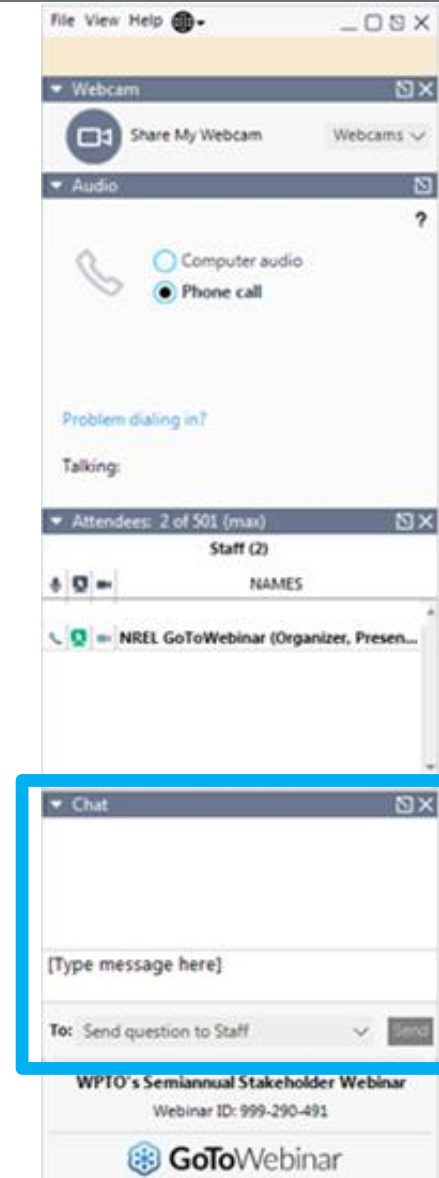




- All listeners have been muted as this webinar will be recorded, transcribed, and shared on our website and in a future edition of the Water Wire.
- If you have issues with the webinar, please send us a note using the chat box on the right-hand side of your screen.
- The webinar will conclude with a Q&A session. Please send questions by 2:15pm ET to WaterPowerTechnologiesOffice@EE.DOE.GOV.
 - Names of individuals submitting questions will remain anonymous to our listeners.
 - If we do not get to your question, we will follow up via email.



- 1:00-1:05 Welcome, logistics, agenda – Allison Johnson
- 1:05-1:12 Remarks from Derek Passarelli, Director of the Golden Field Office
- 1:12-1:20 Remarks from David Solan, DOE Deputy Assistant Secretary for Renewable Power
- 1:20-1:30 WPTO Peer Review Report, key takeaways & action items – Alejandro Moreno
- 1:30-1:55 Updates from the MHK Program – Tim Ramsey & Jenn Garson
- 1:55-2:20 Updates from the Hydropower Program – Tim Welch & Sam Bockenbauer
- 2:20-2:25 Q&A: Submit questions by 2:15pm ET to WaterPowerTechnologiesOffice@ee.doe.gov!
- 2:25-2:30 Closing

Today's Speakers

**Stakeholder
Engagement Lead**
Allison Johnson



**Golden Field Office
Director**
Derek Passarelli



**Deputy Assistant Secretary
for Renewable Power**
David Solan



WPTO Director
Alejandro Moreno



**Marine & Hydrokinetics
Program Manager**
Tim Ramsey



**Lead for Prizes and
Powering the Blue Economy**
Jenn Garson



**Hydropower
Program Manager**
Timothy Welch



HydroWIRES Lead
Sam Bockenbauer



Derek Passarelli, Golden Field Office Director

Derek oversees the critical operations and support functions in Golden that are key to fulfilling EERE's clean energy mission.

As Director, he is responsible for oversight and implementation of EERE's financial assistance portfolio. He also leads the management and oversight of the National Renewable Energy Laboratory, the nation's preeminent laboratory solely dedicated to renewable energy and energy efficient technology R&D and commercialization.



David Solan, DOE Deputy Assistant Secretary for Renewable Power

David Solan directs renewable energy applied research, development, and demonstration activities for the geothermal, solar energy, and wind and water power technology offices in the Office of Energy Efficiency and Renewable Energy (EERE). In addition, he oversees EERE's energy system integration efforts.



Office highlights since our last webinar

11/12	EERE announced SBIR/STTR Phase 1 Release 2 FOA with five topics related to hydro and marine energy
11/14	WPTO announced 20 winners of the Waves to Water Prize CONCEPT stage and opens the Ocean Observing Prize at White House Ocean Summit
11/21	DOE announced the Plastics Innovation Challenge
12/2	Senate confirmed Dan Brouillette as the new Secretary of Energy
12/18	WPTO selected 48 recipients for \$6.6M 2019 Hydropower Production Incentive Program
1/9	DOE launched Energy Storage Grand Challenge
1/27	Fish Protection Prize CONCEPT stage opened
2/4	DOE and Norway's Royal Ministry of Petroleum and Energy signed MOU to collaborate on hydropower R&D
2/19	WPTO partnered with EDA to launch \$4M Blue Economy Industry Challenge
3/31	WPTO released \$22M FOA for marine energy foundational research and testing infrastructure
4/2	DOE and NOAA announced 11 winners of the Ocean Observing Prize DISCOVER stage
4/6	ARPA-E announced \$38M SHARKS program to develop hydrokinetic turbines for tidal and riverine currents
4/22	WPTO published the 2019 WPTO Peer Review Report
4/27	WPTO released RFI seeking feedback on Hydro Program foundational strategy and HydroWIRES roadmap
5/12	WPTO released new round of funding for the Hydropower Production Incentive Program



