

U.S. DEPARTMENT OF  
**ENERGY**

Office of  
**ENERGY EFFICIENCY &  
RENEWABLE ENERGY**

# water

U.S. DEPARTMENT OF  
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& RENEWABLE ENERGY**

WATER POWER TECHNOLOGIES OFFICE

## Semiannual Stakeholder Webinar

**March 10, 2022**

# Welcome

- All listeners have been muted as this webinar will be recorded, transcribed, and shared on our website and in future editions of the Water Wire, Hydro Headlines, and Water Column.
- If you have issues with the webinar, please send us a note using the chat box on the righthand side of your screen.
- The webinar will conclude with a Q&A session. Please send questions by 1:30 PM ET to [WaterPowerTechnologiesOffice@EE.DOE.GOV](mailto:WaterPowerTechnologiesOffice@EE.DOE.GOV) or use the chat box in Zoom.
  - *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.*



# Speakers

Maxine Hillman  
Communications Analyst



Kelly Speakes-Backman  
Principal Deputy Assistant  
Secretary, EERE



Jennifer Garson  
Director



Corey Vezina  
Hydropower Technology  
Manager



Samuel Bockenbauer  
HydroWIRES Lead



Tim Ramsey  
Marine Energy Program  
Manager



Tessa Greco  
Powering the Blue Economy  
Lead



Ashley Brooks  
Diversity, Equity, and  
Inclusion Lead



# Kelly Speakes-Backman

## Principal Deputy Assistant Secretary, Office of Energy Efficiency and Renewable Energy

Kelly Speakes-Backman is the Principal Deputy Assistant Secretary for the Office of Energy Efficiency and Renewable Energy (EERE) at the U.S. Department of Energy. In her role, Speakes-Backman leads and directs the Office of Energy Efficiency and Renewable Energy, focused on creating and sustaining American leadership in the transition to a global clean energy economy. She oversees the planning and execution of the organization's \$2.8B portfolio of research, development, demonstration, and deployment activities in energy efficiency, renewable energy, and sustainable transportation.



# Jennifer Garson

## Director, Water Power Technologies Office

Jennifer Garson was recently named WPTO director after serving as acting director since May 2021. Since she joined WPTO more than three years ago, Jennifer has led some of the office's key activities and initiatives—like the Powering the Blue Economy initiative—and a portfolio of prizes, interagency grants, and other programs. She has focused on increasing the impact of federal funding for supporting innovation, including leveraging nontraditional financial mechanisms. Over the last decade, she has worked across the Department of Energy (DOE), the federal government, and in partnership with the private sector to launch and create new programs, prizes, and commercialization approaches.



## Fiscal Year (FY) 22 Appropriations

Yesterday, the House and Senate appropriations committees released the FY 2022 spending package.

**\$162 million for WPTO**, not less than \$47 million for hydropower and \$112 million for marine energy.

For more details, see pages 42-43 of the bill (or pages 88-89 of the PDF) shared in the chat.

## Infrastructure Investment and Jobs Act (a.k.a., the Bipartisan Infrastructure Law)

Signed into law by President Biden on November 15.

Nearly \$1 billion for water power programs at DOE, including **\$146.4 million to WPTO** for FY 22-25, including \$36 million for hydropower, \$70.4 million for marine energy, and \$40 million for the National Marine Energy Centers.



# Multi-Year Program Plan (MYPP)

- On March 8, 2022, WPTO released its first MYPP, which outlines the office's research priorities and plans through 2025.
  - Serves as strategic vision and operational guide to help WPTO manage and coordinate its activities.
  - Vehicle to communicate WPTO's mission, goals, and plans to water power stakeholders and the public.
- All outlined goals contribute to the overarching mission of WPTO to enable research, development, and testing of new technologies to advance marine energy and hydropower systems for a flexible, reliable grid.
- Learn more at: [energy.gov/eere/water/multi-year-program-plan](https://energy.gov/eere/water/multi-year-program-plan).



# Annual Accomplishments Report

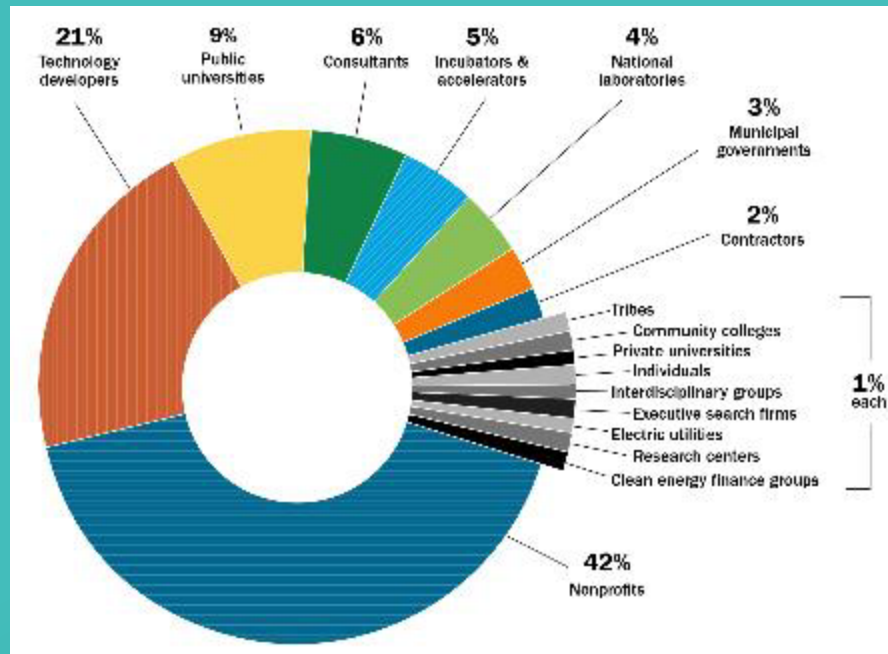


- The Water Power Technologies Office [2020-2021 Accomplishments Report](#) is now available online.
  - Details 48 WPTO-supported projects.
  - Features marine energy and hydropower research and development and highlights partnerships with national labs, academia, and industry.
  - Focuses on data access, analytics, and workforce development; maintenance and cybersecurity; and powering the blue economy.



