with commercially-available passage and generation modules.

### Innovative Conceptual Designs for Pumped Storage Systems

- **Quidnet Energy** will design, engineer, and characterize a bi-directional injector-generator (INGEN) for a geo-mechanical pumped storage (GPS) operation that stores energy by pumping water into existing rock fissures at high pressures.

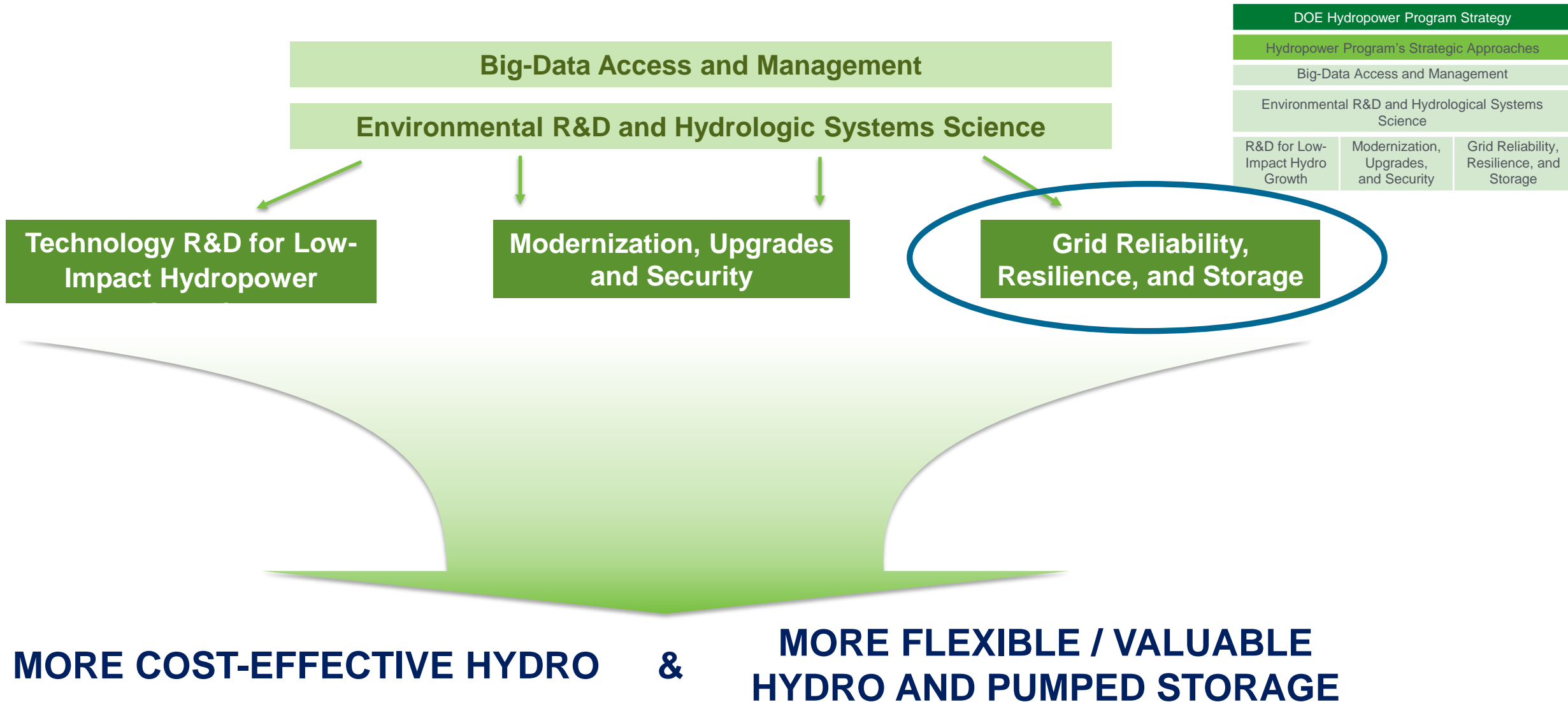
### Modeling and Analyzing the Role of Pumped Storage in Asset and System Optimization

- **The Missouri University of Science and Technology** will evaluate the long-term benefit of optimized PSH operations to better align underlying PSH capabilities with evolving electrical grid needs.
- **General Electric** will assess and quantify the less understood benefits of PSH and outline the potential role that PSH plays in a future U.S. electrical grid that includes higher levels of renewables.
- **The Electric Power Research Institute** will improve state-of-the-art modeling approaches to better capture the value of essential PSH grid reliability services using multiple real-world systems.



## Modular Technologies for Low-Head Hydropower Applications

- **Percheron Power** will develop an innovative, helical fish passage module with the ability to pass fish species both upstream and downstream of a low-head hydropower plant. The modular device, based on Archimedes' screw principles, will manufacture the components in the United States using advanced manufacturing methods and dramatically lower the cost of fish passage solutions.
- **Natel Energy** will advance the design of a fish-friendly, horizontal axial-flow, low-head generation module by leveraging existing industry approaches and technologies to minimize performance and cost risks.
- **Littoral Power Systems** will partner with Whooshh Innovations to develop a fish passage module that can be used to accommodate multiple species simultaneously and can be easily integrated into Littoral's SMH system. The prefabricated modular hydropower system, known as ZAO, is a kit of parts that can be flexibly configured for a variety of small, low-head hydropower projects.
- **The University of Minnesota** will advance the design of a sediment passage module based on an approach called "hydrosuction," which uses siphon flow to continually pass sediment through the dam structure.