Hydro & MHK



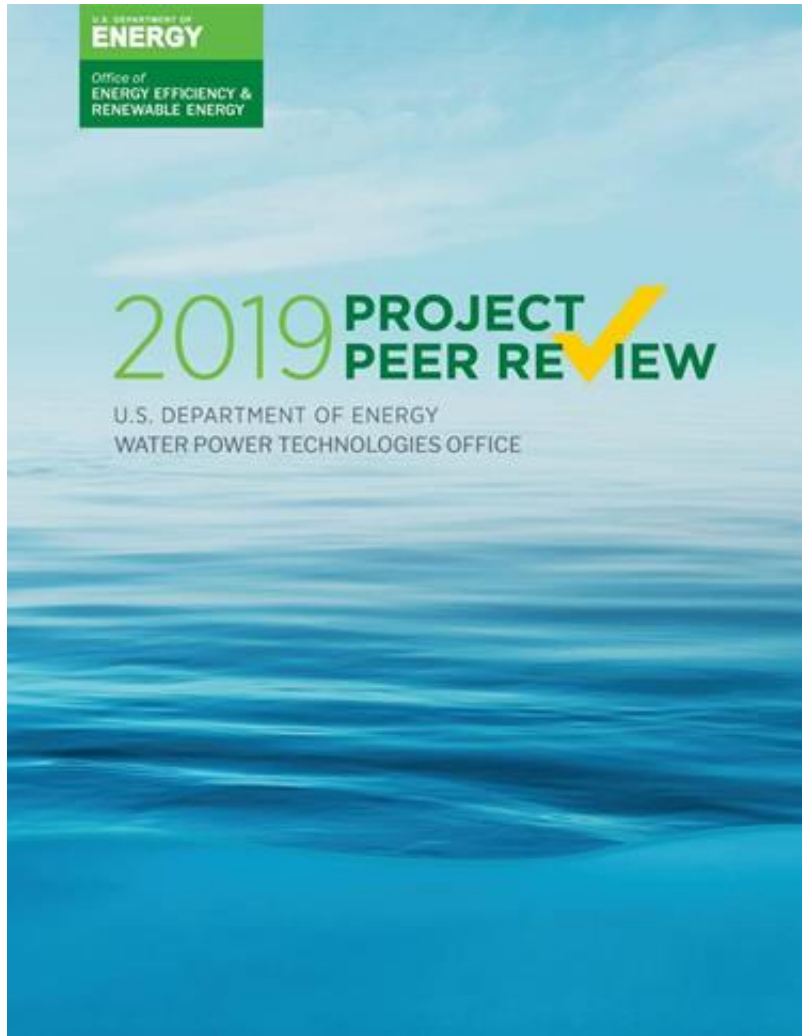
Hydropower Program



MHK Program



DOE



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



energy.gov/eere/water/water-power-program-peer-reviews

Strategies

- (1) program strategy and objectives;
- (2) program portfolio;
- (3) program management approach; and
- (4) stakeholder engagement, outreach, and dissemination

Projects

- (1) project objectives, impacts, and alignment with the program strategy;
- (2) end user engagement and dissemination strategy;
- (3) management and technical approach;
- (4) technical accomplishments and progress; and
- (5) future work

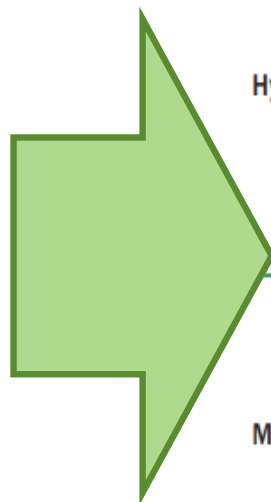
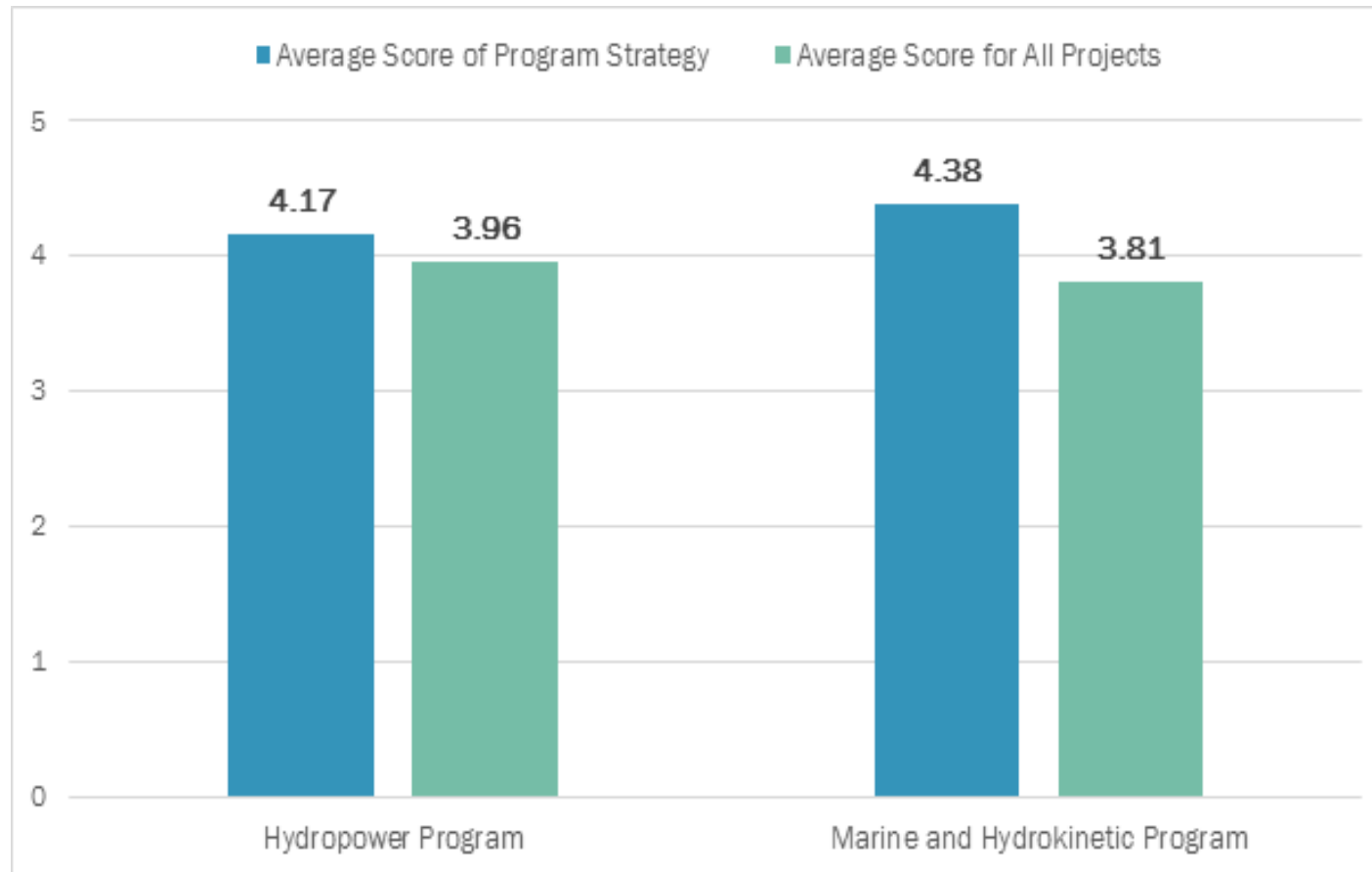