# Inclusive Innovation RFI Report

- In June 2021, DOE released a request for information (RFI) to understand the current barriers and actions needed to make its funding opportunities and innovation and entrepreneurship activities more inclusive, just, and equitable, in line with the administration's climate goals.
- Received 80 responses from 106 organizations.
- Summarized [in a report](#) released in February 2022.



## Key Takeaways:

- DOE should increase community presence by partnering with strong, trusted community-based organizations or hiring community liaisons to:
  - Disseminate information.
  - Assist applicants in navigating the grant process.
  - Build bridges to disadvantaged communities.
- DOE funding structure is disadvantageous to small organizations and emerging innovators and could be improved by:
  - Reducing or eliminating cost-share requirements.
  - Providing a larger number of small dollar value grants.
  - Simplifying application and subsequent administrative requirements.
  - Expanding scope of awards (e.g., ARPA-E, Open Topic) or tailoring to community needs.
  - Setting aside funding for underrepresented groups and communities.

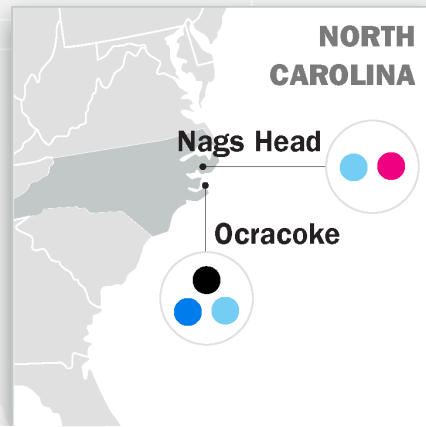
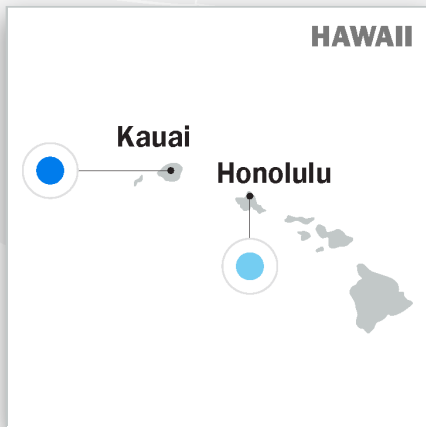
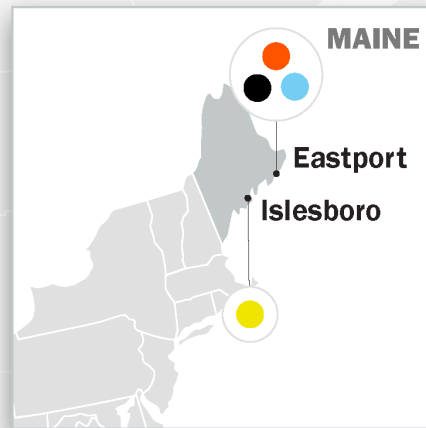
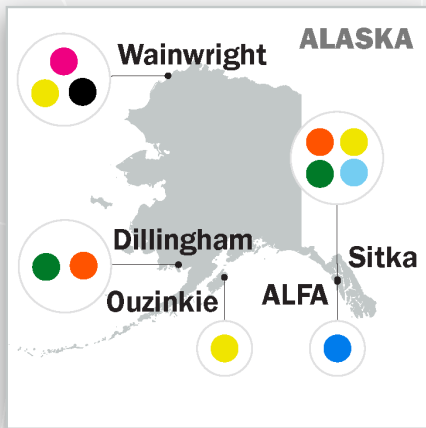
# Energy Transitions Initiative Partnership Project

The Energy Transitions Initiative Partnership Project (ETIPP) is a DOE-sponsored program that provides direct technical assistance to remote, island, and islanded communities across the United States to increase their energy resilience.

- Remote: Isolated from population centers with limited access to centralized energy systems.
- Island: Isolated from the mainland by waterways.
- Islanded: Disconnected from transmission-scale power systems and experience issues with power quality.

Funding and support from DOE and EERE includes:

- Energy Transitions Initiative
- Geothermal Technologies Office
- Solar Energy Technologies Office
- Water Power Technologies Office
- Wind Energy Technologies Office



## TECHNICAL ASSISTANCE AREAS

- Buildings (2)
- Microgrids (5)
- Rates/Tariffs (2)
- Renewable Energy Potential (4)
- Storage (3)
- Transportation (3)
- Hydropower (3)

# Energy Transitions Initiative Partnership Project

- Applications currently open for Cohort 2!
- Apply at: [bit.ly/3fMM2in](https://bit.ly/3fMM2in).
- Selection criteria:
  - Need
  - Project Goals
  - Commitment
- Apply by **April 15, 2022**.







# Hydropower Program Updates

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# Hydropower Program Updates

## Infrastructure Law Hydropower Provisions

### Amendments to Energy Policy Act of 2005

**Section 242:** Adding power to non-powered dams and generation to existing facilities (\$125M).

**Section 243:** Improving existing hydropower facility efficiency (\$75M).

**Section 247:** Maintaining and enhancing existing hydropower through grid resilience, dam safety, and environmental improvements (\$554M).

**Ultimate Goal:** These programs work toward the established goal of modernizing and improving our existing hydropower fleet over the coming decade.

- 242/243 are extensions of programs previously authorized.
- 247 is a brand-new program.

# Hydropower Program Updates

## Section 242 – FY21

- FY21 applications closed February 10, 2022.
  - Received 60+ applications.
- Intend to open FY22 application period after FY21 applications have been reviewed, evaluated, eligibility is determined, and payments are made.
  - Likely opening FY22 application period summer/fall 2022.





# Hydropower Program Updates

## Section 247: Maintaining & Enhancing Hydroelectricity Incentives

**Qualifying facilities:** Federal Energy Regulatory Commission (FERC) licensed and placed in service before enactment of this section.

### Eligible Improvements

#### Improving Grid Resiliency

- Adapting more quickly to changing grid conditions.
- Providing ancillary services.
- Integrating other variable sources of electricity generation.
- Managing accumulated reservoir sediments.

#### Improving Dam Safety

- Maintenance/upgrade of spillways or other appurtenant structures.
- Dam stability improvements, including erosion repair and enhanced seepage controls.
- Upgrades/replacements of floodgates or natural infrastructure restoration.

