Water Power Technologies Office Overview

Jennifer Garson, Director

Research Priorities in the Water Power Technologies Office (WPTO)

WPTO enables research, development, and testing of emerging technologies to advance marine energy and next-generation hydropower and pumped storage systems for a flexible, reliable grid.

Hydropower Program
FY2022: $50M

Modernizing the Existing Fleet

Pumped Storage Hydropower

New Low-Impact Projects

Marine Energy Program
FY2022: $112M

Wave

Tidal, River and Ocean Current

Ocean Thermal

Water Power Matters at All Scales

Watts:

enable a persistent power source to understand the ocean, by powering observing buoys, monitoring for the environment

Kilowatts:

develop deployable systems to provide clean water, power aquaculture, and powering remote communities

Megawatts:

deploy and demonstrate water powered systems for local grids, remote communities, powering dams and agriculture

Gigawatts:

deploy and demonstrate seasonal storage, enhance hydro grid flexibility, demonstrate new water power systems

All scales require technical and financial assistance, testing infrastructure, user-centric designs, and a robust innovation ecosystem.

How We Accomplish Our Mission

Foundational R&D	Invest in the technologies, materials, and approaches to advance the readiness of all water technologies.
Support the Pipeline of Solvers	Through solicitations, fund the solvers, the entrepreneurs, and the technical experts through solicitations to help solve our challenges.
Infrastructure and Access	Fund the infrastructure needed to test technologies and use those assets for more researchers and organizations.
Demonstrations	Fund in-the-water demonstrations of hydro and marine energy research. De-risk technologies for deployment and understand how these technologies work in the field.
Environmental Assessments	Support the analysis, technology development, and partnerships needed to advance water power in rivers and oceans.
Address Regulatory Barriers	Work alongside the partners in the federal and state governments to understand the complexities of deployment.
Partnerships and Community Engagement	Identify the partners critical to work, catalyze the private and public sector partnerships to ensure success, fund the innovation ecosystem and community partnerships, and bring new people and organizations to the table, including a diverse, representative portfolio and programs.

Marine Energy: Key Opportunities for Impact

- **Mitigating climate change and enabling a 100% clean energy future:** Marine energy in different markets can power the systems needed to support reducing ocean acidification, ocean warming, and sea level rise by reducing greenhouse gas emissions and contributing to grid decarbonization.
- **Powering underserved communities and enhancing coastal resilience:** Marine energy can power electric microgrids in coastal, remote, and islanded communities, enhancing energy and coastal resilience and sustaining marine ecosystems.
- **Accelerating technology development timescales through demonstration and deployment:** Marine energy can meet the needs of many blue economy markets in a variety of ways, such as producing fresh water through desalination, servicing the power demands for aquaculture and ocean sensing, and deploying marine energy for coastal and ocean-based applications to accelerate marine energy technology development for the grid.

Hydropower: Key Opportunities for Impact

- **Enabling a 100% clean energy future:** Hydropower, including PSH, provides flexibility, inertia, storage, and grid services to support the increased integration of variable renewables like wind and solar energy.
- **Expanding new value propositions for sustainable hydropower:** Retrofitting existing dams and adding generation at non-powered dams (NPDs) can increase renewable energy production, while rehabilitating dams can address safety problems, increase climate resilience, and mitigate environmental impacts.
- **Understanding and adapting to climate change impacts on hydropower:** Advances in climate and hydrologic science, coupled with hydropower decision-making tools, can improve hydropower reservoir management by ensuring the continued reliability and climate resilience of our energy-water infrastructure.
- **Building out a 21st century hydropower fleet:** Modernization of the existing hydropower fleet can restore reliability and improve performance by adding cutting-edge technologies.

WPTO Outreach and Engagement Strategy

1. TRANSPARENCY: Demonstrate good stewardship of taxpayer funds by persistently and transparently communicating how WPTO funds are being utilized and evaluate project impacts

2. FEEDBACK: Get feedback from stakeholders to inform and improve WPTO projects and strategy

3. DISSEMINATION: Maximize the impact of WPTO-supported research by effectively disseminating results of projects and tracking usage of various products

4. OBJECTIVE AND ACCURATE INFORMATION: Provide access to accurate and objective information and data that can help to accelerate industry development and inform decision-makers

Mission of the Office of Energy Efficiency and Renewable Energy

1. Building the clean energy economy in a way that benefits all Americans.
   - We must address environmental injustices that disproportionately affect communities of color, low-income communities, and indigenous communities.

