Water Environment Federation
the water quality people®

SPECIAL REPORT

INNOVATE

- Energy
- Nutrients
- Resilience
- Reuse
- Stormwater

SEPTEMBER 2014

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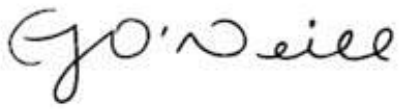
Gaining innovation momentum

The water sector is changing fast and major players have developed ambitious goals, including those found in *The Water Resources Utility of the Future* from WEF, the Water Environment Research Foundation (WERF; Alexandria, Va.), and the National Association of Clean Water Agencies (NACWA; Washington, D.C.), the *Water Technology Innovation Blueprint* from U.S. Environment Protection Agency, and *The Water-Energy Nexus: Challenges and Opportunities* from the U.S. Department of Energy. All water sector professionals share the responsibility to turn these aspirational concepts into practice.

Catalyzing innovation is one of WEF's three critical objectives. The amazing achievements and ideas presented at WEFTEC play an essential role in fulfilling this objective. However, WEF integrates innovation into its activities year-round. This Innovation annual provides brief technical stories that highlight the achievements by WEF and its members to advance the water sector. Topics range from green infrastructure to nutrient recovery to energy generation to asset management to excellence in operations.

You'll read about the WEFTEC Innovation Pavilion — presented with partners BlueTech® Research and ImagineH2O since 2012 — the activities of such water innovation clusters and accelerators as BREW by The Water Council; the New Orleans Water Challenge; and innovations in water reuse, resiliency, and sustainability. Welcome to the Innovation Showcase Pavilion here at WEFTEC 2014. Join us in committing to catalyzing innovation in the water sector. The hope is that championing innovation becomes one of your professional critical objectives as well.



Eileen O'Neill, Ph.D
Executive Director, Water Environment Federation

"If we don't seek out innovative infrastructure solutions, we will continue to build the same infrastructure as we have now. Existing infrastructure was built based on the needs of society 40-100 years ago. We need to look at where society will be 40-100 years in the future."

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INNOVATE CONTENTS

A Vision for WEF and the water sector

Eileen O'Neill officially took the reins as executive director of the Water Environment Federation (WEF; Alexandria, Va.) in February 2014. However, her appointment follows 23 years at WEF working to develop a strong community of experts, foster collaboration, advocate sound science, and provide the water sector with the tools it needs to excel.

"Dr. O'Neill has consistently led WEF operations to be more strategic and data driven, which aligns WEF with industry trends and the changing needs of utilities and global professionals," said Sandra Ralston, 2013–2014 WEF president.

"It is especially exciting to serve the water profession and sector in such a time of change and opportunity," O'Neill said. "The vital role that water services play in communities is becoming increasingly clear and the need for innovative thinking and practices more widely recognized."

In March, O'Neill shared her vision for WEF and the water sector.

What are the largest challenges facing the water sector?

O'Neill: In an era of climate change and competing demands, the primary challenge is meeting the water service needs of growing and, in some cases, shifting populations with an eye to resiliency and flexibility. North America and other developed parts of the world face additional layers of complexity from the challenges of integrating legacy systems, replacing aging infrastructure, and, in some cases, addressing combined sewer overflows.

What do you see as WEF's role in facing these challenges?

O'Neill: WEF will help share and distill knowledge. WEF's diversity and our strength as a practitioner-rich community allows us to help bridge the gap between new water management research and theory and practical, on-the-ground adoption and implementation. We can shine a light on successful early adopters, and contribute to the identification, verification, and dissemination of leading practices that catalyze implementation of innovative and practical solutions.

Eileen O' Neill, Ph.D., Executive Director, Water Environment Federation

What will utilities of the future look like?

O'Neill: We already are getting a glimpse of what utilities of the future will look like and what they will deliver. While utilities historically have provided crucial services and been leaders in protecting public health and the environment, they often have operated in the background. Emerging utilities of the future are visible partners in local development, innovators, leaders in resource recovery, and forces for the enrichment and greening of communities.

It is remarkable how quickly the role water utilities play in their communities is changing and how large an impact many are having on health, economy, and vibrancy of cities.

What role will innovative technologies play in the future for the water sector?

O'Neill: Innovative technologies are saving community resources and driving smarter water management. For example, short-cut nitrogen removal meets stringent nitrogen limits while decreasing use of energy and other resources, and asset management tools and data analytics enable better decision-making and resource allocation. I see these sorts of trends continuing.