#### Environmental Improvements

- Adding or improving fish passage.
- Improving water quality.
- Promoting downstream sediment transport processes and habitat maintenance.
- Improving recreational access.

# Hydropower Program Updates

## Section 247: Maintaining & Enhancing Hydroelectricity Incentives

### Funding

- Incentive payments under this section shall not exceed 30% of the costs of the applicable capital improvement.
- Not more than \$5M to any facility in any fiscal year.
- \$553,600,000 (half made available in FY22, half in FY23) to remain available until expended.



# Hydropower Program Updates

## Tentative Section 243/247 Timeline.

\*These dates are subject to change.

	<u>Near Term</u>				<u>Long Term</u>		
	<u>April 2022</u>	<u>May 2022</u>	<u>June 2022</u>	<u>July 2022</u>	<u>Fall 2022</u>	<u>Winter 2023</u>	<u>Spring 2023</u>
<b>Section 243</b>	Publish RFI (60 days)	Hold Public Workshop	Review Public Comments	Draft Interim Guidance	Issue FY22 Interim Guidance	Draft NOPR	Publish NOPR
<b>Section 247</b>	Publish RFI (60 days)	Hold Public Workshop	Review Public Comments		Draft Guidance	Public Comment on Draft Guidance	Issue Guidance

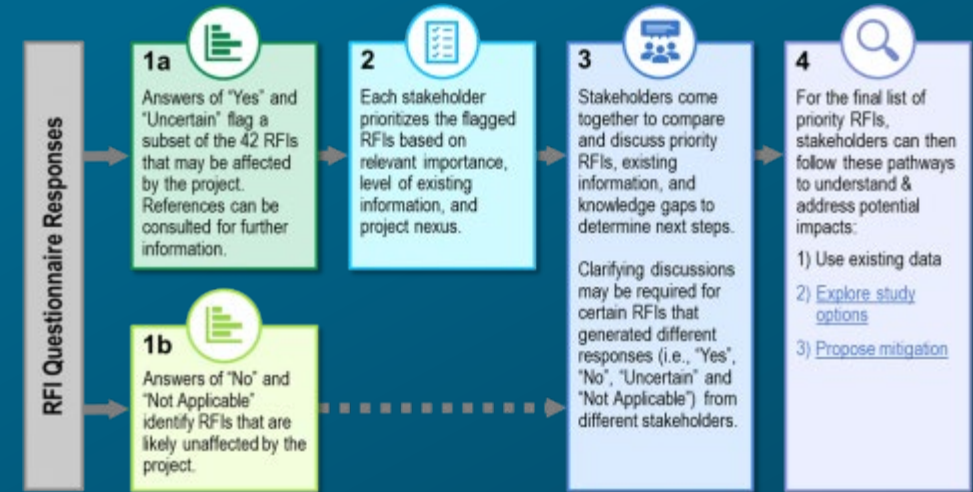


# Hydropower Program Updates

## Environmental Decision Support Tool

The EDS Toolkit is designed to:

- **Characterize and summarize** the best-available science for use by diverse hydropower stakeholders seeking to better understand potential hydropower project impacts on the riverine ecosystem.
- **Provide transparent and consistent methodology** for identifying and discussing potential environmental impacts during hydropower licensing negotiations.
- **Point users toward key river function indicators of concern** to reduce the time and cost of hydropower licensing negotiations and promote greater certainty in federal authorization processes for hydropower development and relicensing.

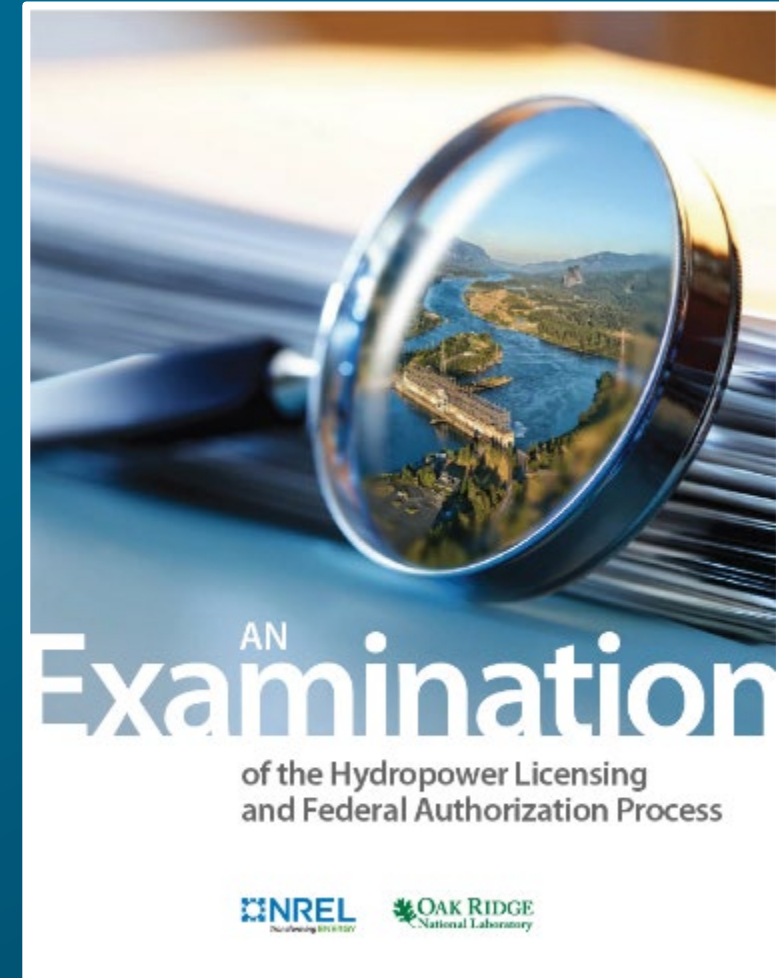


### River Function Indicator Questionnaire

# Hydropower Program Updates

## Regulatory Study

- [New report](#) examines which factors have the greatest impact on the hydropower permitting and licensing processes.
- Key takeaways
  - Greater environmental complexity can lead to longer licensing timelines, especially for relicensing.
  - Licensing costs often disproportionately impact new and/or smaller projects.
  - FERC's Integrated Licensing Process has the shortest and least variable timeline.
  - The U.S. hydropower licensing process can improve environmental coexistence with hydroelectric plants.