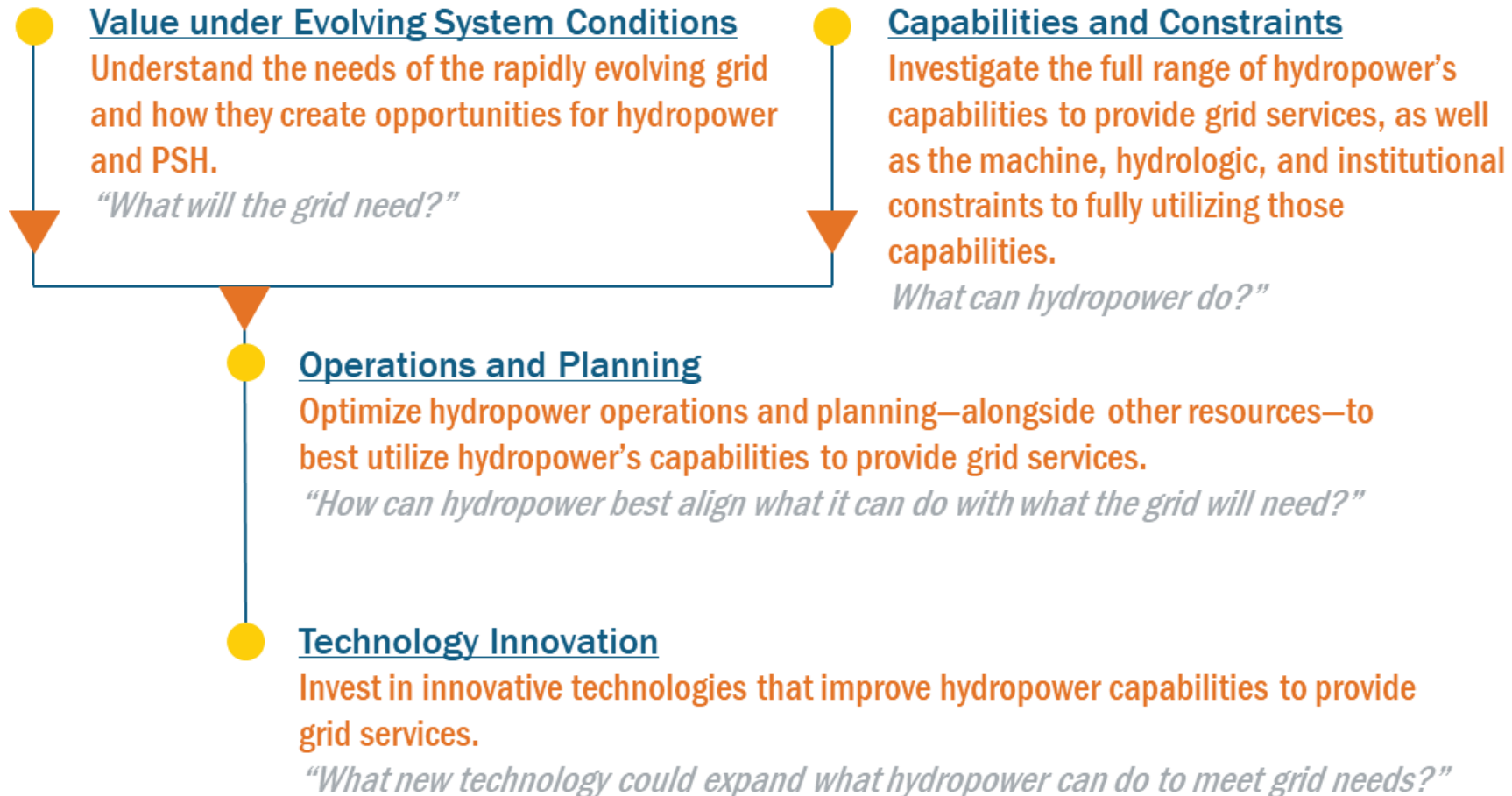


Given the rapid changes occurring in the U.S. electric system—and associated challenges and opportunities—WPTO has launched a new hydropower-grid research initiative titled **HydroWIRES: Water Innovation for a Resilient Electricity System.**

The mission of HydroWIRES is to understand, enable, and improve hydropower's contributions to reliability, resilience, and integration in a rapidly evolving electricity system.



[energy.gov/HydroWIRES](https://energy.gov/HydroWIRES)



# Announced October 31<sup>st</sup> – New projects focused on hydropower flexibility

## Operational Strategies for Increasing Hydropower Flexibility

- **General Electric** will analyze, model, and simulate operation of low-head Francis turbines to demonstrate their flexibility potential.
- **The University of California, Irvine** will develop a mathematical representation of flexible hydropower operation that accommodates various constraints and captures the underlying uncertainty from inflows and net load.
- **The Stevens Institute of Technology** will develop advanced modeling and optimization approaches to enable cascading hydroelectric systems to provide a suite of enhanced operational flexibilities.

## Quantify Hydropower Capabilities for Operational Flexibility

- **Electric Power Research Institute** will develop an industry-recognized methodology and framework for calculating the flexibility that hydropower assets can provide, demonstrate the validity of the approaches and the viability of comprehensive application across the fleet, and establish a platform for future flexibility assessments.





## Published:

- [Hydropower Plants as Black Start Resources](#)
- [Energy Storage Technology and Cost Characterization Report](#)

## Near-Final Drafts:

- A review of storage in transmission planning (white paper)
- A review of pumped storage market participation and FERC Order 841 (white paper)
- Closed-loop pumped storage environmental effects (technical report)
- Hydropower-battery hybrids (technical report)
- NREL ternary pumped storage (technical report)
- Fast commissioning challenge baseline report (technical report)
- Hydropower representation in production cost modeling (workshop report)

## Work in Progress:

- Hydropower Value Study (HVS) series of reports:
  - Hydropower Value Study Executive Summary
  - Historical Analysis of Hydropower Operations in MISO
  - Historical Analysis of Hydropower Operations in WECC
  - Historical Analysis of Hydropower Operations in ISONE
  - Case Study – Chelan Public Utility District
  - Case Study – Tennessee Valley Authority
  - Value of Non-monetized Services by Hydropower
  - Review of Market Rules for Hydropower
  - The Value of Water
  - Value Drivers for Hydropower Operations
  - Power Systems vs. Hydropower Operational Timeframes
  - Hydropower Capabilities & Technology Gap + Cost Analysis
- North American Renewable Integration Study (technical report)
- Ground-Level Integrated Diverse Energy Storage (technical report)



[energy.gov/HydroWIRES](https://energy.gov/HydroWIRES)

## Internal Collaboration



DOE Executive Board:

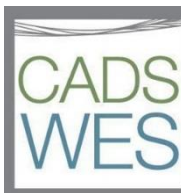
- GMI
- OE
- EERE-SPIA



## International Collaborators



## Awardees



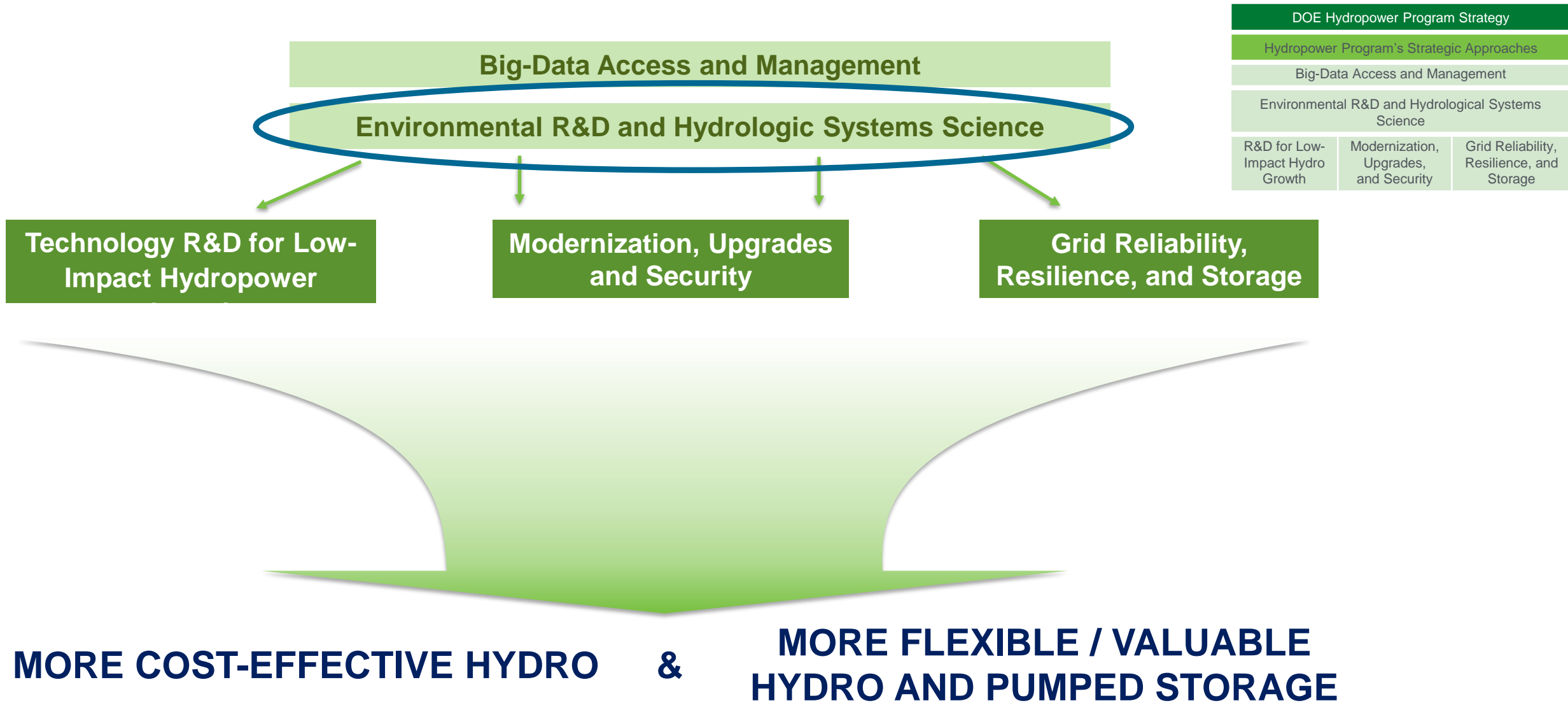
# DOE announced new projects focused on commercialization and additional funding for small businesses innovation