Table 1. WPTO's Peer Reviewed Projects and Strategic Initiatives.

Program	Activity Area	Number of Projects
Hydropower	Technology R&D for Low-Impact Hydropower Growth	8
	Grid Reliability, Resilience, and Storage	9
	Modernization, Upgrades, and Security	2
	Environmental R&D and Hydrologic System Science	10
	Big-Data Access and Management	7
	<i>HydroWIRES Initiative*</i>	
Marine and Hydrokinetics	Foundational and Crosscutting R&D	12
	Technology-Specific Design and Validation	8
	Reducing Barriers to Testing	15
	Data Sharing and Analysis	6
	<i>Powering the Blue Economy*</i>	
Total Number of Projects		77

*Strategic initiatives

Program Strategy and Project: Average Scores



1. Reviewers expressed support for both **programs' strategies and high level objectives.**
2. Reviewers were very supportive of WPTO's use of a **variety of funding mechanisms.**
 - Especially for prizes and other funding mechanisms that de-risk technology development by allowing the failures to happen early and at a small scale.
3. Reviewers provided many comments on the **quality of WPTO staff**, recognizing this is and should be our greatest strength.

1. Some areas of the program could do more in terms of **industry and stakeholder engagement**.
 - Some areas of our programs are doing this well, while others need improvement.
 - Reviewers recommended some projects need stakeholder engaged throughout the entire project cycle. They recommended including merit reviewers as advisors, especially for critical GNG decision points.
2. WPTO needs to do more in the areas of **performance metrics**.
 - Both at a project level (i.e., how do we define success) and at a program level (specifically in quantifying WPTO's impact, return on investment, and commercialization successes)
3. WPTO needs to strengthen its **data sharing efforts**.
 - We recognize that we are collecting large amounts of valuable data, but our current structures for accessing these data don't adequately ensure quality and ease of use.

What does the peer review feedback mean for the MHK Program?

1. Reviewers expressed support for the program's use of a **variety of funding mechanisms** and the **Powering the Blue Economy** portfolio. The program will continue to:
 - leverage creative mechanisms to support R&D,
 - encourage and facilitate lab-industry partnerships,
 - and develop new, flexible funding programs when needed - such as TEAMER.
2. WPTO needs to do more in the areas of **performance metrics**. The program will prioritize the development of technology performance metrics, re-baseline LCOE targets, and support office-wide efforts to refine our program metrics.
3. The program recognizes we collect large amounts of valuable data but our current structures for accessing these data don't adequately ensure quality and ease of use. **We will strengthen our data sharing efforts** by assessing gaps in our data sharing portfolio and opportunities to improve the functionality of data platforms.



Key Finding:

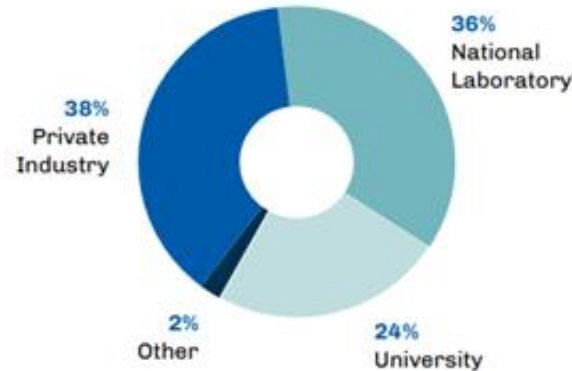
- Global wave and tidal stream energy production surged tenfold over the last decade.

Report Contents:

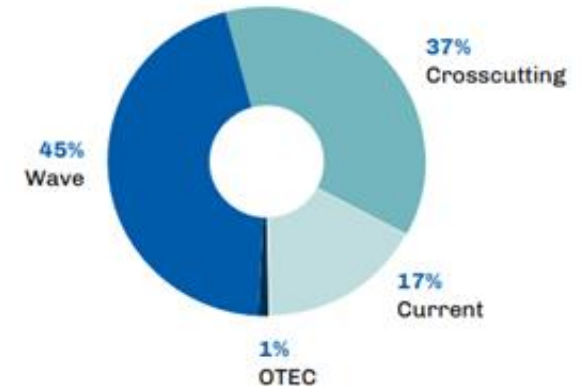
- Overview of OES
- Key achievements and collaborative projects in 2019
- International activities on ocean energy with country-specific highlights

From U.S. chapter: decadal breakdown of DOE MHK Program funding

Percent of total Funding Distribution by Recipient
FY 2008-2018



Percent of total Funding Distribution by Resource Type
FY 2008-2018



Open funding opportunity: \$22M for marine energy R&D at research institutions

Key objectives:

- Grow and enhance R&D partnerships between universities, other research institutes, and industry
- Advance marine energy capabilities at research intuitions, including in the Atlantic region
- Enhance and develop new testing infrastructure
- Improve transparency and collaboration among marine energy research partners
- Develop a strong pipeline for a STEM workforce focused on marine energy
- Encourage new research entities to apply
- Increase research institutions' participation in the new TEAMER program

1 - Foundational Research and Development (R&D)

Impactful R&D to enhance the commercial viability of the U.S. marine energy technologies. Topic areas of interest include: 1) Advanced Materials, 2) Controls, 3) Numerical Modeling, 4) Components/subsystems, and 5) Resource Characterization. Other areas of interest include, but not limited to, project or types of technology areas in the PBE space as well as research on Installation, Operations and Maintenance, and other Transformative Challenges.