# Hydropower Program Updates

## Hydropower Supply Chain Deep Dive Assessment



- [Produced in response](#) to Executive Order 14017 “America’s Supply Chains.”
  - Aims to help build more secure and diverse U.S. supply chains, including energy supply chains.
- Existing U.S. supply chain is mature and effectively supports the nation’s large hydropower fleet.
  - But new construction and the need to complete refurbishments, upgrades, and relicensing activities point to the need to scale up domestic supply chain activities.



# Hydropower Program Updates

## Hydropower MOU Action Plan

- DOE's EERE, Department of the Interior Bureau of Reclamation, and the Department of the Army through the U.S. Army Corps of Engineers signed a new [Memorandum of Understanding \(MOU\)](#).
- An [Action Plan](#) has been developed that provides the framework for five topic areas:
  1. Asset Management
  2. Value of Hydropower
  3. Workforce
  4. Water Supply Reliability
  5. Environmental Outcomes
- Find MOU Action Plan information on the [WPTO website](#).



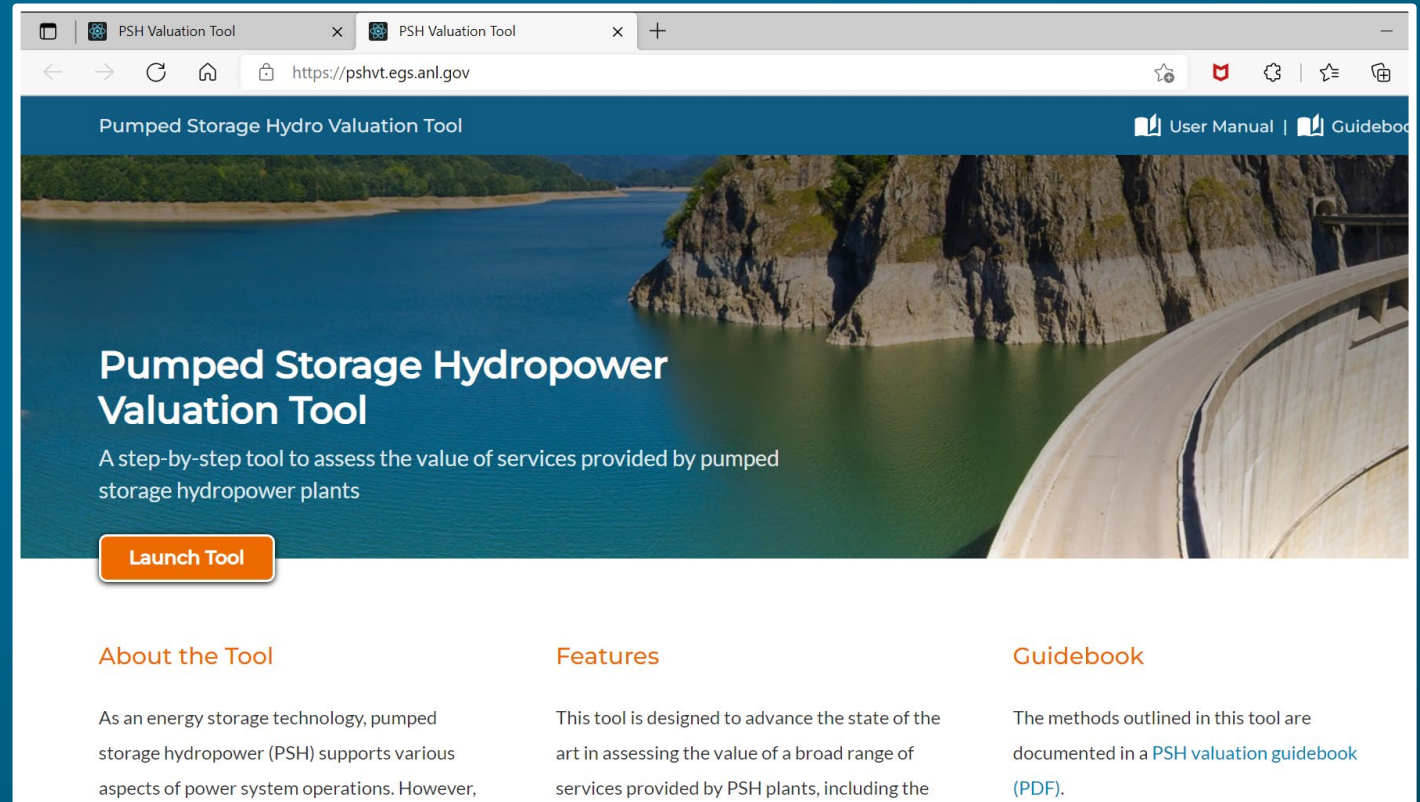
**US Army Corps  
of Engineers®**



— BUREAU OF —  
**RECLAMATION**

## Pumped Storage Hydropower (PSH) Valuation Tool

- A team from Pacific Northwest National Laboratory and Argonne National Laboratory created a [web-based platform](#).
  - The PSH Valuation Tool guides users through the valuation process in the [PSH Valuation Guidebook](#).
  - Features a benefit-cost analysis tool, a price-taker valuation tool for small-scale PSH, and a multi-criteria decision analysis tool.



The screenshot shows a web browser window with two tabs for "PSH Valuation Tool". The address bar displays "https://pshvt.egs.anl.gov". The page title is "Pumped Storage Hydro Valuation Tool". The main content area features a large image of a dam and reservoir. Below the image, the title "Pumped Storage Hydropower Valuation Tool" is displayed, followed by the subtitle "A step-by-step tool to assess the value of services provided by pumped storage hydropower plants". A prominent orange "Launch Tool" button is centered below the text. The page is organized into three columns: "About the Tool", "Features", and "Guidebook".

**About the Tool**

As an energy storage technology, pumped storage hydropower (PSH) supports various aspects of power system operations. However,

**Features**

This tool is designed to advance the state of the art in assessing the value of a broad range of services provided by PSH plants, including the

**Guidebook**

The methods outlined in this tool are documented in a [PSH valuation guidebook \(PDF\)](#).