June 26<sup>th</sup>: **The Technology Commercialization Fund (TCF)** provides commercialization funding to labs to work directly with industry on tech transfer activities. New hydropower selections include:

- ORNL: Autonomous Benthic Macroinvertebrate and Larval Fish Imaging and Identification System
- PNNL: Autonomous acoustic receiver systems for 3D tracking and monitoring real-time fish survival

July 22<sup>nd</sup>: Through DOE's **Small Business Innovation Research (SBIR) program**, WPTO advanced three environmentally-acceptable lubricant (EAL) projects to Phase II of the program. The grantees had to demonstrate the technical feasibility of their proposed R&D in Phase I before being considered for Phase II funding.

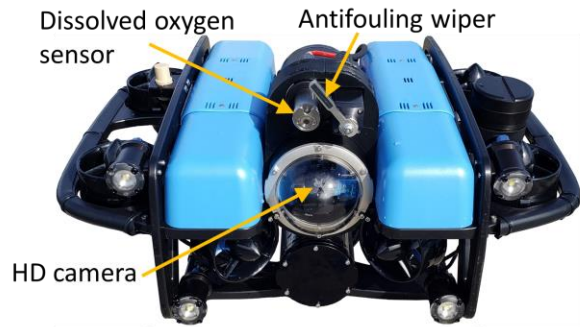
- Polnox Corporation: Developing EAL formulations for hydropower turbine and hydraulic systems. Main focus is on **key additives** to improve performance properties, such as antioxidant corrosion inhibitors, demulsifiers, and anti-wear agents.
- RiKarbon, Inc.: Working to commercialize an **enabling base oils** named BioLubesRK for the production of EALs from plant matters and natural oils.
- Tetramer Technologies, L.L.C.: Developing **synthetic biodegradable** lubricants based on esterified propoxylated glycerol (EPG) that will have properties better than seed or vegetable lubricants.



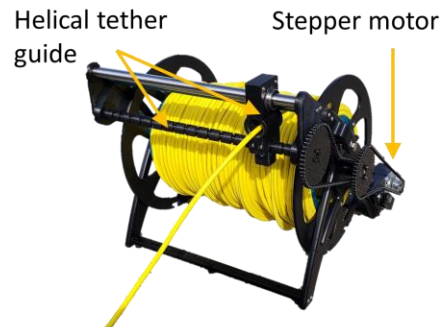


# Real-time and Autonomous Hydropower Water Quality Monitoring System

## System design



ROV (BlueROV2)



Motorized tether spool for ROV



Solar power subsystem

Underwater positioning subsystem

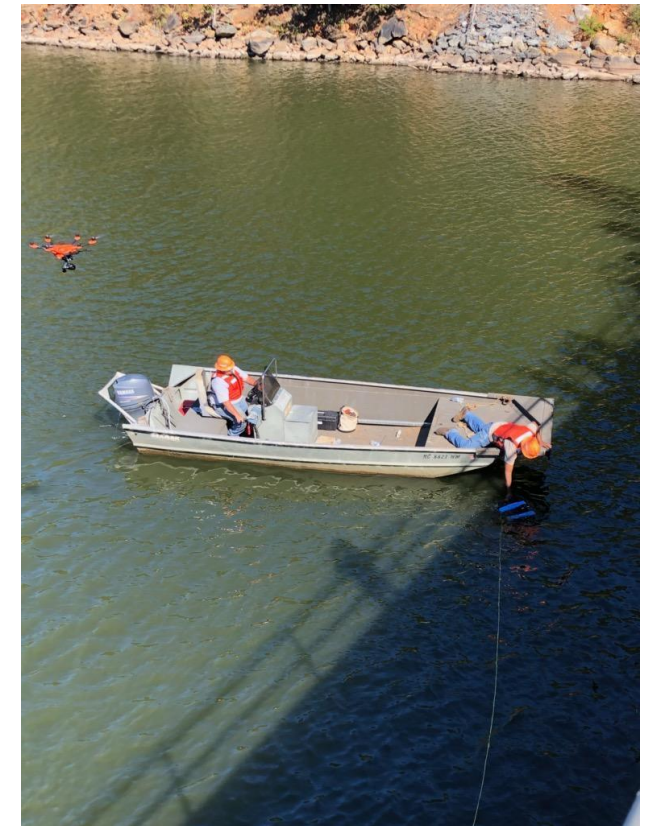
DO sensor with antifouling wiper

Satellite/Wi-Fi communication

Topside computer



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[awqswb.azurewebsites.net](http://awqswb.azurewebsites.net)





New GE Aerating Turbine installed at Cube Hydro's High Rock Hydropower Project



- the 1st-of-a-kind GE retrofitted dissolved oxygen runner installed at High Rock
- the Cube designed linear aeration valve
- and the piloted real-time and Autonomous Hydropower Water Quality Monitoring System being developed by PNNL



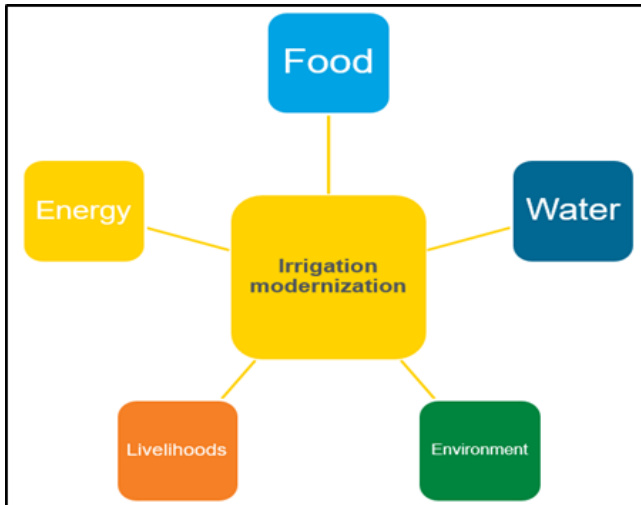
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# Expanding to new areas where we can have major impact, for example – irrigation modernization

Irrigation modernization provides the opportunity to update critical rural infrastructure for better agricultural, economic, environmental, and resiliency outcomes in communities across the Western U.S.