2 - Atlantic Marine Energy Center (AMEC)

There are currently three National Marine Renewable Energy Centers (NMRECs) established through past WPTO funding. The new AMEC will support and further develop the marine energy industry in this region. AMEC, similar to other NMRECs, will complement and enhance the TEAMER program by providing additional choice of and access to test facilities in the Atlantic region.

3 - Foundational Research Network Facilitator (FRNF)

A FRNF will work with and expand the WPTO network of research entities working on marine energy research. The FRNF's role is to help maximize the impact of research carried out across many different non-federal research institutions that will be supported under Topic Areas 1 and 2.

4 - Current Energy Technology Testing Infrastructure

To address a gap in the U.S. testing infrastructure, WPTO will solicit proposals for open water, non-grid connected testing capabilities for current energy converters (CEC). Funds will support design, planning, fabrication, accreditation, and the first year of operations and maintenance for a mobile CEC test vessel.

FOA Issue Date:	March 31, 2020
Submission Deadline for Concept Papers:	May 11, 2020 5:00 pm ET
Submission Deadline for Full Applications:	July 2, 2020 5:00 pm ET
Submission Deadline for Replies to Reviewer Comments:	August 19, 2020 5:00 pm ET
Expected Date for EERE Selection Notifications:	September 2020
Expected Timeframe for Award Negotiations:	September - December 2020

For questions regarding the content of this FOA, please contact MHKFOA@ee.doe.gov

Stay tuned for future announcements from the MHK Program, including:

- TEAMER – first open eligibility round anticipated to begin May 26
- In-water device testing
- State of the Science Report – draft 2020 report will be made public in June
- MHK Program Strategy, Multi-Year Program Plan, and LCOE re-baselining
- Powering the Blue Economy updates – look out for updates on our prizes, competitions, and SBIR awards!



2020 update coming soon!



teamer-us.org





WPTO partnered with EDA on a Build to Scale grant: **\$4M Industry Challenge to support and spur Blue Economy entrepreneurship and commercialization. Full applications due June 14.** Selections will be announced in August or September.

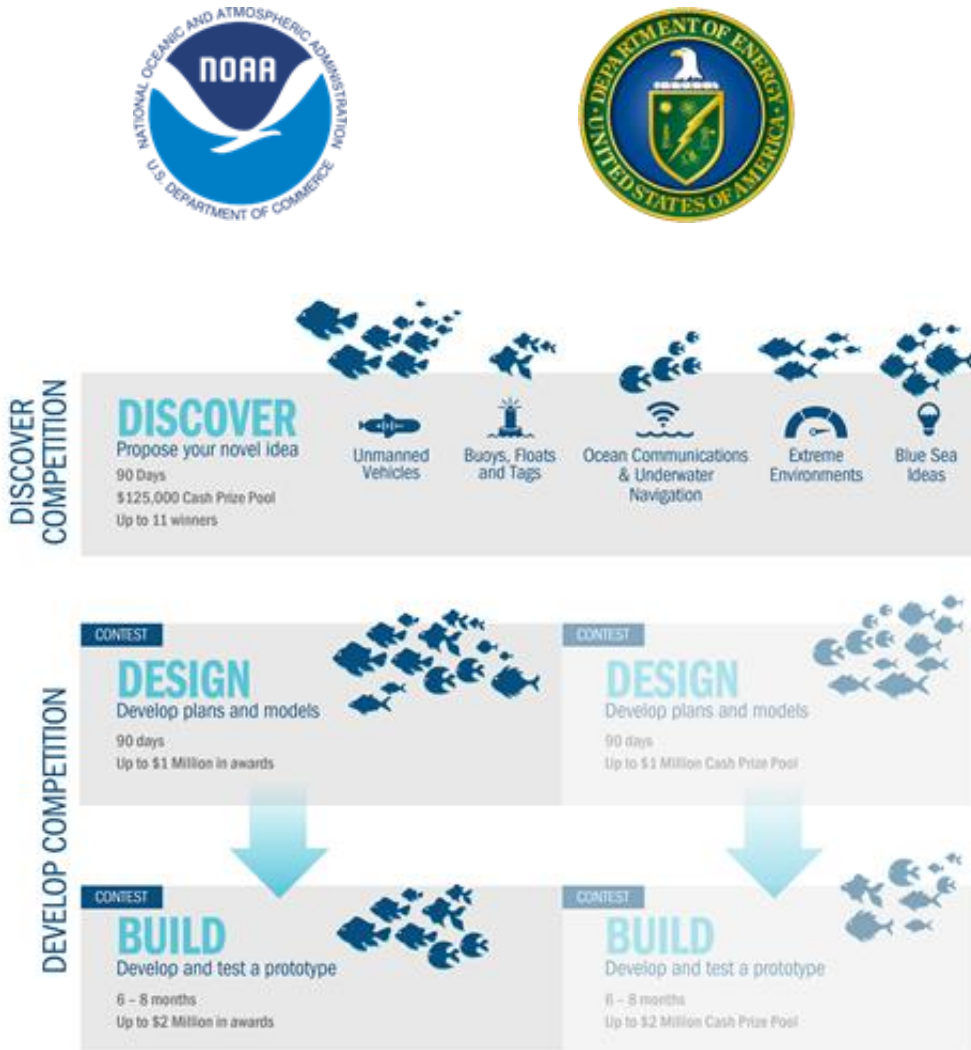


Phase II from FY 2019 - Decisions soon!