## Hydropower Contributions to Grid Resilience Report

[Published October 2021](#)



- Today's grid faces an increasingly broad range of adverse events.
- Based on historical and simulated data, hydropower contributes to grid resilience across time scales.
- The study's framework—mapping hydro capabilities to types of grid resilience—can be used to analyze additional scenarios of interest.



## Dual Participation by Energy Storage as a Transmission and Market Asset

- Dual-use energy storage represents a potentially significant new market for PSH.
- FERC released a policy statement guiding this type of use.
- This study develops a regulatory framework to help market operators and their stakeholders interested in implementing this type of dual use.



[Enabling Principles for Dual Participation by Energy Storage as a Transmission and Market Asset \(pnnl.gov\)](https://www.pnnl.gov/publications/enabling-principles-for-dual-participation-by-energy-storage-as-a-transmission-and-market-asset)

## HydroWIRES \$16M Lab Call Selections

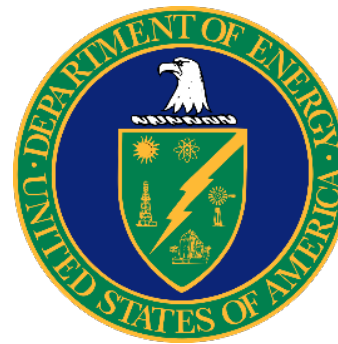


- Tools to Support Deployment of Hydropower Hybrids
- Tools to Evaluate Environment-Flexibility Tradeoffs
- Improving Hydropower Representation in Power System Models
- Modelling Collaborations with Norway
  - Market design
  - Wind-hydropower grid interactions
- Open Topic
  - PSH as a real-time inertia monitor
  - Hydropower controls
  - Hybrids on non-powered dams
  - Hydropower microgrids for wildfire resilience

# Hydropower Program Updates

## U.S.-Norway Hydropower MOU

- Continuing work between DOE/national labs and Norway's HydroCen research consortium on hydropower R&D.
  - Electricity Market Models in the U.S. and Europe
  - Hydropower Digitalization
  - Environmental DNA (eDNA) for Monitoring
  - Hydropower Plant Controller Prototyping
- Technical workshop planned for June 1, 2022.







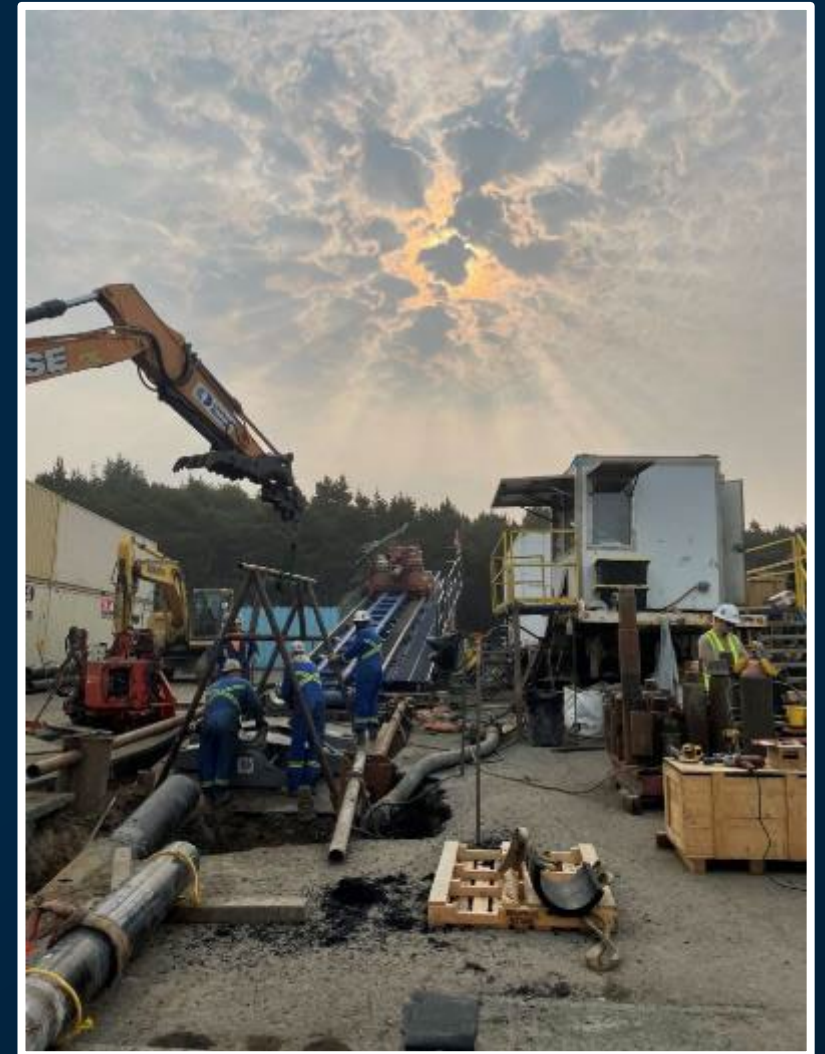
# Marine Energy Program Updates

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WATER POWER TECHNOLOGIES OFFICE

# Marine Energy Program Updates

## PacWave – Facility Update

- Broke ground on June 1, 2021, just before last webinar.
- Concluded drilling operations on February 10, 2022.
- Conduit has been installed in all bores.
- Moving to civil work at Driftwood Beach State Recreation Site to return it to original condition for public use.





# Marine Energy Program Updates

## PacWave – FOA Selection

### Topic Area 1: Testing Wave Energy Converter (WEC) Technologies at PacWave

- CalWave Power Technologies Inc.
- Columbia Power Technologies Inc.

### Topic Area 2: Advancing WEC Designs for PacWave

- Oscilla Power Inc.
- Dehlsen Associates, LLC

### Topic Area 3: Wave Energy R&D at PacWave

- Littoral Power Systems, Inc.
- Portland State University
- University of Washington
- Integral Consulting Inc.