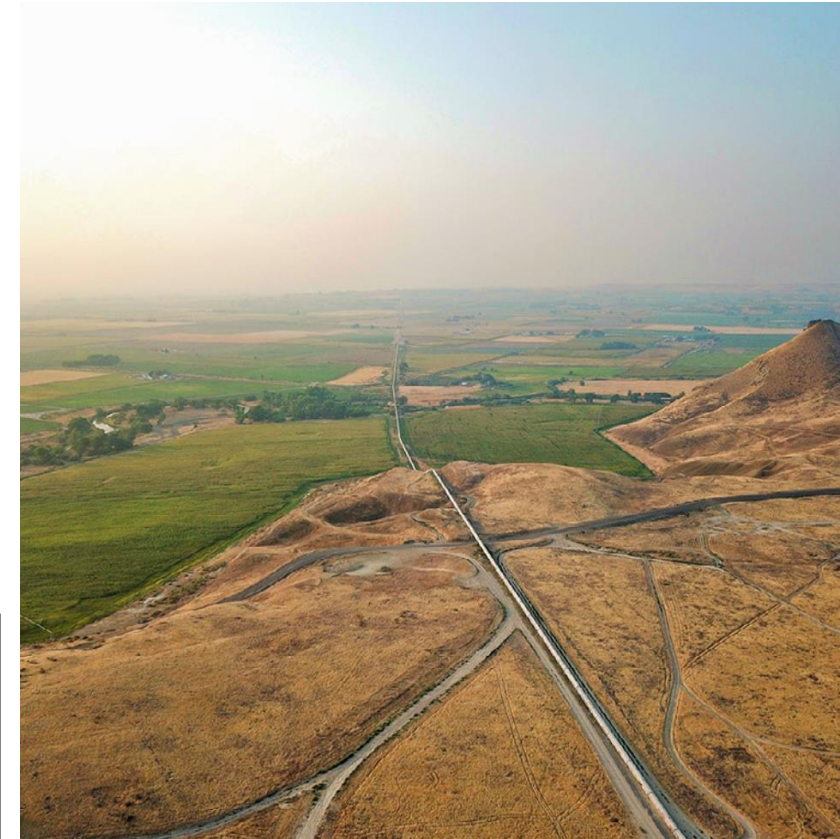
WPTO's initial case study demonstrated that hydropower co-development can be a key enabler of modernization and a wider benefits including:

- Increased local energy generation
- Increased earnings for farmers
- Reduced O&M costs for farmers
- Reduced water usage annually



	Central Oregon	East Fork
Energy generated (MWh)	40,000	3,777*
Energy Conserved (MWh)	9,500	1,169
Net earned per farmer (\$)	437	1,882
Saved per district (\$)	70,000	248,000
Water saved annually (af)	53,396	5,300

*\*East Fork is not presently installing hydropower due to market conditions*





# Meet Hydropower Program staff at these upcoming events over the next six months



2020 NWA  
ANNUAL CONFERENCE

Save the Date!  
February 18-21, 2020  
Downtown Hyatt Regency  
Seattle, WA



SAVE THE DATE

**WATERPOWER**  
★ NATIONAL HYDROPOWER ASSOCIATION ★

**WEEK 2020**

**MAY 19-21, 2020**  
WASHINGTON, D.C.  
MARRIOTT MARQUIS  
[WWW.WATERPOWERWEEK.COM](http://WWW.WATERPOWERWEEK.COM)



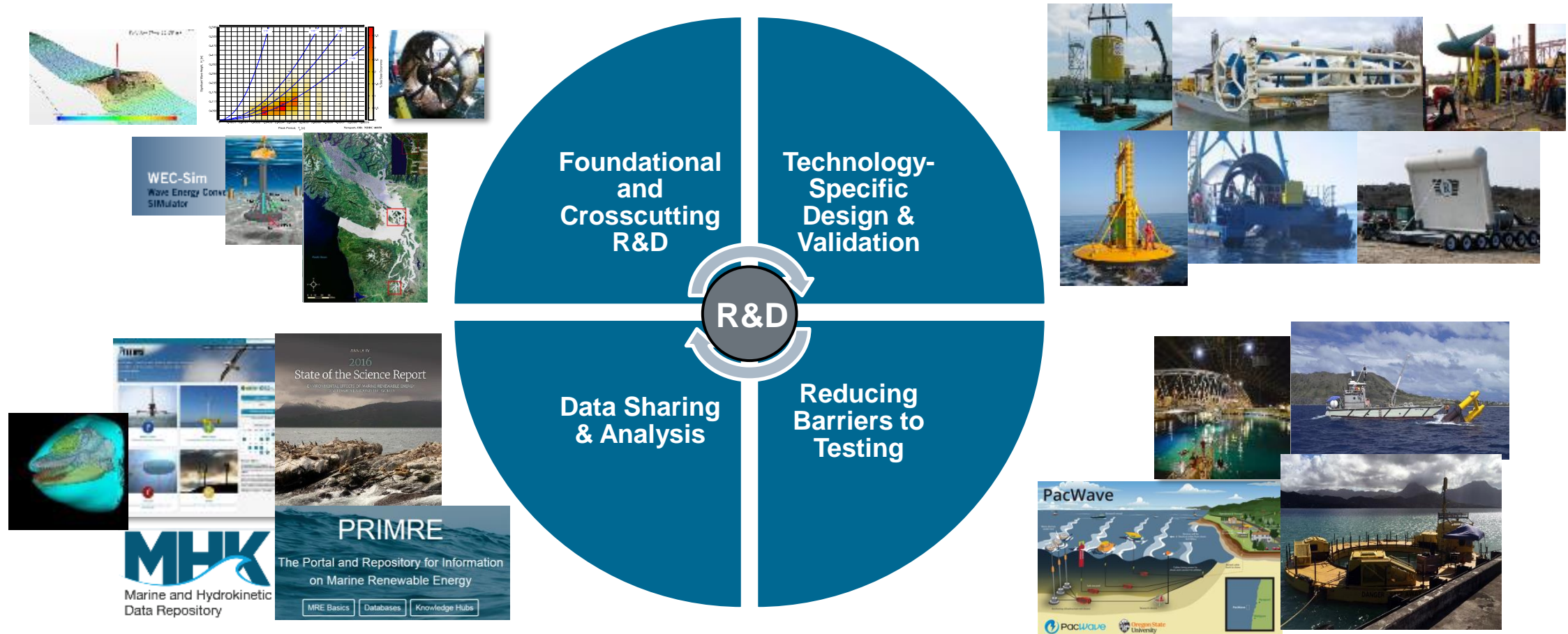
November 19-20, 2019 • Palm Springs, CA

**Renewables Integration Conference**

Supporting Renewable Systems through Energy Storage and Dynamic Grid Management

# MHK Program's R&D approaches

MHK technologies are at an early stage of development due to the fundamental challenges of generating power from dynamic, low-velocity and high-density resource while surviving in corrosive marine environments. These challenges are intensified by high costs and lengthy permitting processes associated with in-water testing.