Phase I FY 2020 Topics:

- Co-Development of Marine Energy Technology at Smaller Scales
- Waterway Debris Remediation Powered by Marine Energy

Updates on the Ocean Observing Prize



Award	Title	Team
\$25k	CalWave's xNode: A Flexible Ocean Science Platform	CalWave Power Technologies Inc.
\$10k	Livewire: wave energy to power ocean monitoring	Drew Lucas, Del Mar Oceanographic
\$10k	Green Power for Persistent Ocean Observing	Seatrec
\$10k	Halona WEC Mobile AUV Docking Station	Halona WEC, Univ. of Hawaii
\$10k	Pulse of The Ocean	Fadel Adib's, MIT
\$10k	Mission Unlimited UUV Station	Brian Theobald, Northrup Grumman
\$10k	Wave Powered Oceanographic Gliders	WaveVenture
\$10k	BlueLink	BlueLink
\$10k	The RIB WEC	Navatek
\$10k	P.A.zolutions	University of Pittsburgh
\$10k	OCG-Data: a smart and clean ocean observer	Ocery

DEVELOP Competition Theme

Based on results from the DISCOVER Competition, the theme of the DEVELOP Competition will be Buoys and Autonomous Systems, a combination of buoys, floats, and tags and unmanned systems.

Expected Announcement of First DEVELOP Competition: June

Expected Opening of First DEVELOP Competition: August

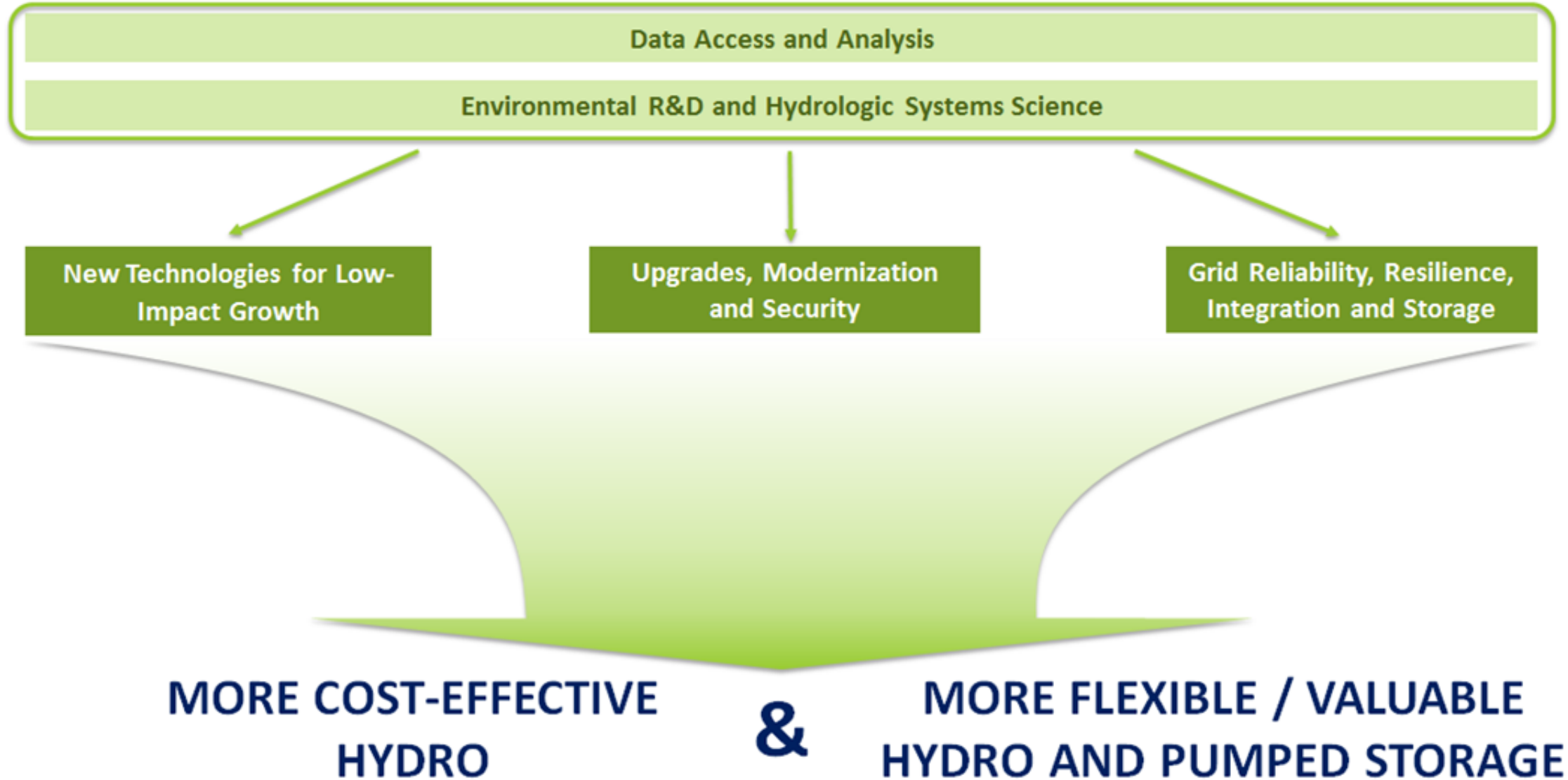
What does the peer review feedback mean for the Hydropower Program?