# Marine Energy Program Updates

## Marine Energy Grid Value Report

[Published November 2021](#)

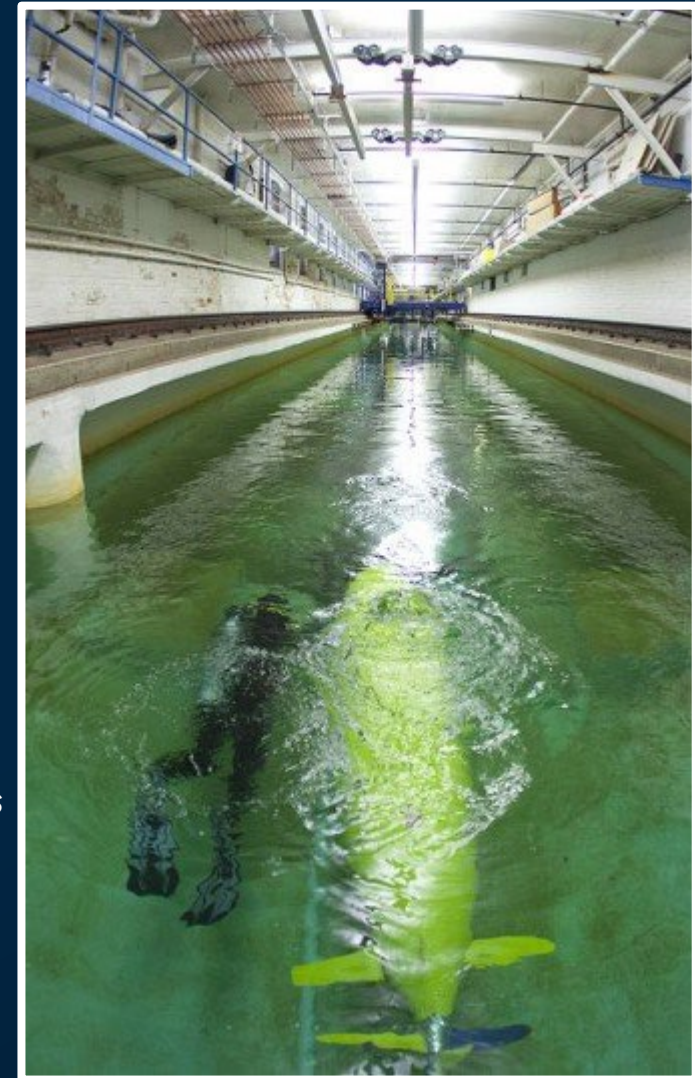
- Focused on preliminary value propositions and potential benefits as a future grid technology:
  - Marine energy has a higher load carrying capacity relative to solar and wind generation.
  - Added diversity reduces the need for balancing resources to meet electricity needs leading to cost savings across grid systems.
  - Deploying marine energy in a clean grid potentially reduces the need to build energy storage capacity to ensure system reliability.
- Marine energy resources can help serve coastal loads where more than 40% of our population resides.
- Marine energy resources can help reduce the reliance on imported fuels for small, island, and remote grids, while supporting local energy system reliability.



# Marine Energy Program Updates

## TEAMER

- Now
  - RFTS 6 Open Now – Closes on March 24.
  - Accepting applications for open water support on a rolling basis.
- RFTS 4 Technical Support Recipients (November 2021)
  - Applied Physics Lab – University of Washington, *Assessing cost-effective, spatially distributed current measurements from microFloat swarms for tidal energy resource characterization and model validation*
  - Creek Tides Energy & Power Inc., *Reactive Reversible Blade Turbine for Power Generation and Pumping Water*
  - Emrgy, Inc., *Performance Validation of Vertical Axis Hydrokinetic Turbine*
  - Hanna Wave Energy Primary Drive, *Subsurface Power Buoy*
  - IDOM Inc., *Extreme events modelling for the MARMOK-OWC wave energy converter*
  - Laminar Scientific Inc., *Numerical modelling of a unique half submerged, biconcave buoy that extracts surge and heave motions*
  - Resolute Marine, *Wave20TM Power Transmission Study*
  - Triton Systems, Inc., *Numerical Modeling of Anchoring System for Marine Renewable Energy Sources*
  - University of Hawaii, *1:4 Scale Halona Mooring Design Study*
- RFTS 5 Technical Support Recipients Coming Soon!



# Marine Energy Program Updates

## Seedlings and Saplings

Developed to [explore innovative new research ideas](#) in hydropower and marine energy.

- All projects begin as Seedlings, eligible for up to \$100,000.
  - FY22 Seedlings to be announced soon!
- Successful Seedlings are eligible to continue their research as Saplings that range from \$250,000-\$500,000.
  - FY21 Saplings:
    - Triboelectric Nanogenerator for Harvesting Wave Energy and Powering Marine Sensors – Daniel Deng, PNNL
    - Novel Eco-Friendly High-Lubricity Ionic Liquids for Marine Turbomachinery Lubrication – Jun Qu, ORNL
    - Co-Locating Wave Energy with an Integrated Multi-Trophic Aquaculture (IMTA) System – Mikaela Freeman, Lysel Garavelli, and Molly Grear, PNNL
    - Surface Modification of Alloys for Low-Cost Corrosion Protection in Marine Environment – Aashish Rohatgi, PNNL
    - Design Load Case Generator: Web Application Tool to Streamline IEC 62600-2 Design Load Requirements and Certification – Vincent S. Neary, Sandia





# Marine Energy Program Updates

## CalWave Deployment

- Successfully deployed CalWave x1 on September 16, 2021, off coast of San Diego.
- Will be tested for six months.
- Facilitated testing by Triton Initiative of the NoiseSpotter environmental monitoring device from Integral Consulting.