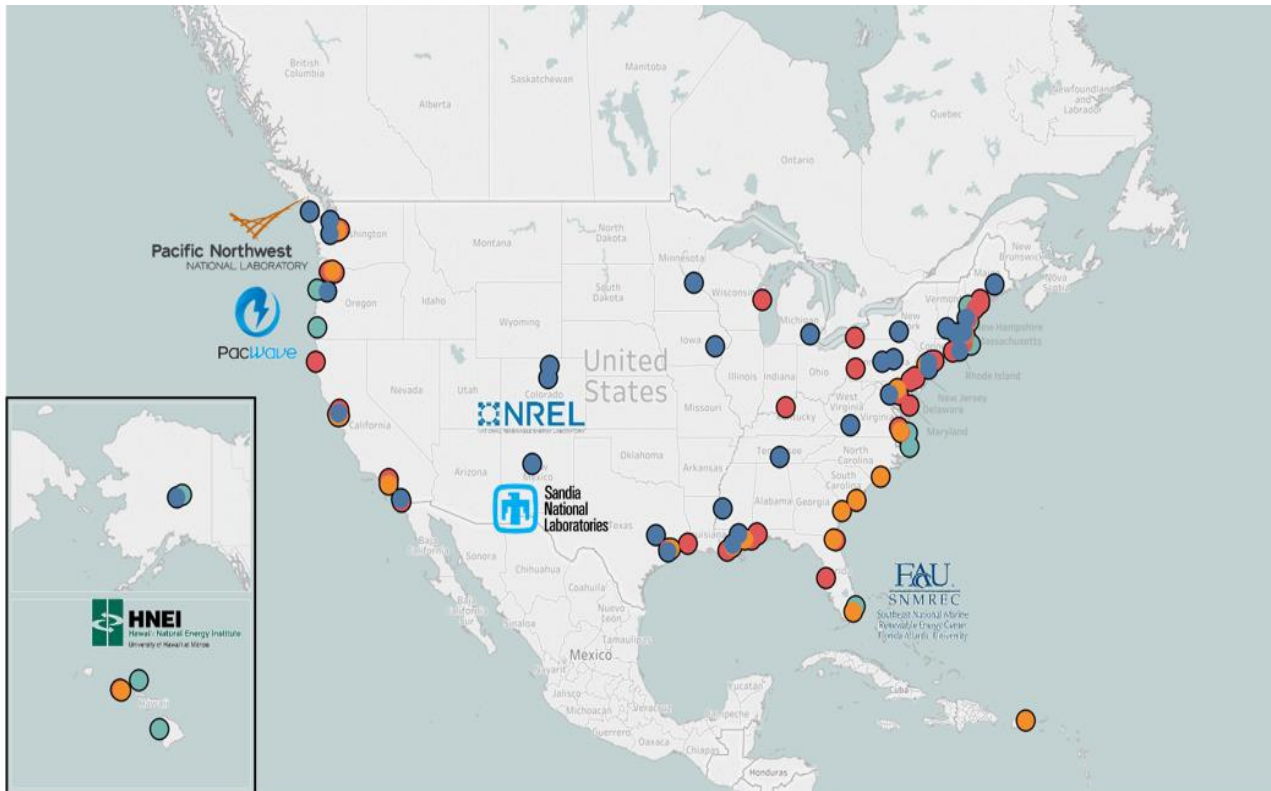


September 17<sup>th</sup>: The **Pacific Ocean Energy Trust (POET)** was competitively selected as the Network Director for the Program



## Anticipated Features of U.S. TEAMER Program

- \$16M program – up to 100 projects
- 3 years
- 20+ facilities involved
- 15,000+ hours technical assistance to be provided
- Targeting TRL 1-5 technologies, including
  - Bench Testing
  - Tank Testing
  - Open-water Testing
  - Testing of devices or cross-cutting areas, such as power take-off systems, grid integration, environmental effects, materials, or moorings
- National Labs and Marine Centers would have access to data to validate models as well as cost and performance
  - Aggregated data would be widely distributed publically



- Dry Testing Site
- Shipyard
- Port
- Wet Testing Site



# Marine energy technologies in the water

Ocean Renewable Power Company  
RivGen® in Kvichak River  
Igiugig, Alaska – July 2019



Ocean Energy (OE)'s Buoy  
Wave Energy Test Site (WETS) in  
Hawaii – est. arrival by Nov 25<sup>th</sup>



Coming soon: Verdant Power  
in the East River again in 2020





# Apply by December 9<sup>th</sup> for the MHK Graduate Student Research Program

This program will provide graduate students access to the expertise, resources, and capabilities available at the DOE laboratories, industry, and other approved facilities while working on their marine energy related thesis.

The program also offers benefits such as a monthly stipend and health insurance.

Accepting applications until December 9<sup>th</sup>!



[orise.orau.gov/mhk-research-program](https://orise.orau.gov/mhk-research-program)

# Announced October 31<sup>st</sup> – Funding selections for wave energy device design, in-stream hydrokinetic technologies, and infrastructure upgrades at marine energy research centers

## Modular Technologies for River Current Energy Converter

### Applications

- **Ocean Renewable Power Company** will develop and demonstrate a modular system where each turbine generator unit is installed as a standalone unit with the option for attaching adjacent modules to form either horizontal or vertical arrays.
- **ABB Inc.** will use a pair of vertical cycloidal rotor modules with independent blade control to deliver a 30-kilowatt (kW) power generation system.
- **Purdue University** will design a cross-flow cycloidal turbine in individual modules that can be connected hydraulically and use a single generator.

## Advancing Wave Energy Device Design

- **Columbia Power Technologies** will develop a standards-compliant, fabrication-ready design of its next-generation WEC.
- **CalWave Power Technologies** will design the next generation of its submerged pressure differential WEC.
- **IDOM** will build the next generation of its oscillating water column device, previously tested off the coast of Spain.
- **The Stevens Institute of Technology** will design a 100 kW annual average electrical power WEC that utilizes two surge devices mounted on a single buoyant platform.

