

The Water Power Program is committed to developing and deploying a portfolio of innovative technologies and market solutions for clean, domestic power generation from water resources across the U.S. (hydropower, marine and hydrokinetics).

### What We Do

The Water Power Program strives to produce the next generation of water power technologies and jump-start private sector innovation critical to the country's long-term economic growth, energy security, and international competitiveness by accelerating the development of markets for those technologies.

- ✓ **Providing Clean, Domestic Energy** such as hydropower, the largest source of renewable electricity in the United States. The Water Power Program leads the critical research and development efforts necessary to deploy technologies that drive sustainable growth and economic opportunity.
- ✓ **Tapping New Sources of Clean, Renewable Energy** such as those that can generate energy from highly predictable waves, currents, and tides. With more than 50% of the American population living within 50 miles of the coast, marine and hydrokinetic (MHK) technologies could provide a substantial amount of electricity for the nation.
- ✓ **Supporting Renewable Energy with Stable Power Delivery** from pumped storage hydropower will help to ensure that variable renewable power sources, such as wind and solar, can be integrated more efficiently and cost-effectively onto the nation's electrical grid.
- ✓ **Enabling the Renewable Energy Market** through the development of low-carbon, environmentally sustainable energy infrastructure and technology.

### Program Goals/Metrics

- **MHK:** Demonstrate component improvements that will allow an increase in wave energy conversion system power-to-weight ratio (PWR) of 100 % (baseline for wave is 0.25kW/ton).

- **Hydropower:** Invigorate hydropower industry innovation, identify or enable opportunities, and solve challenges in the U.S. to support the goal of expanding the contribution of hydropower and pumped storage hydropower in non-powered dams, undeveloped streams, and pumped storage.

### FY 2017 Priorities

- **Wave Energy Testing Infrastructure** will help ensure that domestic MHK technology developers have access to world-class testing infrastructure. This open water, fully energetic wave facility will enable rapid testing of MHK devices and reduce development timelines.
- **MHK Technology Advancement and Demonstration** activities will pursue improvements in existing MHK designs and seek to encourage the development of novel, innovative MHK devices for converting the various resources into energy.
- **Hydropower Technology Development** has the potential to provide up to 12 GW of new hydropower capacity from non-powered dams (NPD) and over 60 GW from low impact, new development. Activities funded under the HydroNEXT initiative will develop low-cost technologies for increased hydroelectric generation from both NPDs and undeveloped streams.
- **Market Acceleration and Deployment** activities will help lower the barriers to deployment of innovative water power technologies, including monitoring instrumentation for MHK devices and biological design tools for engineering more sustainable hydropower turbines.

### Key Accomplishments

- The Water Power Program partnered with the U.S. Navy at its **Wave Energy Test Site (WETS)** in Kaneohe Bay, on the island of Oahu, Hawaii, to test a prototype wave energy device that successfully advanced from initial concept to grid-connected, open-sea pilot testing in June 2015. The device, called Azura, was launched and installed in a 30-meter test berth at the Navy's WETS in Kaneohe Bay. The device is designed to extract power from both the vertical and horizontal motions of waves to maximize energy capture. This pilot testing allows U.S.

(Dollars in Thousands)	FY 2015 Enacted	FY 2016 Enacted	FY 2017 Requested
Marine and Hydrokinetics	\$41,100	\$44,250	\$55,000
Hydropower	\$19,200	\$24,750	\$25,000
NREL Site-Wide Facility Support	\$700	\$1,000	\$0
<b>Total, Water Power</b>	<b>\$61,000</b>	<b>\$70,000</b>	<b>\$80,000</b>

researchers the opportunity to monitor and evaluate the performance of the third-party-verified and grid-connected device in the open ocean for one year.

- The Wave Energy Prize:** Of the 92 teams that registered to compete in the Wave Energy Prize—a two-year design-build-test prize competition to double the state-of-the-art performance of wave energy converters (WECs)—20 were selected as Qualified Teams. In 2015, 17 qualified teams successfully completed testing of 1/50th scale models of their game-changing WECs, and up to 10 will be selected as finalists. Further funds will be provided to national laboratories and the Naval Surface Warfare Center’s Carderock Division, which houses the nation’s premier wave-generating facility—the Maneuvering and Seakeeping Basin—to provide engineering and testing expertise for WEC Prize device design, building, and testing throughout 2016.
- Hydropower Vision:** The Water Power Program continued the development of a long-range national Hydropower Vision that will establish the analytical basis for an ambitious roadmap to usher in a new era of growth in sustainable domestic hydropower over the next half century. It is planned for release in summer 2016.
- In April, 2015, DOE released the first-ever **Hydropower Market Report** to quantify the current size, scope, and variability of our nation’s hydropower supplies to provide industry and policy makers with a quantitative baseline on the distribution, capabilities, and status of hydropower in the United States.
- The Department of Energy, the Department of the Interior, and the U.S. Army Corps of Engineers renewed its original 2010 **Memorandum of Understanding (MOU)** for hydropower for another five years in March 2015. The second phase of collaboration with its new Phase II Action Plan seeks to support the Administration’s goals for doubling renewable energy generation by 2020 and improving federal permitting processes for clean energy as established in the President’s Climate Action Plan.
- Innovative Hydropower Technology Powers Data Center.** An example of the next generation of hydropower is using an existing, previously unpowered irrigation canal to generate reliable, renewable energy. The electricity is being purchased by a private company to lower its carbon footprint.

- River/Tidal turbine provides clean energy to remote Alaskan village:** The DOE Water Program-funded project marked the first commercial, grid-connected hydrokinetic tidal energy project to deliver power to a utility grid in the United States. Funding for the device’s next generation system relies heavily on positive results from the most recent deployment in Alaska.



Coffeerville Lock and Dam, located on the Tombigbee River near the town of Coffeerville, Alabama. When converted, this Army Corps of Engineers dam may provide as much as 60 megawatts of electricity to the region. *Photo courtesy of U.S. Army Corps of Engineers.*



Energy Department-supported “Azura” wave energy converter is installed at a U.S. Navy test site in Hawaii. *Photo courtesy of Northwest Energy Innovations.*