Also, through the work of such programs as the WEF and Water Environment Research Foundation (Alexandria, Va.) Leaders Innovation Forum for Technology (LIFT), I see an increasing pace of adopting innovation in the U.S. As a country we have some of the best technical minds in the world and we lead in innovation in many spheres. Now we are putting our minds to work, making sure that the water sector and the public sees the benefits of water innovation sooner rather than later.

Collaboration seems to be a buzzword in the water sector right now. How will WEF foster collaboration? Who needs to take part in this collaboration?

O'Neill: Effective collaboration is not just a priority for WEF, it's an expectation from our members and customers who are looking to maximize their investment.

The water sector is rich with opportunities and we believe there is room for contributions by many organizations. WEF is very open to both meaningful coordination and true partnerships. We prefer to identify specific collaborative activities and programs and build understanding and trust by working together.

Excerpted from the following articles from *WEF Highlights*:

- "Eileen O'Neill Becomes WEF's New Executive Director," February 2014.
- "O'Neill Shares Her Vision for WEF," March 2014.

Working together to advance innovation

LIFT program encourages cooperation and shared research findings

Carita Parks

In 2012, the Metropolitan Water Reclamation District of Greater Chicago and the Metro Wastewater Reclamation District (MWRD) in Denver joined the newly formed Leaders Innovation Forum for Technology (LIFT) program — a joint Water Environment Federation (Alexandria, Va.) and Water Environment Research Foundation (WERF; Alexandria, Va.) initiative designed to help move innovation into practice in the wastewater industry. LIFT helps utilities cooperate to demonstrate new technologies. The program affords participating utilities a platform to communicate, collaborate, pool resources, and discuss experiences in research and initiatives of common interest. The first technology area of interest identified by LIFT members was sidestream deammonification; both Chicago and Denver had begun to explore this technology individually.

During the past few years, the Metropolitan Water Reclamation District of Greater Chicago has pilot tested a new sidestream nitrogen removal technology to help it prevent odor problems with transporting high-strength centrate from one facility to another. Chicago shared its findings through the Leaders Innovation Forum for Technology program. Water Environment Research Foundation

Chicago

At Chicago's John E. Egan Water Reclamation Plant, centrate with high ammonia nitrogen cannot be returned to the mainstream without compromising compliance with permitted ammonia limits. As a result, centrate is conveyed via interceptor to another facility. Odor issues have plagued residents along this sewer line. To prevent the transfer and the odor, Chicago began to investigate sidestream nitrogen removal.

Denver

Concurrently, Denver, which had implemented sidestream treatment strategies at its Robert W. Hite Treatment Facility several years prior, was beginning to investigate the potential to integrate sidestream deammonification. Denver sought the potential benefits of compliance with tighter effluent ammonia and nitrogen limits, as well as improved performance reliability of enhanced biological phosphorus removal in the main process.

Choosing technologies

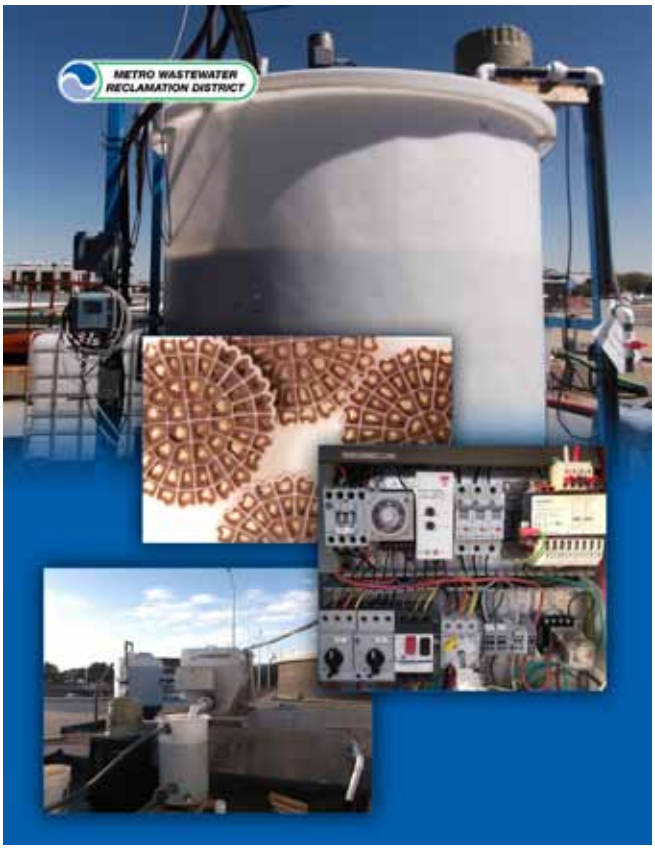
Chicago pursued the DEMON® technology and scheduled pilot testing beginning in September 2012. The utility chose this technology because of its maturity and energy efficiency; Chicago also intended to investigate ANITA™ Mox technology soon after.