## Marine Energy Centers Research Infrastructure Upgrades

- The University of Washington in Seattle, Washington, will ensure that a coordinated effort is made to enhance marine energy testing and address the highest priority testing infrastructure upgrades required by industry. The NMRECs are organized as follows:
  - **Pacific Marine Energy Center**
  - **Hawaii National Marine Renewable Energy Center**
  - **Southeast National Marine Renewable Energy Center**



# PBE announcements in 2019: one foundational report, two prizes, one collegiate competition, and multiple small business awards



## Waves to Water Prize



U.S. DEPARTMENT OF ENERGY



<b>Propose a Wave Powered System</b> Up to 20 Winners (\$200,000 Cash Prize Pool)	<b>90</b> days
<b>Develop Detailed Plan and Model</b> 10-20 Winners (\$800,000 Cash Prize Pool)	<b>90</b> days
<b>Demonstrate Working Principles</b> Up to 10 Winners (\$500,000 Cash Prize Pool)	<b>180</b> days
<b>Test &amp; Demonstrate in the Ocean</b> Grand Prize up to \$500,000; and individual Metrics Prizes up to \$500,000	<b>180</b> days

# Applications for the first-ever Marine Energy Collegiate Competition were due November 1<sup>st</sup>



University and graduate-level teams will develop technical business plans focused on near-term blue economy market opportunities for marine energy technologies.



For more info:

[PRIMRE.org](https://www.primre.org)

## Competition Components

- Written Report
- Public Pitch
- Poster and Model

## Competition Features

- Interdisciplinary
- Intertwines academic coursework with hands-on learning
- Experience with real-world challenges
- Opportunity to engage the MRE community and potential end-users in Blue Economy sectors

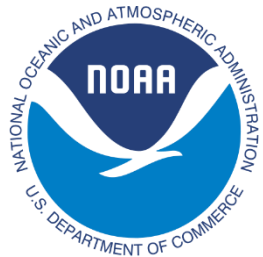




# One of our prizes is co-led by NOAA, focused on powering ocean observation

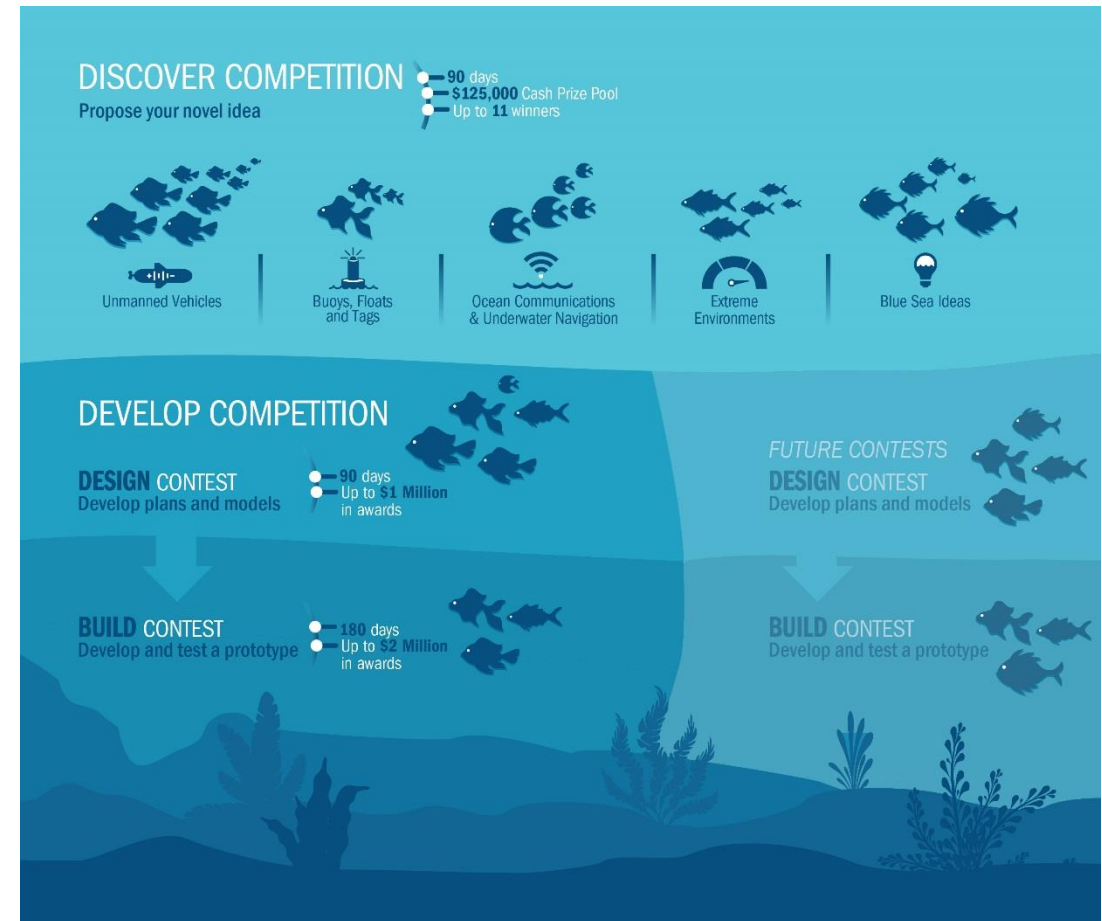


WPTO and the NOAA-led Integrated Ocean Observing System are launching a **\$3 million prize** to integrate marine renewable energy with ocean observation systems.



## Join the Challenge

[americanmadechallenges.org/oceanobserving](http://americanmadechallenges.org/oceanobserving)



# *This June, DOE announced new projects focused on water power technology commercialization*

The **Technology Commercialization Fund (TCF)** provides commercialization funding to labs to work directly with industry on tech transfer activities. WPTO funded a project focused on marine energy.

- **NREL: Significant Cost Reduction Potential for Wave Energy Conversion Devices with Variable Geometry Modules**  
Supported by research from [University of Massachusetts Amherst](#), NREL will design, model, and test a bottom-fixed variable-geometry oscillating surge wave energy converter (VGOSWEC). Similar to how wind turbines adjust the pitch of their blades when faced with increasing wind speeds, this technology is designed with variable geometries that can change shape when interacting with waves. This design has potential to not only reduce capital costs through reduction of materials and load on WECs, but can also be adapted for a variety of different types of wave energy devices.
- **PNNL: A miniaturized long-life low-frequency acoustic transmitter for fish tracking in marine environments**  
Partnering with ATS, PNNL will pilot a small, long duration acoustic transmitter that can be used to track the three-dimensional location of marine animals. The new prototype is similar to the transmitter currently used in the JSATS model for hydropower, but will be adjusted for lower frequencies in marine environments. Advancing technologies to better track and understand the movements and behaviors of marine mammals, fish, and other protected species is crucial to the development of the marine energy industry.

# On May 20<sup>th</sup>, DOE also selected new small business projects with Blue Economy applications

WPTO selected seven small businesses in the latest round of the DOE **Small Business Innovation Research (SBIR) program**. In this round of funding, small businesses receive Phase I grants to demonstrate technical feasibility for their proposed R&D before being considered for additional funding.

## Microgrid for Improved Resilience in Remote Communities through Utilization of Marine Hydrokinetics and Pumped Storage Hydropower

- **Blade Runner, LLC (Bend, Oregon):** Blade Runner will demonstrate a **microgrid** utilizing marine renewable energy (MRE).
- **Ocean Renewable Power Company (Portland, Maine):** Working with the city of False Pass, Alaska, ORPC will develop scalable applications of MRE as a baseload power source to completely replace diesel generators for renewable **microgrid** operations.

## Ocean Energy Storage Systems

- **Oscilla Power Inc. (Seattle, Washington):** Oscilla will develop an innovative **wave energy convertor coupled with compressed air energy storage** to allow the wave energy source to supply electric power to the grid at times of high demand and low supply.