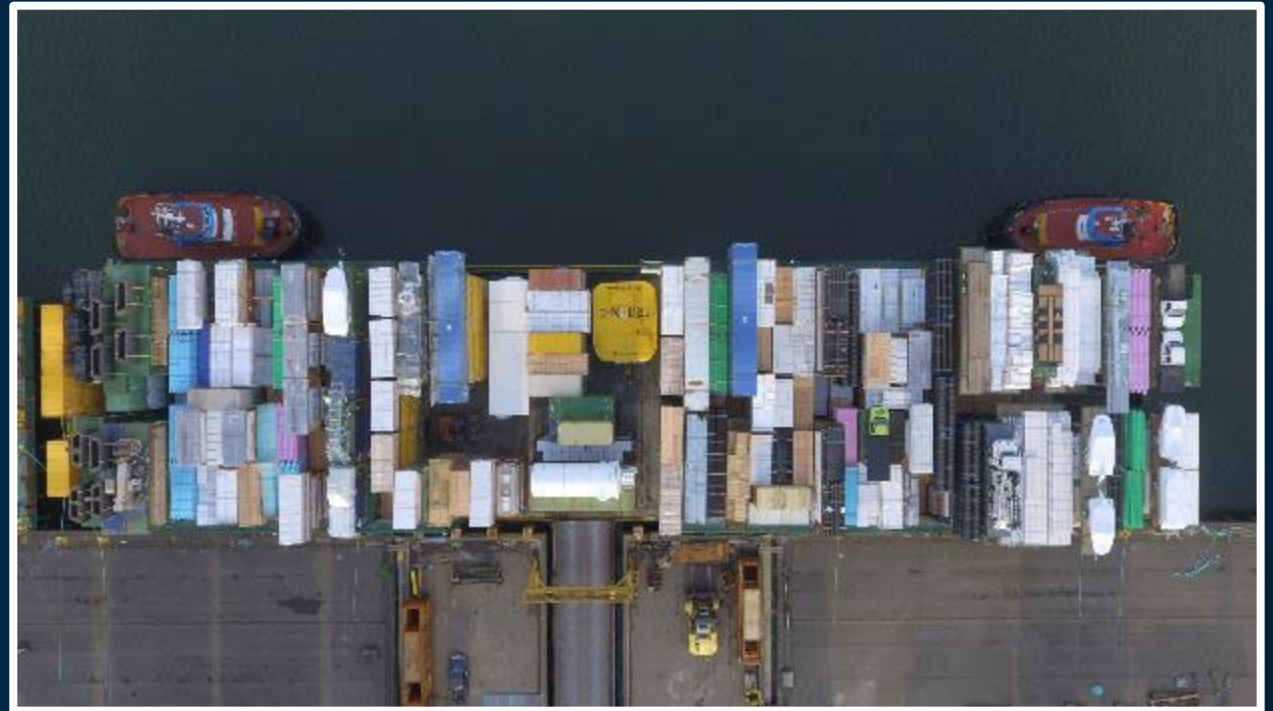
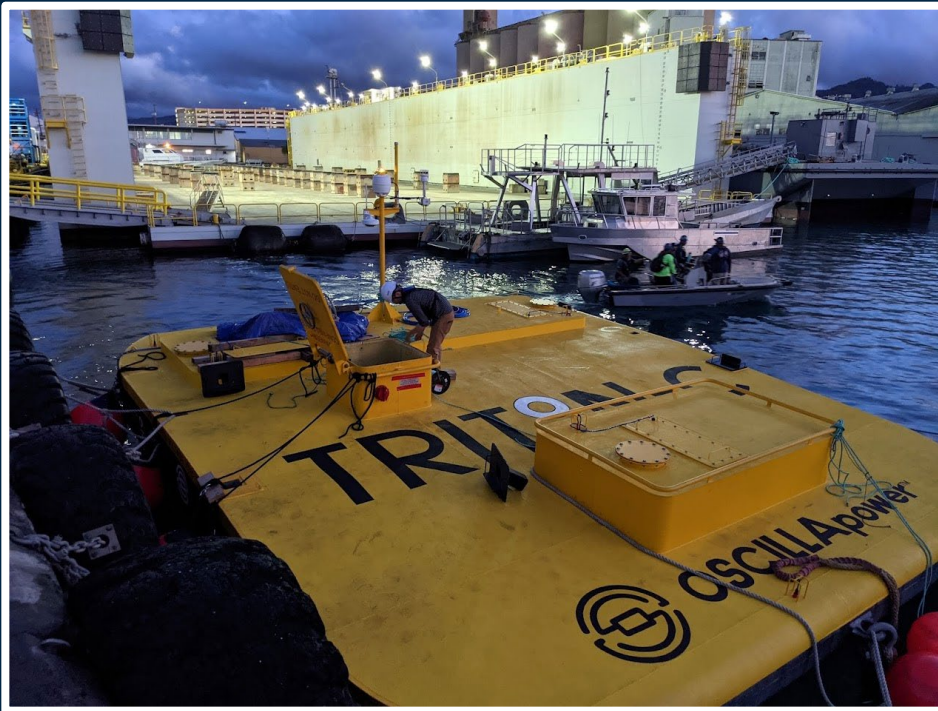




# Marine Energy Program Updates

## Oscilla Power

- Triton-C has been transported to Hawaii in preparation for ocean testing.
- The system will deploy at the U.S. Navy's Wave Energy Test Site (WETS).
- Pending weather windows, the team is targeting a spring deployment.



# Marine Energy Program Updates

## ETIPP

Applications currently open for Cohort 2!

Apply at: [bit.ly/3fMM2in](https://bit.ly/3fMM2in).

- Selection criteria:
  - Need
  - Project Goals
  - Commitment
- Apply by **April 15, 2022**.