Denver, on the other hand, pursued ANITA™ Mox and also scheduled testing to begin in September 2012. The DEMON® technology also is on Denver MWRD's list of technologies for evaluation. Both technologies are extremely effective at developing the ecological niche of organisms required for deammonification, but they differ considerably in attributes that must be considered when determining whether a technology selection fits well with a facility and its operating culture.

Collaborating and sharing

In 2012, several utilities discussed their interest in deammonifciation or actual demonstration projects through the LIFT program. Both Denver and Chicago highlighted their respective pilot studies and realized their common interest.

The connection through LIFT helped the utilities align efforts and leverage benefits from each other's studies. Denver and Chicago initiated recurring personal communication and information-sharing on their respective studies. Through status meetings, phone calls, and e-mail, the two utilities discussed pilot study direction and design criteria, operational guidelines



The Metro Wastewater Reclamation District (Denver) tested a different nutrient removal technology. The driver for this research was reaching tighter effluent ammonia and nitrogen limits and improved reliability in biological phosphorus removal. Denver also shared its findings through the Leaders Innovation Forum for Technology program. Water Environment Research Foundation

and problems, process control, infrastructure needs, system robustness, and overall performance.

In December 2012, to enhance technology evaluation leading toward application, Chicago co-hosted a LIFT deammonification workshop where utilities convened to learn about vendors of different technology approaches and to exchange information and experiences. Chicago and Denver both shared midpoint updates of their studies.

Moving ahead

Both Chicago and Denver continued to share progress updates into 2013 until both studies were completed. Both utilities now can use the other's information to support proceeding with deammonification and technology selection. From the studies, both utilities were able to compare operating requirements, reliability of performance, volumetric efficiency, and control strategies of the two technologies.

From the collaborative effort on technology evaluation, Chicago is moving forward with the design and implementation of a full-scale ANITA™ Mox process at its Egan facility.

Both utilities reduced research costs and stretched resources while accelerating understanding and building confidence in new technologies. This joint research approach enabled both utilities to reap accelerated benefits of research and new technology.

Chicago and Denver both received WERF's 2013 Award for Excellence in Innovation for their work on this project, which demonstrated how LIFT can be successful.

- Adapted from "Working together to advance innovation: LIFT program encourages cooperation and shared research findings" from the March 2014 issue of *Water Environment & Technology.*

Challenges & opportunities for a freshwater future

As a nation, we face a host of challenges, threats and opportunities associated with the availability, quality and resilience of our freshwater resources. These include significant pressures on our natural and built infrastructure that is increasingly under stress from new sources of demand, shifting populations and impacts from climate change. We also have witnessed remarkable leadership and innovative responses that have been rising to meet these challenges in communities across the country.

Since 2008, The Johnson Foundation at Wingspread has been examining these challenges, threats and opportunities through its Charting New Waters (CNW) initiative, an unprecedented collaboration of diverse stakeholders designed to both address these challenges and redesign our vision for the systems and services that both meets and exceeds our needs for a secure and resilient freshwater future.

"Innovation is happening in every aspect of water resources management today - in all regions of the nation - and The Johnson Foundation sees myriad opportunities to take water sector innovation and resilience to the next level," said Dr. Lynn Broaddus, Director of The Johnson Foundation's Environment Program.

After two years of exploratory work that included more than 100 experts meeting at Wingspread — the Foundation's iconic headquarters in Racine, Wisconsin — the Foundation released *Charting New Waters: A Call to Action to Address U.S. Freshwater Challenges* in 2010 and committed to continued work on behalf of the challenges identified in the report.

"We originally launched this effort knowing that, despite the growing concerns around U.S. water security, there seemed to be no one pulling together the important work that was happen-

ing in different sectors and different regions," Broaddus said.