## Pumping and Compression using Marine and Hydrokinetic Energy

- **PCCI (Alexandria, Virginia):** Building off laboratory research conducted by Virginia Tech, PCCI will test and improve **a novel tube pump system that uses MRE**. The device will be constructed with composite materials and will use high pressure water for **desalination** with minimal maintenance.
- **Pliant Energy Systems, LLC (Brooklyn, New York):** The **Traveling Wave Hydro (TWH) Pump** can streams, rivers or tidal flows to power its pumping action. The TWH Pump will be designed at low cost and will not require hard-to-come-by materials or complex processes to fabricate.
- **Resolute Marine Energy Inc. (Boston, Massachusetts):** Resolute Marine Energy will create numerical models to design a **wave-powered seawater pump** that will address cost and performance challenges facing development of wave-energy powered **desalination** of seawater. Their fresh-water production solution can help to cost-effectively solve water security problems facing underserved markets.

## High Value Critical Mineral Extraction from the Ocean Using Marine Energy

- **Triton Systems Inc. (Chelmsford, Massachusetts):** Many critical minerals essential to the U.S. economy and for national defense are not readily available on a domestic basis or freely within open markets. This project will develop a method to **harvest rare earth elements from seawater as a coproduct of desalination**, while using marine energy as a power source.



# DOE will sponsor ICOE 2020

ICOE has never before been hosted in the United States and has only taken place outside of Europe once since its inception in 2006.

Through DOE's sponsorship of ICOE, the Office will help develop the program and host side events including the first-ever Marine Energy Collegiate Competition.

[ICOE2020.org](http://ICOE2020.org)

The Call for Abstracts is open for both the industry and research tracks

[SUBMIT BY NOVEMBER 15<sup>TH</sup>!](#)



WPTO held its 2019 Peer Review in Alexandria, Virginia on October 8-10.

# 2019 PROJECT PEER REVIEW

U.S. DEPARTMENT OF ENERGY  
WATER POWER TECHNOLOGIES OFFICE



Peer review is defined as:

*A rigorous, formal, and documented evaluation process using objective criteria and qualified and independent reviewers to make a judgment of the technical/ scientific/business merit, the actual or anticipated results, and the productivity and management effectiveness of an Office's portfolio of projects.<sup>2</sup>*

- Essential to providing robust, documented feedback to inform program planning
- Essential to designing future program and to enhancing existing efforts

- FY17, FY18, Q1 and Q2 of FY19 (October 2016 – March 2019)
- Projects with industry & academia as well as National Labs





- 1. Gather important feedback to inform the future of water power R&D.** Assess past accomplishments and challenges to inform the future. (*historical goal*)
- 2. Leverage Peer Review to disseminate work to new audiences and engage more stakeholders.**
- 3. Enable all participants (not just reviewers) to provide feedback on the future of WPTO and the programs' strategic direction through:**
  - dedicated networking breaks and discussion time throughout the week, in addition to Q&A sessions
  - comment boxes in all session rooms for attendees to submit feedback anonymously
  - end-of-review Town Hall (open feedback forum with WPTO staff for all Peer Review attendees)



# Thank you to our MHK reviewers

## Foundational R&D, Technology Design, and Validation Panel

- **Elaine Buck**, European Marine Energy Centre (MHK Chair/Panel Lead)
- **Alex Fleming**, iMetalx Group LLC
- **Andy Hamilton**, Monterey Bay Aquarium Research Institute
- **Henry Jeffrey**, The University of Edinburgh
- **Jim Bretl**, Korvis Automation
- **Mike Muglia**, University of North Carolina



## Reducing Barriers to Testing and Data Sharing Panel

- **Chris Bassett**, University of Washington (Panel Lead)
- **Anu Kumar**, U.S. Navy, Living Marine Resources Program
- **Gayle Zydlewski**, University of Maine
- **Jason Wood**, SMRU Consulting
- **Martin Wosnik**, University of New Hampshire
- **Whitney Hauer**, BOEM Pacific OCS Office

# Thank you to our Hydro reviewers

## New Technology and Modernization Panel

- **Greg D. Lewis**, Duke Energy (Hydro Chair/Panel Lead)
- **David Hanson**, Retired (formerly Sacramento Municipal Utility District)
- **David Sinclair**, Advanced Hydro Solutions
- **Steve Lewis**, Sapere Consulting



## Environmental R&D and Data Management Panel

- **Tim Brush**, Inter-Fluve (Panel Lead)
- **Colleen McNally-Murphy**, American Rivers
- **Edith Zagona**, University of Colorado-Boulder
- **Juliusz Kirejczyk**, Independent Consultant



## Grid Reliability and Resilience Panel

- **Scott Flake**, Independent Consultant (Panel Lead)
- **John Simonelli**, Retired (formerly ISO New England)
- **Charlton Clark**, formerly DOE
- **Tom Acker**, Northern Arizona University





## **Process on Feedback**

1. This WPTO Peer Review felt different.
  - First comprehensive review looking at years of WPTO as an independent office.
  - Also the first Peer Review since much of our office management was in place, including Director Alejandro Moreno.
2. Venue and organization were significantly better than in past reviews.
3. Non-review sessions (such as the panels) brought important outside perspectives to our event.
4. We heard the program and project presentations were generally much better than in past reviews.
5. In the next WPTO Peer Review, we'll make sure to focus more on project milestones and decision points, such as Go/No-Gos for FOA projects and merit review for lab projects.

## WPTO Office-level Feedback

1. Enthusiasm for WPTO's use of a variety of funding mechanisms
  - We need flexible funding mechanisms that allow people to fail fast and small.
2. Importance of meaningful, early, and frequent stakeholder engagement and impactful dissemination
  - Importance of collaboration and communication for individual projects – not just that the project teams are disseminating but that they're making an impact
  - We in WPTO are thinking of additional ways to help and empower our researchers to do effective stakeholder engagement.
    - *For example, we are developing a WPTO communications toolkit for PIs!*
3. WPTO may need to do more in the areas of performance metrics, quantifying WPTO's impact and ROI, and tracking commercialization.



