U.S. DEPARTMENT OF
ENERGY

Office of
ENERGY EFFICIENCY & RENEWABLE ENERGY

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's) Water Power Technologies Office (WPTO) supports research, development, demonstration, and commercial activities to:

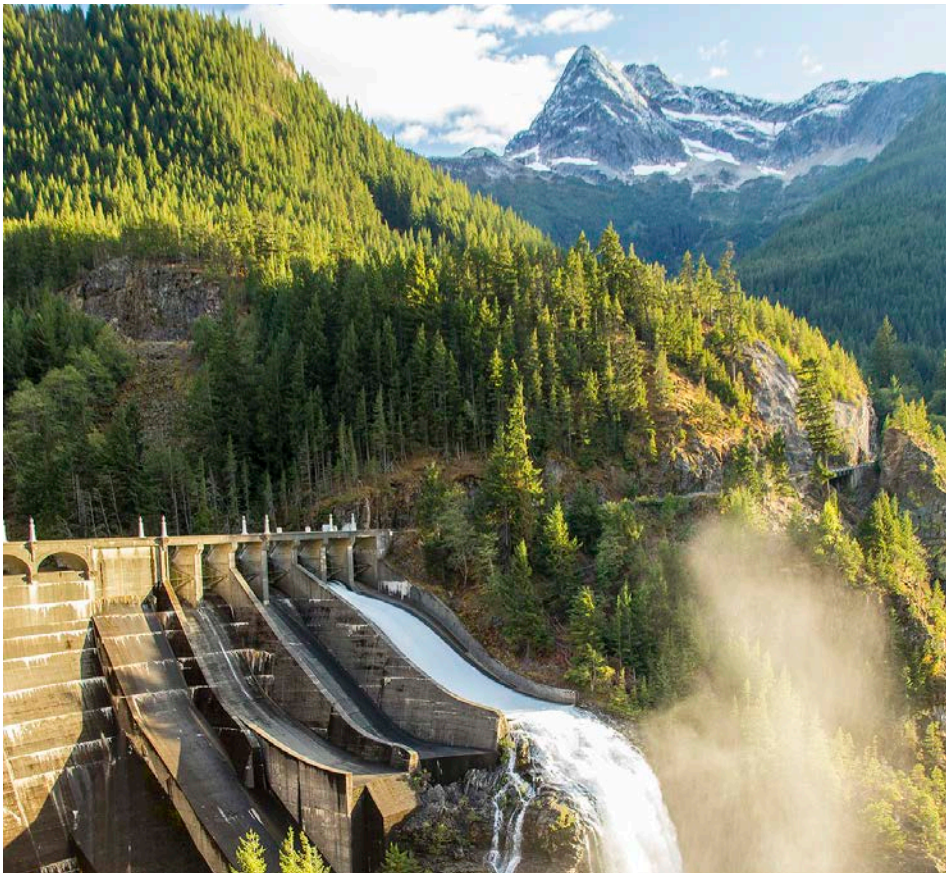
- Advance transformative, cost-effective, reliable, and environmentally sustainable hydropower and pumped-storage technologies.
- Understand and capitalize on opportunities for these technologies to support the nation's rapidly evolving grid.
- Improve energy-water infrastructure and security.

Vision

A U.S. hydropower and pumped-storage 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 2019, hydropower provided 6.6% of the electricity on the grid and accounted for 38% of U.S. renewable electricity generation.[1] Hydropower, including pumped-storage hydropower, provides flexibility, inertia, storage, and grid services to support the integration of variable renewables like wind and solar energy.



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 commercial 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 in recent years.

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. energy.gov/eere/water/water-power-funding-opportunities

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1 Rocío Uría-Martínez, Megan M. Johnson, and Rui Shan, *U.S. Hydropower Market Report* (DOE, 2021), energy.gov/eere/water/downloads/us-hydropower-market-report.

2 Rocío Uría-Martínez, Megan M. Johnson, and Rui Shan, *U.S. Hydropower Market Report* (DOE, 2021), energy.gov/eere/water/downloads/us-hydropower-market-report.

3 DOE, *Hydropower Vision: A New Chapter for America's 1st Renewable Electricity Source* (DOE, 2016), energy.gov/eere/water/articles/hydropower-vision-new-chapter-america-s-1st-renewable-electricity-source

The following describes the main mechanisms WPTO leverages 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 the national laboratories on research proposals. Direct funding proposals for research by national laboratories, which are merit-reviewed by external subject matter experts, are competitively selected.

Prizes and Competitions

Prizes and competitions 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 and marine energy industries. 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. 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, to foster and encourage participation by minority and underrepresented persons in technological innovation, and to increase private-sector commercialization derived from federal research and development.

The Small Business Administration's 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. science.energy.gov/sbir/

Tools & Resources

HydroSource

HydroSource, developed by Oak Ridge National Laboratory with funding by WPTO, consists of hydropower related data sets, 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. hydrosource.ornl.gov

HydroPASSAGE

HydroPASSAGE, a multiyear R&D collaboration of 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. hydropassage.org

Hydropower RAPID Toolkit

Developed by the National Renewable Energy Laboratory with funding from WPTO, the Hydropower RAPID (Regulatory and Permitting Information Desktop) 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. openei.org/wiki/RAPID/Hydropower

Hydropower STEM Portal

In 2020, WPTO, in collaboration with the National Renewable Energy Laboratory, launched new science, technology, engineering, and math (STEM) and workforce development portals, including the STEM Hydropower Portal. openei.org/wiki/Hydropower/STEM

Stay Updated

Attend a WPTO Webinar

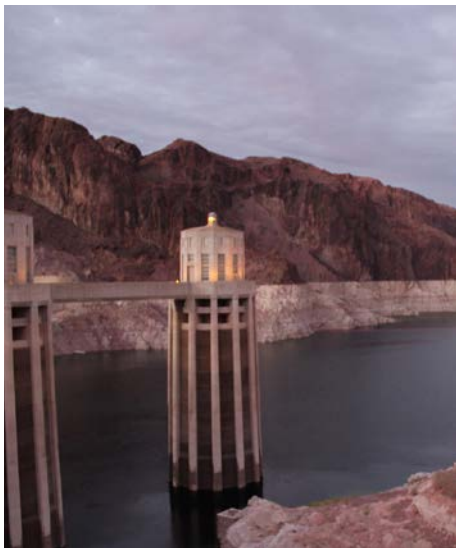
WPTO is hosting a series of R&D Deep Dive webinars to share updates on tools, analysis, and emerging technologies to advance next-generation hydropower and pumped-storage systems. The webinars will feature WPTO technology managers, national laboratory research experts, and other partners, and will highlight WPTO's research and development efforts for the hydropower industry. 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. If you're interested in becoming a reviewer, visit 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. bit.ly/HydropowerNewsletter ■



Back page photo of Hoover Dam by Vik Friedman.

Front page photo of Diablo Dam by Pablo McLoud.

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For more information, visit:
energy.gov/eere/water.

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

DOE/GO-102021-5558 · April 2021