In its latest phase, CNW focused on what it will take to transform the nation's aging 19th- and 20th-century water infrastructure into resilient 21st-century systems that will sustain the nation's environment, economy and society for future generations. By aiming to help local, state and national leaders set a course for and navigate decisions regarding the conception, construction, financing and management of water infrastructure, CNW's ultimate goal is to accelerate the widespread adoption of innovative and successful water infrastructure and management solutions.

This fall, The Johnson Foundation will be ending its CNW initiative. In doing so, it will issue a groundbreaking, timely set of recommendations to catalyze transformative changes in how the United States manages its freshwater resources in the face of climate change, failing infrastructure, drought, extreme storms, and other critical challenges. The culmination of a six-year examination of U.S. freshwater challenges, the recommendations presented in *Navigating to New Shores: Seizing the Future for U.S. Freshwater Resources* are informed by the wisdom of more than 600 diverse experts who have participated in the CNW initiative, and are based on principles that can help guide the efforts of public agencies, utilities, businesses, advocates and communities.

"It is our intention to push decision makers and implementers in all sectors and across scales to act quickly on the recommendations laid out in this report and advance the transformation of water management throughout the country so that we seize the opportunity before us to create a sustainable and resilient future," Broaddus explained.

The report will be launched during an open press conference on Monday, Sept. 29 at 12:15 p.m. during WEFTEC in New Orleans. The press event will take place in the foyer outside the main ballroom at the New Orleans Morial Convention Center and will feature a presentation by Broaddus, followed by remarks from George Hawkins, general manager of DC Water and Sewer Authority. All are welcome to attend.

"We all need water and count on it to survive," Broaddus said. "Our economy would grind to a halt without the reliable, safe, disease-free water that most North Americans have come to take for granted. Getting ahead of our water infrastructure challenges presents an opportunity for future economic growth and an overall better quality of life for all of us."

Challenges & Opportunities
for a Freshwater Future

Johnson Foundation at Wingspread Releases Landmark Report for Transforming U.S. Water Resources Management

As a nation, we face a host of challenges, threats and opportunities associated with the availability, quality and resilience of our freshwater resources. These include significant pressures on our natural and built infrastructure, which is increasingly under stress from new sources of demand, shifting populations and impacts from climate change.

Through its Charting New Waters initiative, The Johnson Foundation at Wingspread has collaborated with more than 600 diverse experts to address these challenges and issue a groundbreaking set of recommendations for catalyzing transformative changes in how the United States manages its freshwater resources. The report, *"Navigating to New Shores: Seizing the Future for U.S. Freshwater Resources,"* marks the conclusion of the Foundation's six-year examination of U.S. freshwater challenges and offers guiding principles and timely recommendations to help guide the efforts of public agencies, utilities, businesses, advocates and communities.

Get a front row seat for the launch of this report and a discussion of its implications at the following WEFTEC events:

— **Open Press Conference**
Monday, September 29th at 12:15pm
Great Hall Prefunction Space

— **Innovation Pavilion**
Tuesday, September 30th at 4pm
Exhibit Hall Booth 4029

— **Reception**
Tuesday, September 30th at 5pm
Exhibit Hall Booth 4029

For further information, visit us at **www.johnsonfdn.org**

Invisibility is no longer the goal

Community interaction partnered with technological innovation key to future

Cathy Chang

"It's not our parents' wastewater utility anymore," was the theme shared among a panel of utility managers from around the world — Singapore, Australia, and San Francisco — and a water technology CEO, who met to discuss their challenges and future goals Oct. 7 at WEFTEC® 2013.

The special session, "The Future of Cities and Water: Insights From Iconic Water Cities," was a chance for four water leaders to share their experiences "rethinking water services to allow for smarter, more sustainable approaches that will allow them to support their growing populations and be competitive," according to 2012-2013 Water Environment Federation President Cordell Samuels.

Chicago Mayor Rahm Emanuel welcomed the audience and shared his city's plan to invest $7 billion in infrastructure. The infrastructure improvements include replacing 1440 km (900 mi) of pipe, rebuilding two water treatment facilities, relining 1200 km (760 mi) of pipe, rebuilding 12 pump stations, and investing $50 million in "greener, cleaner stormwater management above and beyond federal standards," he said.

G. Tracy Mehan, former U.S. Environment Protection Agency assistant administrator for water moderated the panel, which advocated that utilities shed the traditional role as an "invisible" service.