2. Fostering a diverse STEM workforce.
   - We need to increase awareness of clean energy job opportunities at minority-serving institutions and ensure that organizations receiving EERE funding are thinking through diversity and equity in their own work.

3. Developing more robust workforce training opportunities to build a pipeline for permanent, good-paying jobs for the clean energy workforce.

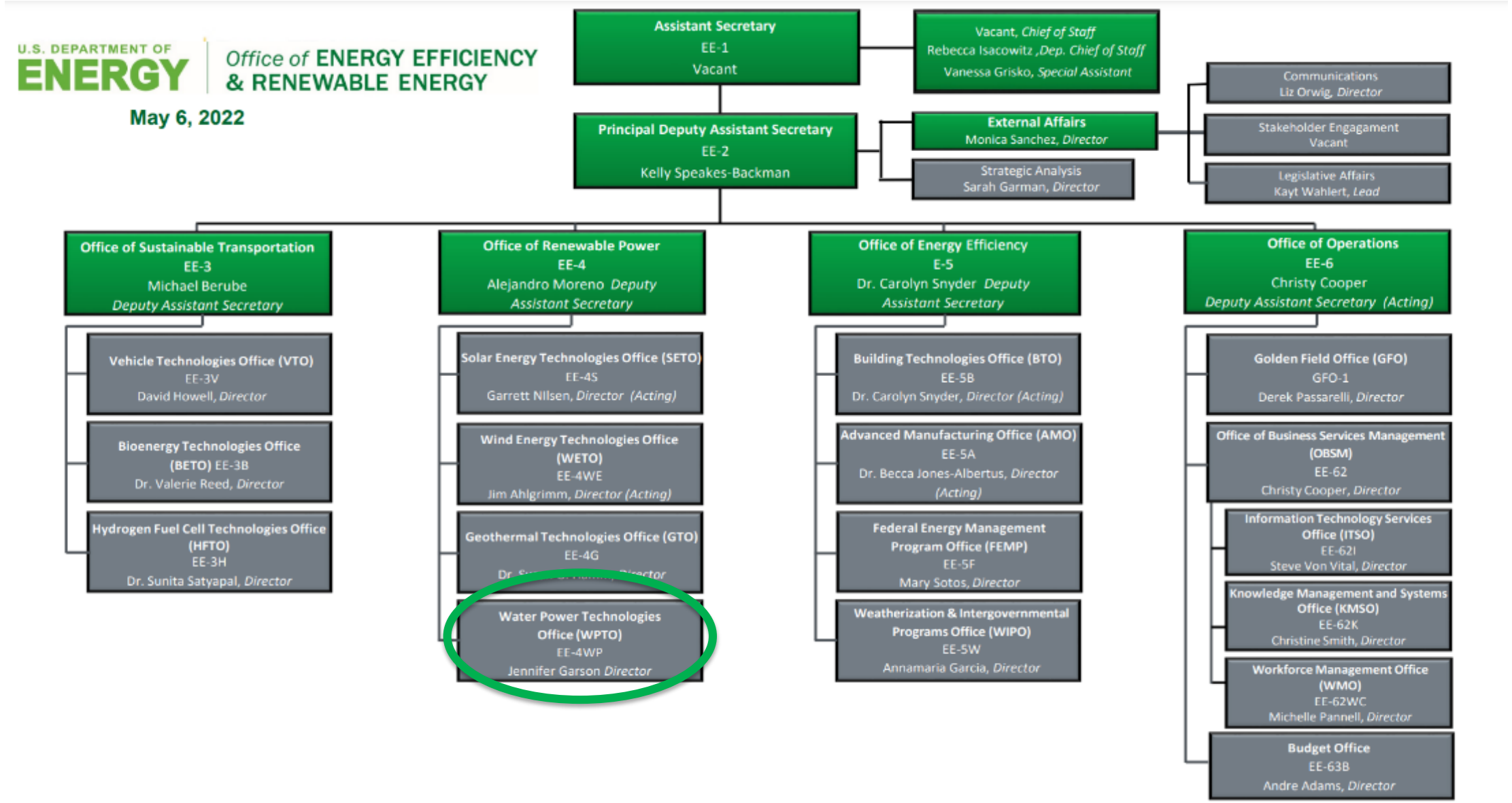
4. Working closely and learning from state and local governments.

