

# Promoting Innovation for a Sustainable Water Future

## A Progress Report

### *Message from Ken Kopocis, Deputy Assistant Administrator for Water, U.S. EPA*

*"I am delighted to share this progress report on the ways that communities and the water sector have used innovation and technology to accelerate progress to clean and sustainable water resources. The water sector has embraced the need to think differently about sustainability and the concept of 'One Water.' We are far from done, but the evidence of change and progress is unmistakable, and EPA will continue to support efforts that are taking our nation on this important path."*

In April 2014, EPA Administrator Gina McCarthy issued the [Promoting Technology Innovation for Clean and Safe Water, Water Technology Innovation Blueprint—Version 2](#) (Blueprint Version 2) to demonstrate the extent of risks to water sustainability, the “market opportunities” for innovation, examples of innovation pioneers, and actions to promote technology innovation. These actions included ways that EPA will be a positive contributor to the effort, along with utilities, industry, investors, academics, technology developers, and entrepreneurs.

Over the past year, EPA has collaborated with a wide spectrum of partners, all of whom play a critical role in advancing water technology and innovation. Progress toward sustainable water resources is accelerating. This Progress Report provides additional examples of the growing momentum across the country to address traditional and emerging threats to the nation’s water resources.

## The Business Case for Water Innovation and Sustainability

[Blueprint Version 2](#) made the business case for innovation in the water sector and provided many examples of how innovation was being deployed across the United States. In the past year, notable authors and experts issued reports that also framed our nation’s water challenges and made the strong case for water technology, innovation, and sustainability. Examples of these critically important works include:

*"With shocking water crises in the news this year, the urgent need for infrastructure upgrades and resilience building in our water systems has been made clear."* (From: [Innovating for a Sustainable and Resilient Water Future](#), Aspen-Nicholas Water Forum, 2014)

*"[...] the water sector is rapidly shifting from a culture of stasis to one that values and embraces innovation."* (From: [Navigating to New Shores: Seizing the Future for Sustainable and Resilient U.S. Freshwater Resources](#), The Johnson Foundation, 2014)

*"Although they have been highly effective to date, the country’s water supply systems are now on the cusp of new challenges that they are not prepared to meet."* (From: [The Path to Water Innovation](#), Stanford Woods Institute for the Environment, 2014)

*"The time has come to secure the water future we want before a crisis forces it upon us."* (From: [Water 4.0: The Past, Present, and Future of the World’s Most Vital Resource](#), David Sedlak, 2014)



# Recent Innovations in the Water Sector

EPA's [Blueprint Version 2](#) identified and described 10 of the most promising opportunities to employ technology and institutional innovation to help solve current water resource issues and promote economic growth. Collectively, these "top ten" market opportunities, listed in the key at right, form the basis for achieving water sustainability. Building off the 20 examples provided in [Blueprint Version 2](#), the map below highlights additional innovative technology efforts across the nation and identifies their corresponding market opportunities.

## Market Opportunities in the Water Sector

- Conserving and Recovering Energy
- Recovering Nutrients
- Improving and Greening of Water Infrastructure
- Conserving and Reusing Water
- Reducing Costs and Improving Techniques for Water Monitoring
- Improving Performance of Small Drinking Water Systems
- Reducing Water Impacts from Energy Production
- Improving Resiliency of Water Infrastructure to the Impacts of Climate Change
- Improving Access to Safe Drinking Water and Sanitation
- Improving Water Quality of Our Oceans, Estuaries, and Watersheds

**Gresham, OR Achieves Energy Net Zero**  
Through the use of [biogas generation and recovery](#), as well as ground-mounted solar arrays, the City of Gresham's wastewater treatment plant is the first in the Pacific Northwest to generate the same amount of electricity as it consumes each year.

**Madison, WI Harvests Phosphorus**  
The [Madison Metropolitan Sewerage District](#), in conjunction with Ostara Nutrient Recovery Technologies, recovers phosphorus at their Nine Springs Wastewater Treatment Plant, converting it into an environmentally friendly fertilizer, Crystal Green®.

**Rocky River Hydrology**  
Cleveland Metroparks studied the hydrology of the Rocky River headwater streams affected by runoff by using [real-time flow and water quality sensors](#) to attain precise, short-interval hydrograph and water quality data.

**Improving Onsite Systems**  
The [Massachusetts Alternative Septic System Test Center \(MASSTC\)](#) aids in the development, testing, and piloting of new and innovative onsite technologies.

