

The Water Power Technologies Office leads efforts in developing innovative water power technologies to help the United States meet its growing energy demand. The Office is pioneering research and development efforts in marine and hydrokinetic and hydropower technologies, which hold the promise of clean, affordable electricity, and will move our nation toward energy independence.

What We Do

The Water Power Technologies Office supports a cutting-edge research portfolio aimed at producing the next generation of water power technologies and jump-starting private-sector innovation critical to the nation's long-term economic growth, energy security, and global competitiveness by accelerating the development of markets for those technologies.

- ✓ **Marine and Hydrokinetic Technology (MHK)** research, development, and demonstration investments that will allow the MHK sector to advance and achieve cost competitiveness with local hurdle rates in major coastal load centers by 2030.
- ✓ **Hydropower Technology** activities include critical research and development efforts necessary to develop more efficient technologies that will drive sustainable growth and economic opportunity in the near, mid, and long term.
- ✓ **Market Barriers Reduction** activities aim to address environmental and regulatory barriers that prevent significant amounts of deployment of MHK and hydropower in the United States.

Program Goals/Metrics

- Compress technology development timelines with the goal of reducing the levelized cost of energy for MHK devices to local coastal hurdle rates of \$0.12–\$0.15 per kWh by 2030.

- Invigorate hydropower industry innovation, identify or enable opportunities, and solve unique challenges in the United States to support the goal of doubling the contribution of hydropower to the U.S. electricity system by 2030 (an additional 300 TWh).

FY 2015 Priorities

- **HydroNEXT:** This new initiative aims to double the current contribution of hydropower in the United States. Activities will focus on technologies and tools to improve performance and sustainably increase generation at existing water resources infrastructure. Additionally, HydroNEXT will support new stream-reach development by sponsoring the research and development of innovative technologies that lower the cost, improve the performance, and promote environmental stewardship of hydropower.
- **Modular Pumped-Storage Hydropower (m-PSH):** The Office will begin developing innovative m-PSH system designs tailored to provide the emerging and ancillary services needed today.
- **MHK Research and Design:** To advance system designs of marine energy conversion devices, the Office will continue to support field studies and applied MHK research, integrate innovative component technologies into advanced system designs, and demonstrate the viability of MHK systems at a pre-permitted site.
- **Validate Open-Source Advanced Design Tools:** Compile, analyze, and disseminate performance data from device testing to enable the validation and improvement of numerical modeling tools. These datasets will be freely available to entrepreneurs and industry to allow for the simulation of device array designs and array impacts on marine surroundings.

(Dollars in Thousands)	FY 2013 Current	FY 2014 Enacted	FY 2015 Request
Marine and Hydrokinetic (MHK) Technologies	35,456	41,275	30,500
Hydropower Technologies	19,231	17,290	31,500
NREL User Facility	0	0	500
Total, Water Power Technologies	54,687	58,565	62,500

Key Accomplishments

- Wave Energy Testing and Demonstration:** The Northwest National Marine Renewable Energy Center (one of three Marine Renewable Energy Centers in the United States)—led by the University of Washington, and Oregon State University—launched the Ocean Sentinel, a mobile ocean testing platform that obtains critical technical and cost-performance data for a variety of technologies.
- Establishing Cost-Reduction Pathways MHK Devices:** Led by the U.S. Department of Energy’s (DOE’s) Sandia National Laboratories in coordination with three other national labs, four reference models were completed to establish benchmark conservative costs for four generic MHK devices. Additionally, DOE published four white papers to identify cost-reduction pathways for different types of devices based on industry input.
- International Environmental Database:** DOE collaborated with the International Energy Agency’s Ocean Energy Systems group to create the Tethys database, which catalogues and shares environmental research from around the world to enable sustainable development and expansion of clean, renewable energy and ocean power. A complementary report was released that provided an in-depth analysis of the environmental impacts of wave, tidal, and current devices, including on wildlife and overall health of the host water body.
- New Stream-Reach Development:** Led by DOE’s Oak Ridge National Laboratory, an assessment of energy potential from new stream-reach development in the United States was recently released. The assessment provides a national picture of the remaining new hydropower development opportunities in more than 3 million U.S. rivers and streams. The estimated resource capacity of new stream-reach development is between 60 GW and 80 GW.
- Increased Hydropower Generation:** Resulting from the American Recovery and Reinvestment Act-funded hydroelectric modernization projects is estimated to exceed 135,000 MWh annually—enough to meet the annual electric usage of more than 10,000 average U.S. homes at an estimated incremental cost of less than \$0.04

per kilowatt hour. DOE completed these capacity and efficiency upgrades at seven U.S. hydropower facilities in FY 2014.

- Water Use Optimization Toolset:** Led by DOE’s Argonne National Laboratory, industry will implement the Water Use Optimization Toolset in 2014. The toolset allows for the joint optimization of generation, ancillary service provision, and environmental objectives. This novel energy-environmental optimization approach will increase energy and grid services from available water and will enhance environmental benefits from improved hydropower operations and planning.