Singapore: Leadership, local control

Chew Men Leong, chief executive of PUB Singapore, discussed Singapore's campaign to "use every drop twice." This message is especially critical for the sovereign city-state in Southeast

G. Tracy Mehan, former U.S. Environment Protection Agency assistant administrator for water, moderated the panel. He explained the role of water in sustainability as "not only environmental, but also social and economic." Panel members talked about how they communicate community livability benefits from investment in water infrastructure. Oscar Einzig


Oscar Einzig

Chew Men Leong


Oscar Einzig

Sue Murphy


Oscar Einzig

Harlan Kelly Jr.

Asia facing water demands from growing industry and population.

Historically, Singapore has purchased water from neighboring Malaysia, but political conflicts made Singapore's water supply vulnerable. Leong said his utility's plan for self-sufficiency emphasized "collecting every raindrop," which led to water supply diversification through desalination, rainwater use, and recycling.

Leong described continuous innovation and risk taking as part of being a water quality leader. "We need to take the risk to adapt technologies so that we can position ourselves for future challenges," he said. "If we don't take this risk, we are sitting on a bigger risk of not being prepared for challenges of growth in population."

Australia: Conservation, community first

Sue Murphy, CEO of western Australia's water utility Water Corporation, said recent changes in climate have forced her utility and its more than 2 million customers to adapt to new ways of using and conserving water.

"We've moved heavily into desalination," Murphy said. "Fifty percent of the water supply in Perth comes from the sea." The next step, Murphy said, is a groundwater replenishment program, in which membrane technology treats wastewater to inject into deep aquifers for common use.

She said her utility's stance has shifted to work closely with the community. "Over the last decade, although the population has grown by one-third, the amount of water supplied is 8% less," Murphy said. "We've done this by … allowing our community to take us forward."

"As a water industry, we have to stop thinking we have all the answers," she said. "We have to open ourselves up to partner with everybody else. Only then can we achieve what we mean to achieve."

San Francisco: Engage and educate

Harlan Kelly, Jr., general manager of the San Francisco Public Utilities Commission, said affordability and reliability are the main concerns for his more than 2 million customers. The main challenge is to "make sure you deliver water 24/7, and make it affordable."

With 60% of his utility's system more than 70 years old, Kelly stressed infrastructure investment. "The time to do that is now," he said. He also encouraged engaging the community during infrastructure improvements as key to his utility's success with large, expensive projects.

"We engage in every opportunity to educate about the infrastructure; to not be invisible," Kelly said.

GE: Efficiency and innovation

Heiner Markhoff, president and CEO of GE Power & Water Process Technologies, had a different perspective. From his private sector seat, the impetus is on creating the technologies to help utilities in water recycling, energy efficiency, reduction in operating costs, enhanced asset management, and improving the resiliency of water systems.

"As a technology provider, water is what we do," Markhoff said. "It's making water treatment more efficient, more energy-efficient. And that can help keep operating costs down. It also means applying analytics and tools and remote monitoring and diagnostics tools to mine data, to assist predictive operation to customers," he said.

- Adapted from "Water leaders: Invisibility is no longer the goal: Community interaction partnered with technological innovation key to future" from the December 2013 issue of *Water Environment & Technology.*

Water, wastewater, and stormwater agencies respond to extreme weather events

Case studies on community response, lessons learned, and resiliency in the future

Lauren Fillmore, Nancy Beller–Simms, Karen Metchis, and Kenan Ozekin

Did the U.S. face more extreme weather than usual in 2012? Weather extremes nationwide in 2012 included

- the warmest year on record for the nation, with 19 states breaking heat records;
- record floods in the upper Midwest and Florida's wettest summer on record;
- drought throughout the Plains states, approaching records set 60 years ago;
- record numbers of wildfires, torna does, and hurricanes and a multistate extreme windstorm (*derecho*); and
- Superstorm Sandy, which caused an estimated $50 billion in damage.

If this is the "new normal," water, wastewater, and stormwater agencies must develop strategies to respond to extreme weather while safely maintaining the water services upon which our communities rely. Water systems are among the largest investments in most communities, and for good reason, as they provide critical services to protect human health and the environment — even in the face of weather disasters.