**Mobile App for Water Quality Data**  
A mobile application called [KCWaterBug](#) provides live water quality data so users can make real-time informed decisions about recreation in numerous streams in the Kansas City area.

**Private Wastewater Treatment for Nutrients**  
A partnership between the [Buzzards Bay Coalition](#) and the Kingman Yacht Center marina is working to provide currently unsewered households with access to a new, privately built wastewater treatment plant as a means to control the discharge of nutrients.

**Protecting Lake Tahoe**  
The [Lake Clarity Crediting Program](#) uses a suite of stormwater tools and protocols to target ongoing effective actions to reduce urban stormwater fine sediment and nutrient pollutants to Lake Tahoe.

**Philadelphia, PA Extracts Heat from Wastewater**  
The city of Philadelphia uses a [geothermal process](#), acting like a large heat pump, to extract ambient heat from wastewater to heat its compressor building and gallery space, saving \$18,000 a year in energy costs.

**GreenPlan Bay Area**  
The [GreenPlan Bay Area](#) project developed a GIS-based tool and GreenPlans to help municipalities identify the optimal combination and location of green infrastructure/low impact development features to address water quality on a watershed scale.

**DC Water Saves Energy**  
DC Water is the first plant in North America to adopt a [Cambi thermal hydrolysis process](#) that will enable them to create a significant amount of biogas which, when fully operating, will generate one-third of the plant's energy requirement.

**Cleaning Hydraulic Fracturing Wastewater**  
Researchers at the University of Colorado, Boulder have developed a [method using microbes](#) to clean both organic contaminants and salts from hydraulic fracturing wastewater, while producing renewable energy.

**Rainwater Harvesting at EPA**  
[EPA's Headquarters facility](#) recently upgraded an existing 6,000-gallon capacity rainwater harvesting system with OptiNimbus real-time controls to manage stormwater retention and use more effectively. The system allows EPA to monitor the volume of rainwater captured and used over time.

**Padre Dam Municipal Water District, CA**  
The recently completed construction of an [advanced water purification facility](#) will reclaim treated wastewater and use it to recharge drinking water aquifers, providing 20-25 percent of Padre Dam's current drinking water demands.

**Potable Reuse**  
The communities of [Big Spring](#) and [Wichita Falls](#), Texas, became the country's first two potable reuse facilities, using multiple barrier technologies and intense monitoring.

**Emory University Reclaims Wastewater**  
The [WaterHub](#) at Emory University is reducing its water footprint nearly 40% by reclaiming and reusing up to 146 million gallons of campus wastewater annually by using an [adaptive ecological technology](#) that naturally breaks down organic matter in wastewater for use as make-up water in its steam and chiller plants.

**Crisfield, MD Uses Wind Power**  
The city of Crisfield is planning a [750 megawatt \(MW\) wind turbine](#) to provide electricity at its wastewater treatment plant. The turbine is expected to generate more than enough electricity to power the treatment plant and save the city \$150,000 to \$200,000 a year in electricity costs.

**Resource Conservation and Pollution Reduction at Wastewater Treatment Facilities**  
As part of a broader [Energy Management Initiative \(EMI\)](#), EPA Region 4 supported energy assessment site visits at eight wastewater treatment facilities. The site visits identified opportunities for significant energy savings, and reductions in CO<sub>2</sub> equivalent, and nitrogen discharges, at very little to no cost to the utilities.



## EPA Tools and Guidance That Support Innovation and Sustainability

- [Water Utility Response On-The-Go](#)—A mobile website and innovative tool that consolidates, and makes accessible from the field, information and tools that water utility operators and their response partners may need during an emergency.
- [Flood Resilience: A Basic Guide for Water and Wastewater Utilities](#)—A handbook that outlines a simple, four-step assessment process to help any water utility understand its flooding threat and identify practical mitigation options to protect its critical assets.
- [National Stormwater Calculator](#)—An application that estimates annual rainwater and frequency of runoff for a specific site anywhere in the United States. It now includes estimated costs of green and gray infrastructure stormwater BMPs and a mobile website for use on tablets.