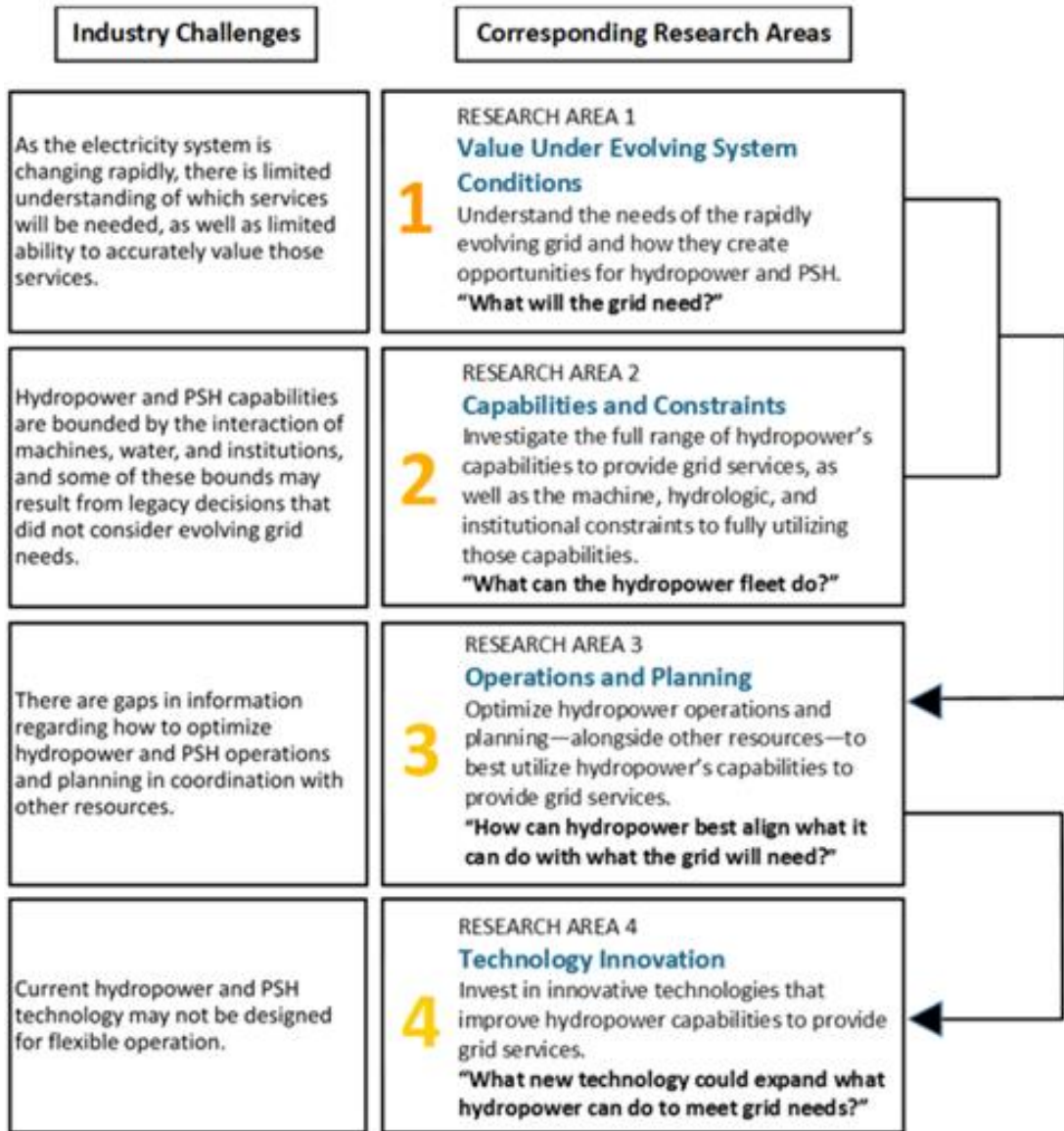
1. Reviewers expressed support for both **programs' strategies and high level objectives**. After receiving feedback through the public RFI, the program will develop a long-term strategy and refine the HydroWIRES research roadmap.
2. Some areas of the program could do more in terms of **industry and stakeholder engagement**. WPTO is investigating our potential to act on a specific suggestion from the hydro reviewers - to include FOA **merit reviewers as advisors** throughout the entire project life cycle, particularly for the Go/No-Go decisions.
3. We will work to address reviewers' feedback that the program must **add more rigor to our required milestones and Go/No-Go reviews** to focus on metrics of success.

- Clearly communicate the rationale for and organization of possible DOE supported Hydropower R&D out to 2030
- Help to focus Program activities to create greatest impact on new technology and industry advancement
- Understand where DOE can have the most important impacts related to needs identified in the Hydropower Vision Roadmap
- Identify activities that the Hydropower Program can take to increase the competitiveness and grid resiliency and reliability contributions of U.S. hydropower and pumped storage

Challenges for hydropower and pumped storage in the U.S.

Untapped Opportunities for Hydropower & Pumped Storage to Support a Rapidly Evolving Grid	Limited Opportunities for New, Affordable Growth Given Existing Hydro Technologies	Maintaining Cost-Competitiveness and Security of Existing Hydropower Assets Given Fleet Age	Addressing Environmental Impacts and Hydrologic Uncertainties	Limited Access to Information Necessary to Support Decision-Making
<ul style="list-style-type: none"> As the electricity system rapidly changes, there is limited understanding of which services will be needed, and the ability to accurately value those services Hydropower and PSH capabilities are bounded by the interaction of machines, water, and institutions, and some of these bounds may result from legacy decisions that did not consider evolving grid needs There are gaps in information regarding how to optimize hydropower operations and planning in coordination with other resources Current hydropower and PSH technology may not be designed for flexible operation 	<ul style="list-style-type: none"> Remaining new hydro resources (including non-powered dams, new stream-reaches and conduits) are smaller, lower-head, more diverse and distributed, and require new technologies to be cost-competitive Conventional hydropower designs can have significant environmental impacts that are often uncertain, complex, and require difficult or expensive mitigation measures There is a lack of infrastructure and capabilities to test and validate new technologies and designs Existing value streams for hydropower are limited and often insufficient to support new development. 	<ul style="list-style-type: none"> Introduction of new technologies and upgrades of the existing fleet occur over long time periods given longevity of assets Hydropower facilities are extremely different from one another, with wide ranges of operational and physical characteristics and limited information availability Hydropower and PSH plants are increasingly connected to information technology systems which heighten cybersecurity risks Effective application of digitization requires a heretofore unestablished “right sized” focus on information and analytics 	<ul style="list-style-type: none"> Hydropower plants and the environments they are deployed in are both extremely diverse There are remaining scientific knowledge gaps around biology, behavior and interaction of many species with hydropower facilities (including limitations in instrumentation and monitoring technologies) There is uncertainty regarding potential future changes to hydrologic systems and weather patterns, and the effects to hydropower operations and the ecosystems in which they operate 	<ul style="list-style-type: none"> Data on technologies, resources, environmental attributes, markets, etc. are widely dispersed, of differing qualities, and difficult to gain access to Regulatory processes are cost and time-intensive, and there is poor information and data available / accessible on regulatory process outcomes and drivers The many uses of/for water itself make development and operation of hydropower complicated and there are analytical challenges in evaluating tradeoffs, and management objectives (environmental, recreational, irrigation, etc.) that are changing, and sometimes unclear and difficult to reconcile