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

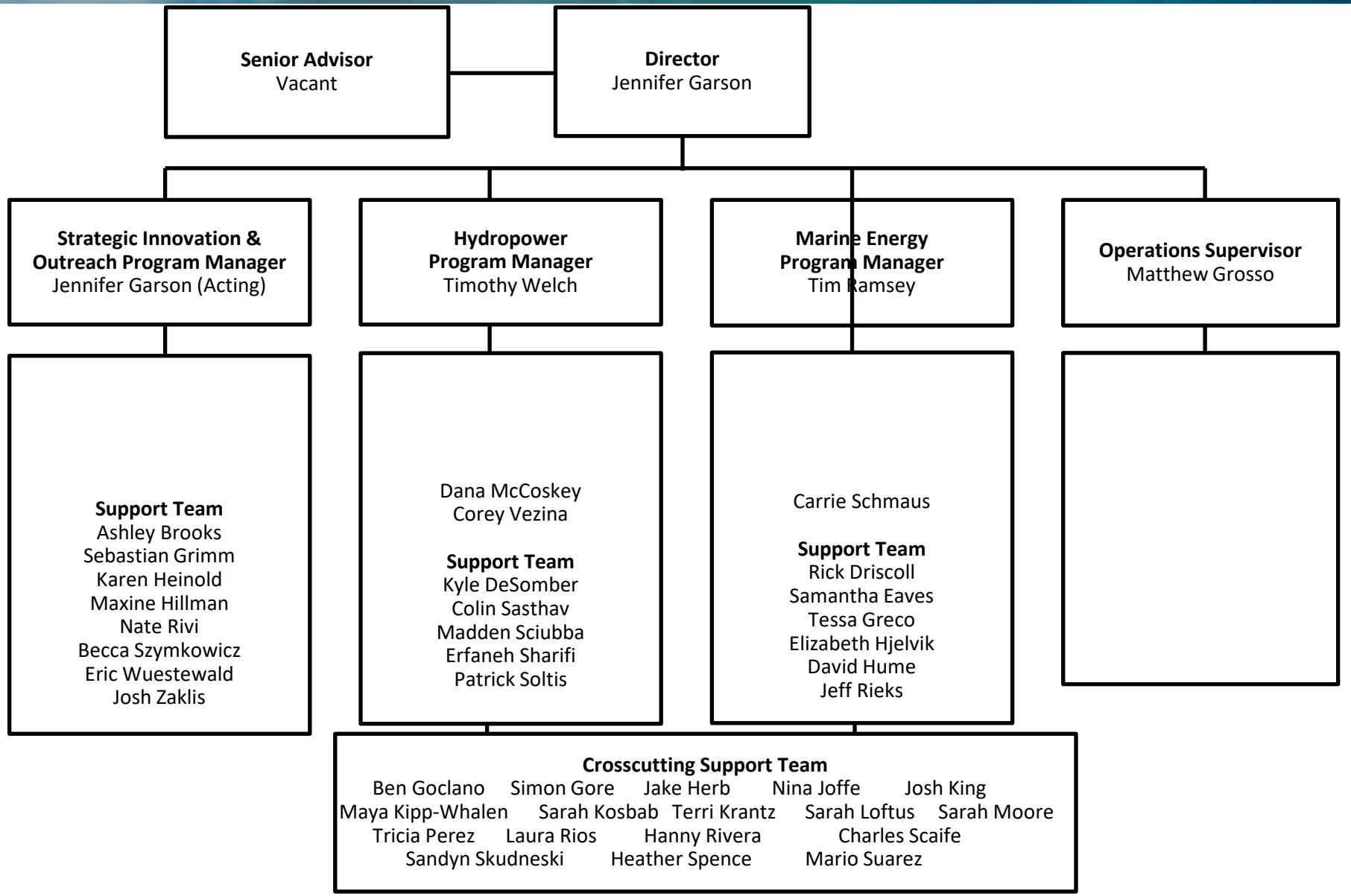
WPTO's Contributions to Broader DOE Programs