## EPA Promotion of Sustainable Utilities Based on Proven and Progressive Practices

- [Moving Toward Sustainability: Sustainable and Effective Practices for Creating Your Water Utility Roadmap](#)—Provides a series of proven best practices to optimize utility operations.
- [Making the Right Choices for Your Utility: Using Sustainability Criteria in Water Infrastructure Decision Making](#)—Outlines a six-step process to analyze alternatives for infrastructure investments.
- [Rural and Small Systems Guidebook to Sustainable Utility Management](#)—Introduces rural and smaller utilities to key areas for effective utility management. Developed jointly with USDA.



*“We are making real strides, at EPA and across the entire water sector, to support the use of innovation and technology to achieve a sustainable water future.”*  
—EPA Administrator Gina McCarthy

## EPA Actions to Support Technology Innovation and Water Sustainability

[Blueprint Version 2](#) provided the framework for EPA and its partners in the water sector to support water sustainability. Examples of progress include:

### Advocating Technology Innovation

**Technology Innovation Showcase**—In December 2014, EPA held the Technology Innovation Showcase, which demonstrated innovative water technologies, including over 20 technologies designed by EPA researchers.

**2015 Supplemental Environmental Projects (SEP) Policy**—EPA recently updated its SEP Policy to include opportunities for defendants to develop and demonstrate innovative technologies that may prove more protective of human health and the environment than existing processes.

### Creating Regulatory Space

**Integrated Planning**—EPA is providing \$335,000 in technical assistance to five communities to develop components of integrated plans for meeting Clean Water Act (CWA) requirements for municipal wastewater and stormwater management.

**NPDES Compendium of Next Generation Compliance Examples**—EPA has provided examples of how advances in pollutant monitoring and information technology have been used to increase compliance with environmental requirements under the NPDES program.

### Speeding Delivery of Proven Technologies

**National Centers for Innovation in Small Drinking Water Systems**—With funding support from EPA, the University of Colorado and University of Massachusetts are developing programs to identify and address common potential barriers in how states approve the use of new treatment technologies.

**Leaders Innovation Forum for Technology (LIFT) Program**—Through funding provided by a cooperative agreement with EPA, the Water Environment Federation (WEF) and the Water Environment Research Foundation (WERF) LIFT program, now with over 280 water agency participants, launched several new programs, including a Web platform to help identify and deliver information on innovative water technologies. WEF is also developing a framework for a work group on national stormwater testing and evaluation for products and practices (STEPP).

### Facilitating Opportunities for Financing and Funding

**New Water Infrastructure Financing**—On January 16, 2015, the Obama administration announced efforts to accelerate economic growth and additional investment in the nation's infrastructure, including water and wastewater.

**Small Business Innovation Research (SBIR) Program**—Since its inception, EPA's SBIR Program has provided incentive funding to small businesses to translate their innovative ideas into commercial products that address environmental problems.

**Water Infrastructure and Resiliency Finance Center (WIRFC)**—Launched in January 2015, EPA's WIRFC will promote the use of innovative financing, including public-private partnerships, to serve as a resource for communities, municipal utilities, and private entities as they seek to address their future water infrastructure needs.

### Partnering and Leveraging Actions with Others

**Collaborating for Energy Efficiency**—EPA Region 9, in partnership with the Department of Energy's Industrial Assessment Centers, conducted 19 energy audits at wastewater treatment facilities. These audits identified 125 energy conservation opportunities that could save approximately \$7 million and 70 million kWh annually.

**Technology Innovation at WEFTEC 2014**—WEF showcased Blueprint Version 2 and led facilitated discussion sessions on each of the market opportunities at its [2014 WEF Technical Exhibition and Conference \(WEFTEC\)](#). WEF is publishing summaries of each of those discussions monthly in its Water Environment & Technology (WE&T) magazine throughout 2015 in a featured series titled “Building Blueprints.”

### Supporting Research, Development, and Demonstration

**Nutrient Sensor Challenge**—In partnership with EPA, the Alliance for Coastal Technologies' Nutrient Sensor Challenge will accelerate the development and deployment of affordable nutrient sensors for use in water.

**Environmental Technology Innovation Clusters**—EPA has supported the creation of 14 clusters across the country to lead the nation in water technology innovations through regional collaboration among businesses, government, research institutions, and other interested groups.

## Moving Forward—Continuing to Advocate and Embrace Change

This progress report identifies just a few of the many examples of how innovative water technologies and practices are being pursued to support a sustainable water future. For more information about innovative technologies and practices related to water sustainability, please visit the EPA Water Technology Webpage at [www.epa.gov/innovation/watertech](http://www.epa.gov/innovation/watertech).

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