In 2019, WPTO launched the HydroWIRES Initiative (energy.gov/hydrowires) to understand, enable, and improve hydropower and pumped storage hydropower's contributions to reliability, resilience, and integration in the rapidly evolving US electricity system.

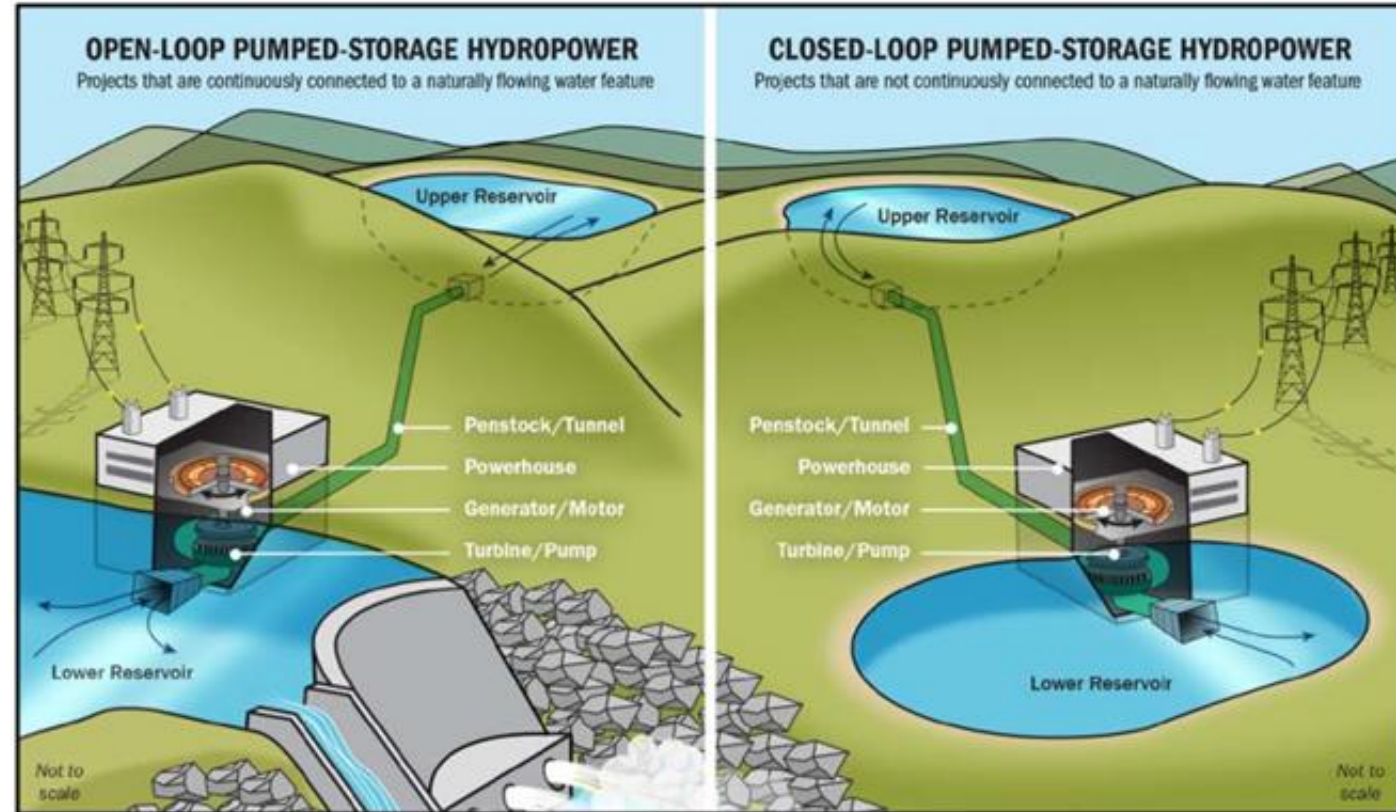
New HydroWIREs report finds closed-loop PSH likely to create less environmental impact than open-loop

A Comparison of the Environmental Effects of Open-Loop and Closed-Loop Pumped Storage Hydropower (released April 2020)

There are no US closed-loop PSH projects so environmental effects are not well documented.

Based on information from the FERC record, this report concludes that the **environmental effects of closed-loop projects are generally lower (i.e., more localized and of shorter duration) than those of open-loop projects** because they:

1. are located “off-stream,” potentially minimizing aquatic and terrestrial impacts, and
2. often have greater siting flexibility than open-loop projects.