- Energy Transitions Initiative Partnership Project (ETIPP)
  - DOE-sponsored program that provides **direct technical assistance to remote, island, and islanded communities** across the United States to increase their energy resilience.
  - Funding and support from Energy Transitions Initiative, Geothermal Technologies Office, Solar Energy Technologies Office, Water Power Technologies Office, and Wind Energy Technologies Office.
- Inclusive Energy Innovation Prize
  - Seeks to enable and enhance business and technology incubation, acceleration, and other community-based and university-based entrepreneurship and innovation in climate and clean energy technologies.
  - More than 200 teams competed in Phase One and submitted impact plans that detailed their experiences in engaging and supporting disadvantaged communities. In May 2022, DOE announced 18 Phase One winners to carry out their impact plans in Phase Two.
- Clean Energy Innovators Fellowship
  - Funds **recent graduates and energy professionals to work with critical energy organizations** to advance clean energy solutions.
  - Fellows to work for up to two years supporting an energy organization, including **public utility commissions, municipal and cooperative utilities, and grid operators like regional transmission organizations or independent system operators.**

EERE Organization Chart



WPTO Organization Chart



How WPTO Distributes Competitive Funding

Competitive funding opportunities, otherwise known as **funding opportunity announcements (FOAs)**, allow organizations to apply for financial support for water power projects.

A **Notice of Intent (NOI)** typically comes before a FOA to notify interested stakeholders.

Prizes & Competitions facilitate participation from young professionals, bringing diverse innovators and representatives from both private sector and the government to leverage resources.

The **Small Business Innovations Research (SBIR) and Small Business Technology Transfer (STTR) Programs** are competitive programs targeted to small businesses.

A **Notice of Opportunity for Technical Assistance (NOTA)** is a public, competitive processes for targeted and specific types of technical assistance provided by the national laboratories.

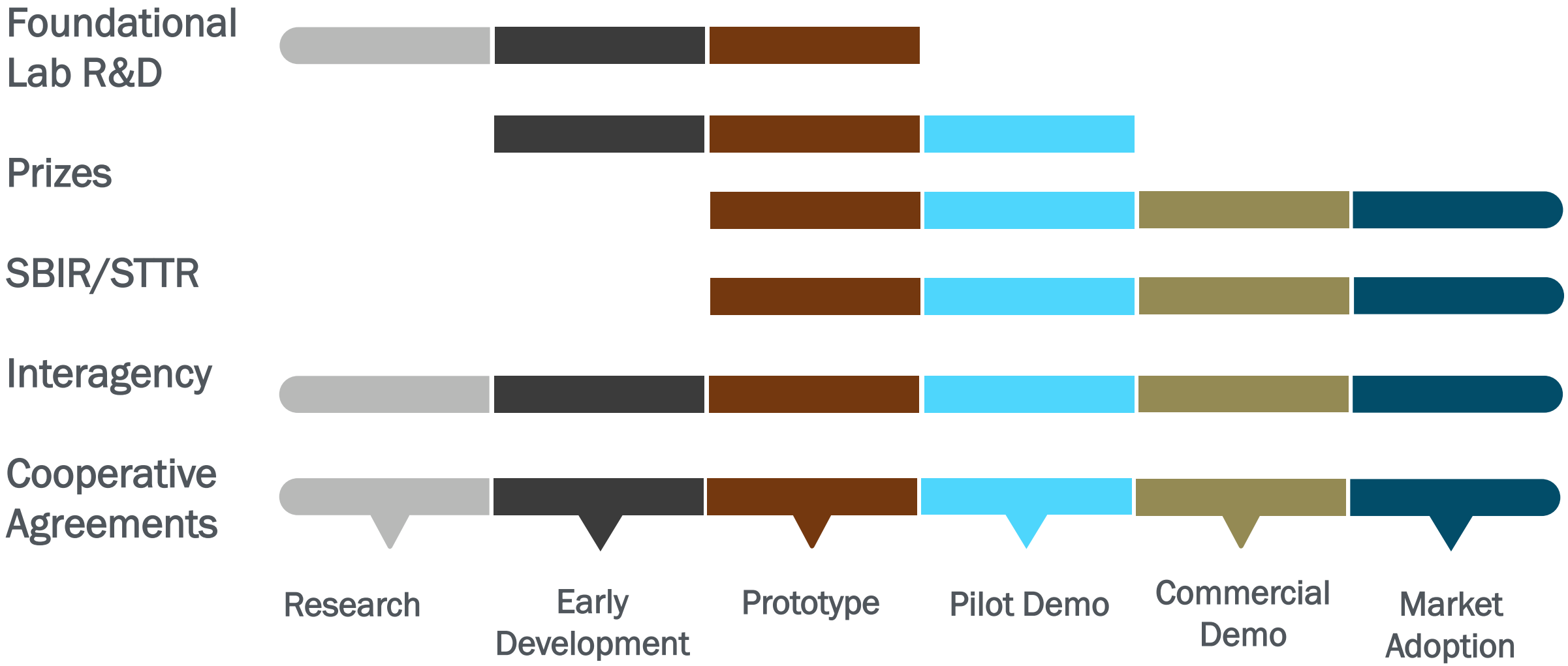
Direct National Lab-Led R&D agreements take the form of contracts, called Annual Operating Plans (AOPs), with DOE national laboratories that define the scope, schedule, milestones, and cost for work.

