

Working With the Hydropower Program in the U.S. Department of Energy's Water Power Technologies Office

The Hydropower Program at the U.S. Department of Energy's (DOE) Water Power Technologies Office (WPTO) supports research, development, demonstration, and commercial activities to:

- Advance transformative, cost-effective, reliable, and environmentally sustainable hydropower and pumped storage hydropower technologies.
- Better understand and capitalize on opportunities for these technologies to support the nation's rapidly evolving grid.
- Improve energy-water infrastructure and security.

Vision

WPTO envisions a U.S. hydropower and pumped storage hydropower industry that modernizes and safely maintains existing assets, responsibly develops new low-impact hydropower, promotes environmental sustainability and supports grid reliability, integration of other energy resources, and energy-water systems resilience.

Hydropower Benefits

Hydropower has provided the United States sustainable, reliable, and affordable power for over 100 years. In 2020, it accounted for more than 7% of U.S. electricity generation and nearly 37% of U.S. renewable



The Diablo Dam. Photo from Pablo McLoud

electricity generation.¹ Hydropower, including pumped storage hydropower, provides flexibility, inertia, storage, and grid services to support the integration of variable renewables, like wind energy and solar power.

Pumped storage hydropower is the largest contributor to U.S. energy storage with an installed capacity of 21.9 gigawatts, or roughly 93% of all utility-scale energy storage capacity in the United States.² Additionally, pumped storage hydropower offers unique flexibility and long-duration storage, and multiple new large-scale pumped storage hydropower projects have started development.

Even though many technologies used in hydropower today are well established and commercially available, there is still opportunity for innovation and growth. DOE's Hydropower Vision report found that an additional 50–65 gigawatts of new hydropower and pumped storage hydropower could be added to the U.S. generation mix by 2050.³ However, to realize this potential, difficult scientific challenges facing the existing hydropower fleet must be addressed and new technologies must be developed to reduce the costs and environmental impacts of new projects.

Through a host of programs, prizes, and partnerships, WPTO is working to build a clean energy economy and to find opportunities to address the growing impacts of climate change.

Funding Opportunities

WPTO leverages a variety of funding mechanisms and increasingly focuses on developing innovative programs and funding mechanisms to support R&D. View funding opportunities at [energy.gov/eere/water/water-power-funding-opportunities](https://www.energy.gov/eere/water/water-power-funding-opportunities).

Seedlings Program

The Seedlings Program, established by WPTO, funds promising, potentially high-impact new research ideas from DOE research laboratories, encouraging and incentivizing them to broaden their thinking about research pathways. Learn more at [energy.gov/eere/water/seedling-and-sapling-program](https://www.energy.gov/eere/water/seedling-and-sapling-program).

^{1,2} Uria-Martinez, Rocio, Megan M. Johnson, and Rui Shan. 2021. *U.S. Hydropower Market Report*. Oak Ridge, Tennessee: U.S. Department of Energy. <https://www.energy.gov/eere/water/hydropower-market-reports>.

³ U.S. Department of Energy. 2016. *Hydropower Vision: A New Chapter for America's 1st Renewable Electricity Source*. Oak Ridge, Tennessee: U.S. Department of Energy. <https://www.energy.gov/eere/water/articles/hydropower-vision-new-chapter-america-s-1st-renewable-electricity-source>

WPTO leverages several main mechanisms to fund R&D.

Competitively Selected Awards

Information about the competitive awarding of discretionary grants or cooperative agreements with industry, academic, or national laboratory partners through funding opportunity announcements is available at eere-exchange.energy.gov.

National Laboratory Funding

There are various ways to partner with national laboratories on research proposals. Direct funding proposals for research by national laboratories are competitively selected. The proposals are merit-reviewed by external subject-matter experts.

Prizes and Competitions

Prizes and competitions, like the new Hydropower Collegiate Competition, enable WPTO to find solutions by tapping into the ingenuity and creativity of innovators nationwide. These unique funding mechanisms bring together a diverse community made up of researchers, innovators, students, and partners to address energy challenges in the hydropower industry. Prizes, in particular, serve as a key mechanism to lower the barrier to entry to attract novel solutions and reach a broad spectrum of stakeholders. Learn more at energy.gov/eere/water/water-power-technologies-office-prizes-competitions.

Small Business Innovation Research Grants

The Small Business Innovation Research program is aimed at stimulating technological innovation in small businesses to meet federal R&D needs, foster and encourage participation by minority and underrepresented persons in technological innovation, and increase commercialization in the private sector derived from federal research and development.

The Small Business Technology Transfer program funds collaborative efforts between small businesses and research institutions with the goal of transferring technologies and products from the laboratory to the marketplace. Five federal agencies, including DOE, participate in the

program, soliciting grant proposals from small businesses and making awards on a competitive basis. Learn more at science.energy.gov/sbir/.

Tools & Resources

HydroSource

HydroSource, developed by Oak Ridge National Laboratory with funding from WPTO, consists of hydropower-related datasets, data models, visualizations, and analytics tools that support and enable hydropower research and development on topics of national interest, such as U.S. hydropower market acceleration, deployment, resources assessment and characterization, environmental impact reduction, technology-to-market activities, and climate change impact assessment. Learn more at hydrosources.ornl.gov.

HydroPASSAGE

HydroPASSAGE, a multiyear R&D collaboration between Pacific Northwest National Laboratory and Oak Ridge National Laboratory, provides information and tools to increase fish survival through turbines and other hydropower structures across the United States and around the world. Learn more at hydropassage.org.

Environmental Decision Support Toolkit

Oak Ridge National Laboratory led a team that developed an online, interactive, and science-based River Function Indicator Questionnaire to provide hydropower stakeholders a method for identifying the potential environmental impacts of a hydropower project. Learn more at rfiq.ornl.gov.

Hydropower RAPID Toolkit

Developed by the National Renewable Energy Laboratory (NREL) with funding from WPTO, the Hydropower Regulatory and Permitting Information Desktop (RAPID) Toolkit is a one-stop shop for essential permitting information. It allows developers to navigate the complex system of federal and state regulations and permits with ease. Learn more at openai.org/wiki/RAPID/Hydropower.

Hydropower STEM Portal

WPTO and NREL developed the Science, Technology, Engineering, and Mathematics (STEM) for Hydropower portal to provide resources for academia and industry to educate the future workforce. Learn more at openai.org/wiki/Hydropower/STEM.

Stay Updated

Attend a WPTO Webinar

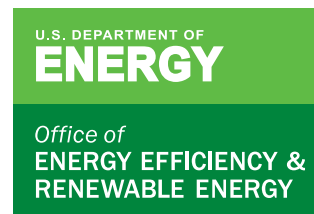
WPTO hosts an R&D deep-dive webinar series to share updates on tools, analysis, and emerging technologies to advance next-generation hydropower and pumped storage systems. The webinars feature WPTO technology managers, national laboratory research experts, and other partners and highlight WPTO's research and development efforts for the hydropower industry. Learn more at energy.gov/eere/water/water-power-technologies-office-rd-deep-dive-webinar-series.

Serve as a Reviewer

WPTO is always in need of subject-matter experts to review research funding applications and the current water power portfolio. Learn more about becoming a reviewer at energy.gov/eere/water/interested-becoming-water-power-reviewer-doe.

Subscribe to the Hydropower Newsletter

WPTO's hydropower e-newsletter features news on R&D and applied science to advance sustainable hydropower and pumped storage technologies. Subscribe at bit.ly/HydropowerNewsletter. ■



For more information, visit energy.gov/water.

To contact WPTO, email WaterPowerTechnologiesOffice@ee.doe.gov.