# Marine Energy Program Updates

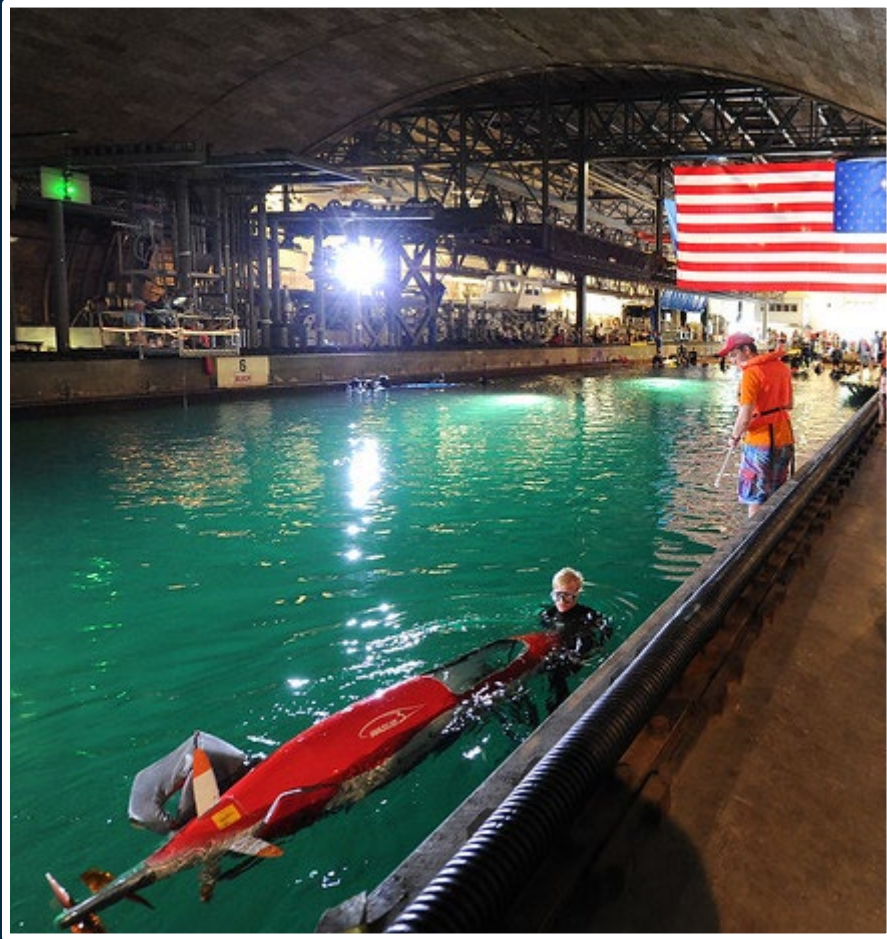
## Waves to Water – DRINK Finale

- Competitors demonstrating their wave energy-powered desalination systems.
  - Ballast, Buoys, and Borrowing from Archimedes
  - MZSP Freshwater Production System
  - Oneka Snowflake
  - Wave-Actuated, Tethered, Emergency Response, Buoyant Reverse Osmosis System
- Finalists competing for up to \$1 million in cash prizes.
- Events will take place over a four-week period.
- Testing will take place off of Jennette’s Pier in North Carolina and supported by the Coastal Studies Institute.



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# Marine Energy Program Updates



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## Ocean Observing Prize

- BUILD Contest participants awarded additional time and funds to help them successfully achieve their goals in this new timeline.
- Competitors will test devices in state-of-the-art wave tank at the U.S. Navy's Maneuvering and Seakeeping Basin in Carderock, Maryland, in June 2022.
  - Autonomous Marine Power System (Sacramento, CA)
  - EEL Drone (Los Angeles, CA)
  - Maiden Wave Energy Rover (Philadelphia, PA)
  - Platypus Prowler (West Palm Beach, FL)
  - Thaumias – God of the Wonders of the Sea (Menlo Park, CA)
  - Wave Powered Oceanographic Gliders (Tallahassee, FL)
- Competing to receive awards from a cash prize pool of \$500,000.
- Winning teams will also be eligible to test their devices at sea in the final SPLASH Contest in Washington State.



# Marine Energy Program Updates

## UN Decade of Ocean Science for Sustainable Development

Vision: The science we need for the ocean we want.

### Decade Action: PBE Global

Powering the Blue Economy™ –Global seeks to understand the power requirements of emerging coastal and maritime markets and encourage international knowledge and data sharing on the advancement of technologies that could integrate ocean renewable energy to relieve maritime power constraints and enable sustainable growth of the global blue economy.

### Expected outcomes:

- An open-access, international knowledge and data-sharing hub on the use of marine renewable energy to support the global blue economy.
- Increased international collaboration for Powering the Blue Economy–Global, including the initiation of an annual conference on the topic.
- Development of a shared international charter on Powering the Blue Economy–Global, with growth targets and success metrics defined therein.





# WPTO Selected the 2022 Marine and Hydrokinetic Fellows

Congratulations to the students selected for this year's cohort for the Marine and Hydrokinetic Graduate Student Research Program!



**Claire Gonzales** from the University of California, Santa Barbara, will work with the Bureau of Ocean Energy Management to advance research into the co-location of marine renewable energy with offshore aquaculture development along the California coast.



**Habilou Ouro-Koura** from Rensselaer Polytechnic Institute will work with Pacific Northwest National Laboratory to create a comprehensive tool to cost-effectively develop efficient ocean thermal energy harvesters to power long-range and long-duration underwater unmanned vehicles.



**Christopher Ruhl** from Lehigh University will work with Sandia National Laboratories to characterize turbulence at tidal energy sites around the world. This will help inform the design of hydrokinetic turbines based on environmental conditions.

# Other Student Opportunities

## Marine Energy Collegiate Competition

- 17 teams competing to:
  - Develop and pitch a market-research-supported business plan and conceptual-level technical design of a system that could be commercialized to address power needs for a chosen sector of the blue economy.
  - Design, build, and test a device to achieve energy production (optional).
  - Engage with their community through outreach and educational activities.
- Pitch sessions to take place virtually May 24-26; award ceremony will be held on May 27.



## Hydropower Collegiate Competition

- Inaugural competition inviting disciplinary teams of undergraduate and graduate students from a variety of academic programs to compete in two contests.
  - Case Study Contest focuses on how hydropower fits into a future power grid supported by 100% renewable energy and the associated opportunity and challenges of incorporating the hydropower fleet into this clean energy vision.
  - Connection Creation Contest tasks teams with developing a team story, discovering the hydropower industry, community engagement, and a final presentation.
- Applications open in early April; details of an informational webinar to come.





# Upcoming Events

## March/April

- March 16: [WPTO R&D Deep Dive: LUPA, An Open-Source Laboratory Scale Wave Energy Converter](#)
- [Waves to Water DRINK Finale](#), Outer Banks, North Carolina
  - Events kick off the week of March 28, 2022, and weather window allowances extend through April 30.

## May

- May 24-26: Marine Energy Collegiate Competition Pitch Sessions
- May 27: Marine Energy Collegiate Competition Awards Ceremony

## June

- June 1: Norway MOU Workshop
- Alternative Opportunities for Hydropower Workshop
- Ocean Observing BUILD Contest Onsite Testing

## July

- July 18-22: Marine Energy Peer Review
- July 25-29: Hydropower Peer Review





# water

## Q&A

For more information, visit [www.energy.gov/water](http://www.energy.gov/water).

Contact us at [WaterPowerTechnologiesOffice@ee.doe.gov](mailto:WaterPowerTechnologiesOffice@ee.doe.gov).

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**Hydro Headlines** (monthly hydropower news)



**Water Wire** (bi-monthly marine energy and hydropower news)