The **Seedling and Sapling Program** encourages national laboratory researchers to explore novel ideas in water power in a low-risk agreement.

Other DOE Funding Opportunities are listed on the WPTO website.

All public funding opportunities are amplified in the bi-monthly **Water Wire** newsletter and monthly hydropower focused newsletter, Hydro Headlines.

Harnessing a Multitude of Financing Mechanisms



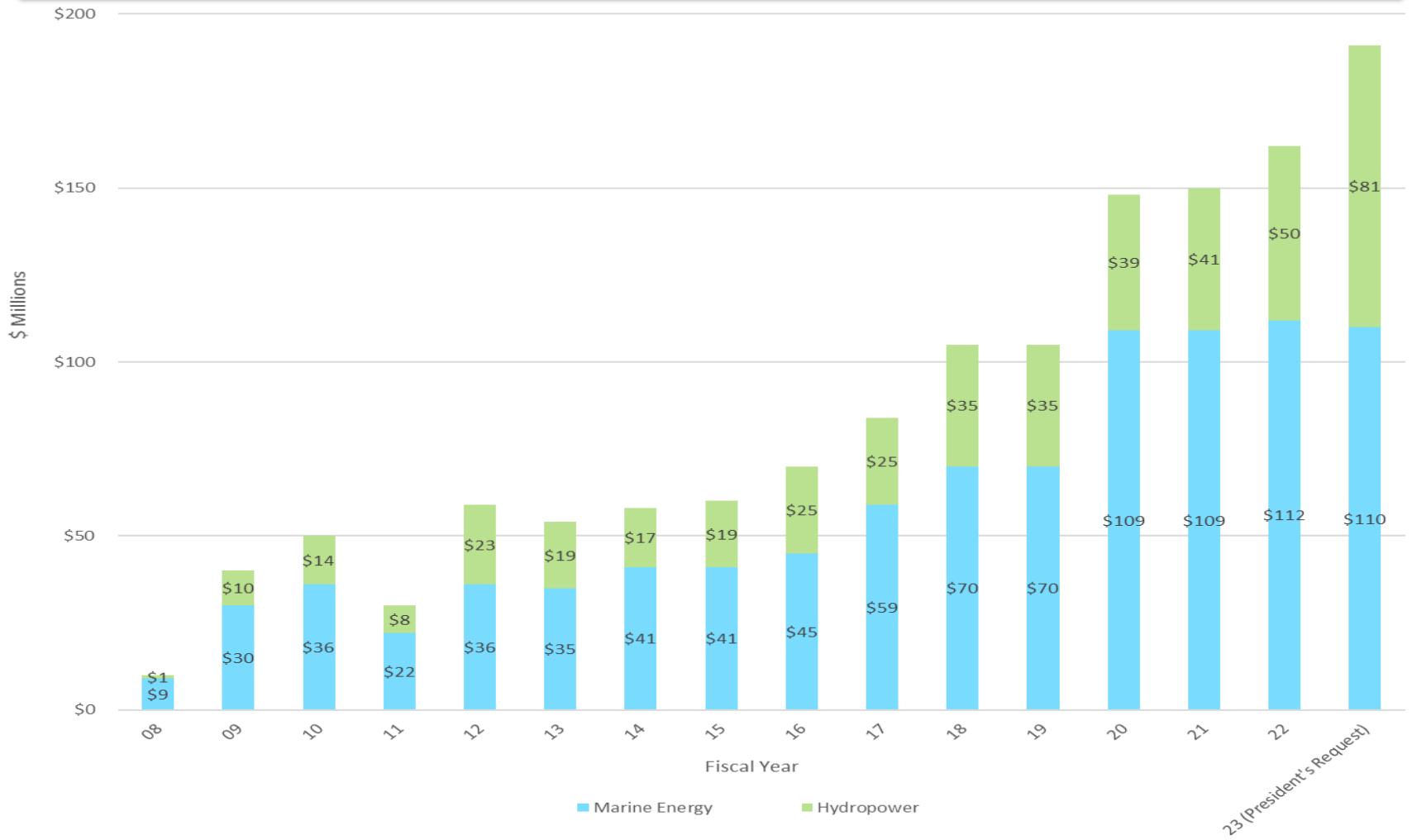
Infrastructure Investment and Jobs Act (Bipartisan Infrastructure Law)

