National Water Reuse Action Plan
Completed Action

Action 4.3 Support Water Reuse Through the U.S. Department of Energy's Water Security Grand Challenge

Background

To help address the array of water resource challenges and opportunities, in October 2018 the Department of Energy (DOE) announced the Water Security Grand Challenge. The Water Security Grand Challenge is a White House-initiated, DOE-led framework to advance transformational technology and innovation to meet the global need for safe, secure, and affordable water.

Using a coordinated suite of prizes, competitions, early-stage research and development, and other programs, the Grand Challenge set five goals for the United States to reach by 2030.

- Launch desalination technologies that deliver cost-competitive clean water.
- Transform the energy sector's produced water from a waste to a resource.
- Achieve near-zero water impact for new thermoelectric power plants, and significantly lower freshwater use intensity within the existing fleet.
- Double resource recovery from municipal wastewater.
- Develop small, modular energy-water systems for urban, rural, tribal, national security, and disaster response settings.

Action Team

Action Leaders

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Action Partners

- **EPA**
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- **U.S. Department of the Interior**
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- **U.S. Department of Agriculture**
- **U.S. Department of Defense**
- **Electric Power Research Institute**

Accomplishments/Impact

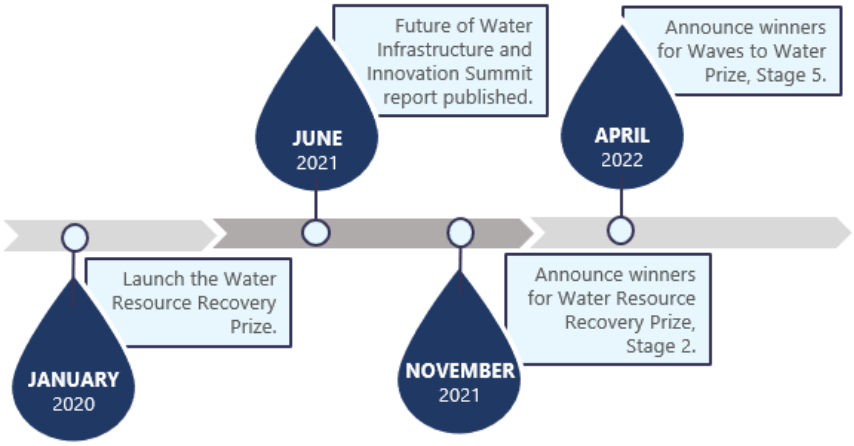
- Through the five-stage of the Waves to Water Prize, a total of $3.3 million was awarded to teams developing small, modular, wave energy-powered desalination systems. Such systems are expected to be especially important in disaster and recovery scenarios along with coastal and island communities. In April 2022, DOE announced one Grand Prize winner with the other finalists also awarded for their accomplishments.
- The Solar Desalination Prize was designed to accelerate the development of low-cost desalination systems through the use of solar thermal power. Finalists will need to demonstrate a successful test of a promising solar-thermal desalination system prototype and will be eligible for a $1 million grand prize.
- Launched in 2020, the Water Resource Recovery Prize to accelerate the transition from conventional wastewater treatment to a model of resource recovery from municipal wastewater. A two-phased competition was completed with over $500,000 awarded in total.
- As a way to bring together the different priorities of these prize competitions and the Water Security Grand Challenge, a Future of Water Infrastructure and Innovation Summit was held in October 2020. This Summit gathered experts from DOE, EPA, and the private sector to discuss a path forward for advancing innovative practices and technologies in the water sector.

Lessons Learned

Through the Future of Water Innovation Summit, several recommendations identified including the need for more efficient and selective membrane technologies along with the need to better management concentrate streams. In addition, the need for advanced sensors was identified to better monitoring water quality issues and detect problems. Ideally, such sensors could be integrated with artificial intelligence to improve system operations and can potentially be deployed in modular and decentralized water reuse system to manage water locally.

This summit also identified a series of opportunities were identified such as the potential for enhanced collaboration across different sectors and through public-private partnerships to catalyze innovation. There is also a need to provide more opportunities accelerating the testing and validation of new technologies to reduce the level of risk that utilities taken when adopting such technologies. Finally, a well-trained workforce is needed to operate more advanced water systems that incorporate new technologies.

Action Implementation Process



Potential Future Activity

- The results from the competition will help the Advanced Manufacturing Office (AMO), Water Power Technologies Office (WPTO), National Renewable Energy Laboratory (NREL), and Coastal Studies Institute (CSI) identify future research opportunities, such as on flexible and resilient mooring systems, which anchor devices in place. EPA will continue to collaborate with AMO and other offices in DOE on water-energy research and technology development priorities.
- Through action 4.6, the National Alliance for Water Innovation (NAWI) is continuing to release funding opportunities and develop innovative technologies that will address many of the needs and opportunities identified in this action.

Additional Resources

- The report from the Future of Water Infrastructure and Innovation Summit can be found here: https://www.energy.gov/eere/amo/articles/future-water-infrastructure-and-innovation-summit
- NAWI published a series of technology roadmaps for different end-use sectors for water: https://www.nawihub.org/knowledge/roadmap-publication-series/