## Hydro

1. It will be impossible to build new hydropower if we keep doing it the same way. This is why things like SMH might be promising.
  - Especially considering the program's emphasis that any new hydro needs to be environmentally compatible.
2. Importance of stakeholder engagement and dissemination. On hydro side specifically, we seemed to hear:
  - WPTO should engage broader grid/power system stakeholders to increase cross-technology opportunities.
  - WPTO should engage ISOs & RTOs more.
  - Attendees were interested in the best way to disseminate results of WPTO-funded valuation studies.
3. HydroWIREs is an important area of research for the program. Some discussion around the scope of research.
  - For example: Related to hydropower flexibility, some attendees recommended WPTO-funded research to consider not just past or current flexibility provided but full potential as well as the range of future scenarios (including extreme events and conditions).
4. Performance metrics
  - Especially about environmental performance
5. Tag capabilities, next steps
  - Developing a commercialization strategy from lab to market and the potential to expand to other species
  - Broad application potential with micro-batteries

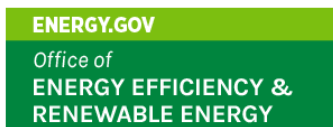
## MHK

1. Importance of stakeholder engagement and dissemination. For the MHK Program specifically, we seemed to hear:
  - WPTO is doing a good job incentivizing data sharing and should do this more, especially sharing lessons learned and failures.
  - WPTO has developed great tools, and we need to ensure all developers are aware of the “toolkit” DOE has provided. Communication and dissemination is key to ensure that people are aware and can access the tools they need.
2. The National Labs are doing great work and have proven responsive to feedback from stakeholders. Industry wants to work with them, but industry members also need easy and cost effective mechanisms to do so.
  - TEAMER is a step in the right direction.
3. Performance metrics – if not LCOE, what else?
4. Standards are important.
  - Not only for technology development through TC114 but also to have more standardization and consistency in environmental monitoring technologies and measurements.
5. Marine energy developers face supply chain challenges – is there any way WPTO could help in this area?
  - How to incentivize vendors to reduce costs without the guarantee of scaling?
6. MHK Program could do more to coordinate with offshore wind researchers and stakeholders.
  - Including environmental research, regulator engagement, work with BOEM's research arms, but also on foundational research side of the program like materials.

# Learn more about WPTO through our Water Wire and projects map (new projects will be added soon!)

## The Water Wire

- Monthly e-newsletter from WPTO
- Get updates on funding opportunities, events, publications, webinars, R&D successes and more



### The Water Wire

October 1, 2019

[Energy Department Announces Network Director for Marine Energy Research and Testing Program](#)

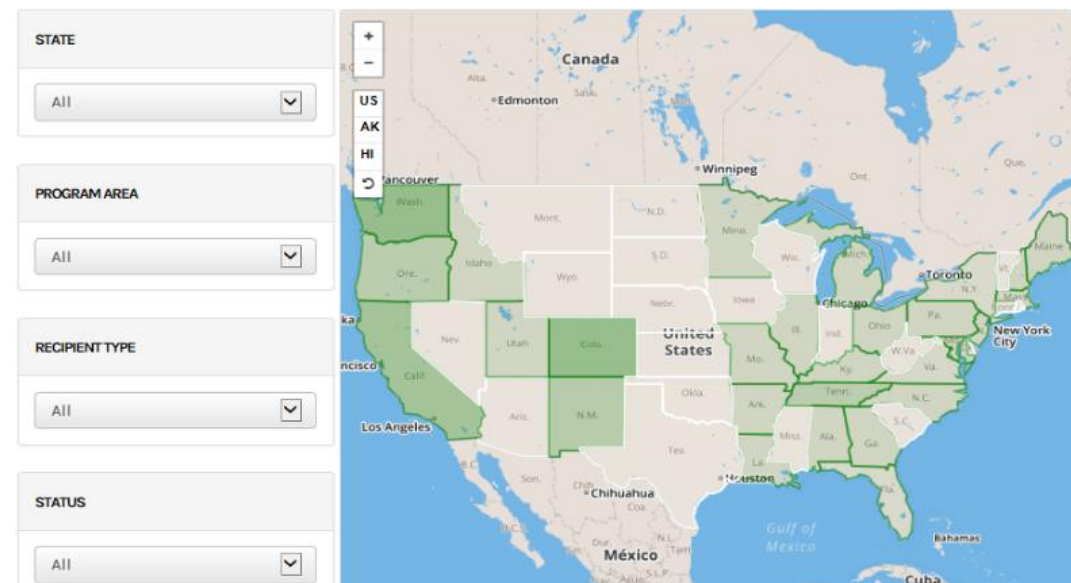
The Water Power Technologies Office has selected a network director for a new program to support testing and research for marine energy technologies—the U.S. Testing Expertise and Access for Marine Energy Research (TEAMER) Program. TEAMER will bring together capabilities from universities and the national laboratory system to provide marine energy developers ready-access to unique, world-class testing facilities and expertise. Through its network of facilities and testing protocols, the program will simplify access and reduce costs of testing for MHK technology developers – ensuring access to the appropriate facilities at the appropriate time.

**Subscribe to The Water Wire**

Submit your e-mail address below.

[energy.gov/eere/water/subscribe-water-power-technologies-office-news-updates](https://energy.gov/eere/water/subscribe-water-power-technologies-office-news-updates)

## Interactive Projects Map



- Features multiple filters to isolate specific details on DOE hydropower and marine energy projects
- Contains historical information on completed projects with research findings, and publication links

[energy.gov/eere/water/water-power-technologies-office-projects-map](https://energy.gov/eere/water/water-power-technologies-office-projects-map)

This Q&A session will conclude the webinar.

The webinar will be recorded, transcribed, and shared in a future edition of the Water Wire.

Thank you for joining us today! We hope to stay in touch.

### ***Stay up to date with WPTO.***

Follow our Water Wire for periodic updates on funding opportunities, events, publications, and our next webinar.

### ***Reach out to us!***

You can send us a question, offer feedback, or request a meeting by writing to [WaterPowerTechnologiesOffice@EE.DOE.GOV](mailto:WaterPowerTechnologiesOffice@EE.DOE.GOV)

### ***Look out for public funding opportunities.***

Funding opportunities and Requests for Information (RFI) are publicly posted on **EERE Exchange** (except SBIR and STTR which can be found on [energy.gov/science](https://energy.gov/science)).



### **Subscribe to The Water Wire**

Submit your e-mail address below.

GO

← → ↻ 🏠 <https://eere-exchange.energy.gov>

## **EERE Funding Opportunity Exchange**

[EERE](#) » [Financial Opportunities](#) » [Funding Opportunity Exchange](#)



# *Backup*

**Externally Distributed Competitions** – Vehicles to fund competitive solicitations that aim to identify and fund solutions or ideas that are developed by private industry.

**FOAs** – Long term, multi-year, with serious funding commitment.

**Prizes** – Focused application or attention-focusing, smaller funding awards and faster timeline. Often interdisciplinary, and attracts new performers.

**SBIR/STTR** – Available to startups and small businesses, specific for prototyping and commercialization.

**Lab-Led/Executed Solicitations with Industry Focus** – Mechanisms that leverage the expertise and resources of the National Laboratories, with the intended recipient being industry or academia.

**CRADAs** – Can be used as a vehicle for either support on competitive solicitations (light form), or through direct agreements between labs and industry. Could include vouchers.

**Notice of Technical Assistance (NOTA)** – Funded support by DOE available to industry competitively.

**National Lab - DOE Contract Only** – Agreements between National Labs and the DOE, with the Labs being the recipient of the funds.

**Lab Calls** – Competitive call to labs, with multi-year agreements.

**Annual Operating Plans** – Annually reviewed plans, managed by DOE staff.

**Request for Innovation** – Light competition to find new ideas to fund at the labs.

**Technology Commercialization Fund (TCF)** – Commercialization funding available to labs to work directly with industry on tech transfer.

**Mechanisms with Other Agencies** – Mechanisms to conduct funded work with other federal agencies.

**Broad Agency Announcements (BAA)** – Interagency call, typically for technologies.

**Interagency Agreements (IAA)** – Agreements between agencies for joint work or solicitations.

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