$910 million for hydropower and marine energy programs under DOE

- **$753.6 million for hydropower incentive programs.** These programs will incentivize hydropower facilities to improve efficiency, maintain dam safety, reduce environmental impacts, and ensure generators continue to provide emission-free electricity. Additionally, the law provides
- **$10 million for a pumped storage demonstration project** and an additional
- **$36 million for various other hydropower research, development, deployment, and demonstration projects**.
- And the law supports marine energy, too—specifically, **$110.4 million for marine energy research projects, including $40 million directed toward the National Marine Energy Centers**.

WPTO Budget Overview

Learn more at: energy.gov/eere/water/water-power-technologies-office-budget



Note: This graph shows annual appropriations and enacted funding only. This graph does not reflect the nearly $1B of funding from the Bipartisan Infrastructure Law for DOE-led hydropower and marine energy programs.

Multi-Year Program Plan (MYPP)

- In March 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: Multi-Year Program Plan | Department of Energy

WPTO Multi-Year Program Plan

I. **EXECUTIVE SUMMARY** (16 pages): Highlights major areas of benefit from Water Power R&D; linkages to Administration goals; High-level overview of Programs, Activity Areas; and WPTO Goals.

II. **WATER POWER TECHNOLOGIES OFFICE OVERVIEW** (9 pages): Congressional Authorization; Mission, Values, and Structure; Budget; Funding Mechanisms; Assessing Performance and Evaluating Success.

III. **HYDROPOWER AND MARINE ENERGY PROGRAM OVERVIEWS** (20 pages): Challenges and Approaches; Program Goals and Objectives; Program Logic Model;

IV. **DETAILED PROGRAM MYPPs** (108 pages): Activity and Sub-Activity Area Details, Performance Goals, Follow-on Objectives; Strategic Partnerships and Crosscutting Activities.

Goals and Objectives

FY21–25 Research Priorities

- Highlights main efforts the office intends to support within the 28 sub-activities to achieve shorter-term performance goals and follow-on objectives.
- A flow diagram illustrates the timing and sequencing of major areas of work.