Published:

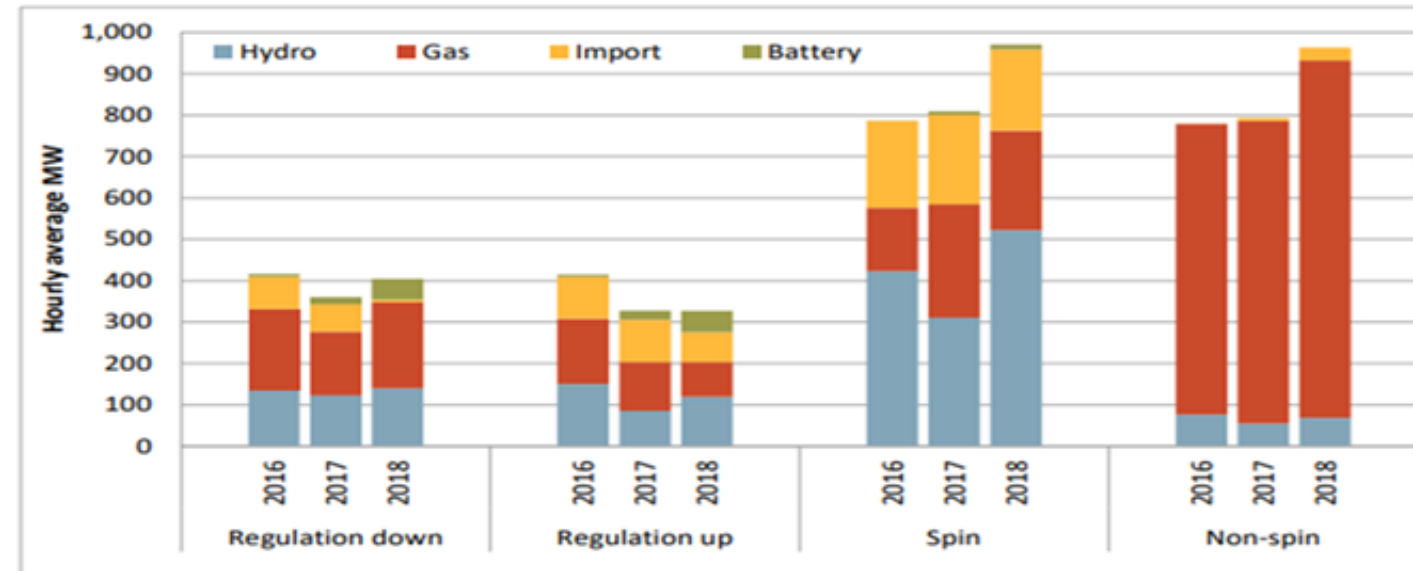
- Hydropower Plants as Black Start Resources
- Energy Storage Technology and Cost Characterization Report
- Closed-loop pumped storage environmental effects

Near-Final Drafts:

- Hydropower representation in production cost modeling (workshop report)
- 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
 - The Value of Water
 - Hydropower Capabilities & Technology Gap + Cost Analysis

Work in Progress:

- NWA workshop report
- Hydropower-battery hybrids (technical report)
- NREL ternary pumped storage (technical report)
- Fast commissioning challenge baseline report (technical report)
- North American Renewable Integration Study (technical report)
- Ground-Level Integrated Diverse Energy Storage (technical report)



Example HVS data: Provision of reserves by hydropower in CAISO

We're seeking your input on foundational strategy documents for the Hydropower Program and the HydroWIRES initiative

WPTO is seeking feedback on our foundational materials for the long-term Hydropower Program R&D strategy and the detailed research roadmap for the new HydroWIRES initiative.

We're interested in YOUR opinion on hydropower's challenges, opportunities to fully leverage hydropower for our evolving grid, and the most impactful R&D to address these issues.

See the full Request for Information (RFI) on EERE Exchange (eere-exchange.energy.gov) and submit your feedback by June 24 to WPTORFI@ee.doe.gov.

Much more happening across the Hydropower Program, including:

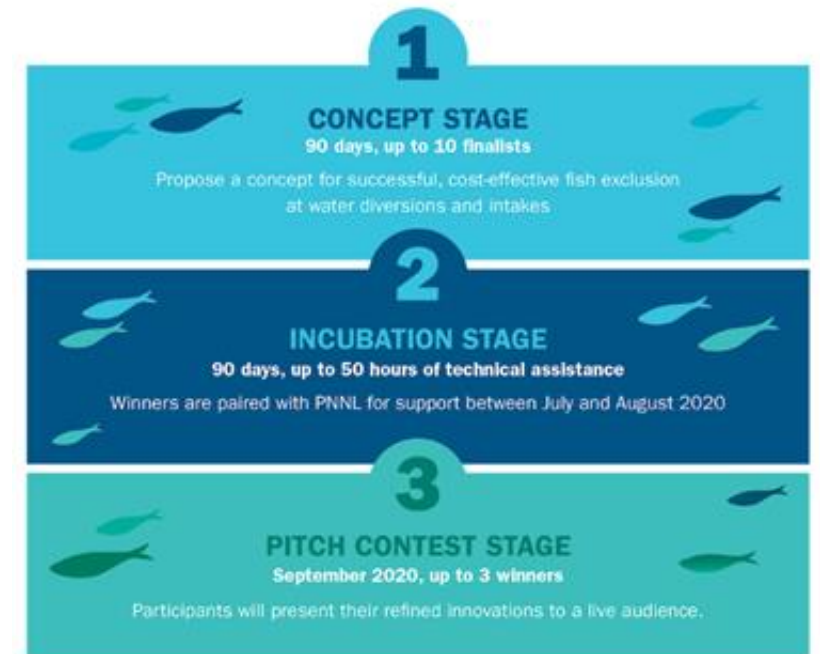
A call for applications for EAct 2005 Section 242 **Hydroelectric Production Incentive Program!** Just announced today. Applications due July 13th!

The **Fish Protection Prize's** CONCEPT stage closes tomorrow, May 13th. Get your ideas in!

Developing **hydropower digital twins** and a **cybersecurity valuation methodology**.



SBIR & STTR FY19 Phase I – selections will be announced soon for the topic area on **Innovative Sensing and Data Platforms for Water and Hydropower**.



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

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).



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