Key Results and Performance Goals (2021–2025)

- Highlights certain significant outputs or products within each of the activity areas that are expected within the next few years.
- Key results and performance goals are critical to achieving the program's 2026-2030 objectives.
- Not intended to be comprehensive and may not include every output produced within the timeframe.

Follow-on Objectives (2025–2030)

- Short-term outcomes that the program aims to achieve by 2030, resulting from the successful completion of the 2021–2025 Key Results and Performance Goals.
- Follow-on objectives logically lead to longer-term outcomes and ultimate impacts defined in the program's logic model.

Addressing Office-level Feedback from 2019 Peer Review

Improve stakeholder engagement and dissemination

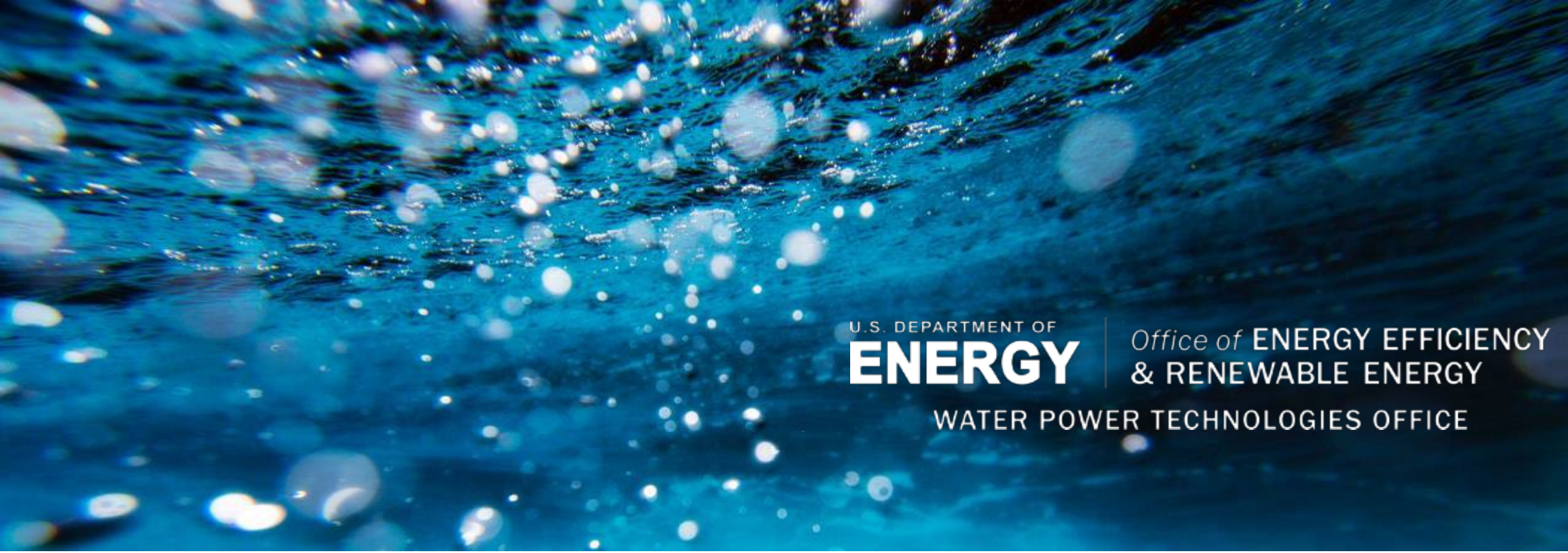
- Program-specific newsletters
- R&D Deep-Dive Webinar Series
- Annual Accomplishments Report
- STEM efforts

Clearly communicate metrics and goals

- Multi-Year Program Plan goals and objectives
- Logic models for each program, as well as lab Annual Operating Plans
- Results-oriented milestones and rigorous go/no-go reviews

Strengthen our data efforts

- Internal data aggregation and centralization
- Data scientist expertise via M&O positions



Q&A

For more information, visit www.energy.gov/water.

WaterPowerTechnologiesOffice@ee.doe.gov

Sign up for our newsletters!

- Water Column (monthly marine energy news)
- Hydro Headlines (monthly hydropower news)
- Water Wire (bi-monthly marine energy and hydropower news)