The Water Environment Research Foundation (WERF; Alexandria, Va.), and the Water Research Foundation (Denver), joined forces with the U.S. National Oceanic and Atmospheric Administration (NOAA) and the U.S. Environmental Protection Agency (EPA) to document the experiences of water service agencies dealing with extreme weather events in six areas across the U.S. As the project moved forward, research organizations Concurrent Technologies Corp. (Arlington, Va.) and Noblis (Falls Church, Va.) also joined this effort. Local water service agency representatives shared their experiences, and researchers synthesized their collective knowledge and identified the lessons learned that would help other water service agencies increase their resilience to future extreme weather.

Through a series of regional workshops, water service agency managers described their experiences during extreme weather events, from acute incidents that happened with little warning, such as floods and wildfires, to ensuring sustainable water services and planning longstanding infrastructure into the future in the face of multiyear droughts or encroaching sea levels.

The final report, *Water/Wastewater Utilities and Extreme Climate and Weather Events: Case Studies on Community Response, Lessons Learned, Adaptation, and Planning Needs for the Future* (No. CC7C11), can be found on the WERF website at http://goo.gl/QAnVAP.

- Excerpted from August 2013 issue of *Water Environment & Technology*

Monday-Wednesday, September 29-October 1
8:30 am – 5:00 pm

WEF is committed to innovation as outlined in our strategic direction. WEFTEC is the place for dynamic thinking, facilitating conversations that transform ideas into solutions, and making new connections to help you turn challenges into accomplishments.

Come and see cutting-edge products and services brought to you by WEF and our innovation partners, Imagine H20 and BlueTech Research. Featured exhibitors include finalists and winners of the Imagine H2O Water Innovation Prize and the 2014 BlueTech Forum Showcase. The theater in the Pavilion includes exciting programs and discussions about innovative ideas, businesses and practices.

Networking

Turn acquaintances into colleagues and expand your network. Networking receptions will be held Monday and Tuesday in the Innovation Pavilion. These can't-be-missed gatherings help investors, strategic partners, entrepreneurs, and YOU make the connections that move the industry forward.

Reception

Monday, September 26, 5:00 pm – 6:00 pm
Network with innovators from all parts of the water industry at this casual reception.
Sponsored by: Parsons Brinkerhoff

The Johnson Foundation at Wingspread Charting New Waters Reception

Tuesday, September 30, 5:00 pm – 6:00 pm
Join our innovation partners, Imagine H2O and BlueTech Research, and our sponsor, The Johnson Foundation at Wingspread, in a networking reception where you can continue to turn your curiosity about innovation into knowledge and your contacts into connections.

The Johnson Foundation AT WINGSPREAD

The Johnson Foundation at Wingspread is building upon the rich collaboration and partnership that has characterized their Charting New Waters initiative since its inception. The current phase of work is focused on catalyzing the widespread adoption of more sustainable and resilient water infrastructure systems in the United States, including nutrient and energy recovery. By aiming to help local, state, and national leaders set a course for and navigate decisions regarding the conception, construction, financing, and management of water infrastructure, Charging New Waters' ultimate goal is identify elements of a new paradigm for water infrastructure and the steps needed to transition to it.

Educational Sessions

The Innovation Pavilion Theater will feature a number of educational sessions focusing on innovation topics throughout the week.

Innovation Showcase Program at a Glance

Monday, September 29, 10:00 am - 5:00 pm

10:00 am 109 Exclusive Access to Water Start-ups: Guided Tour of the Innovation Pavilion
11:00 am 110 Water Entrepreneur Showcase I: What's BREWing in Milwaukee?
1:00 pm 233 Energy Conservation and Recovery: The EPA Water Technology Innovation Blueprint Series
1:30 pm 234 Recovering Nutrients: The EPA Water Technology Innovation Blueprint Series
2:00 pm 235 Water Reuse: The EPA Water Technology Innovation Blueprint Series
2:45 pm 236 Water Entrepreneur Showcase II: WEF's Innovative Technology Award Winners
3:30 pm 237 Exclusive Access to Water Start-ups: Guided Tour of the Innovation Pavilion
4:00 pm 238 Water Innovation in the Beverage Industry: Market Dynamics, Case Studies, and Technology Opportunities

Session 109

Monday, September 29, 10:00 am -10:30 am
Exclusive Access to Water Start-ups: Guided Tour of the Innovation Pavilion
Moderator: S. Bryan
Whether you are a municipality, manufacturer, investment professional, or engineer, this exclusive access will give an overview of the award-winning companies. Be on the cutting edge of technology development, learn new ideas, identify partner possibilities, and evaluate investment potential.

Session 110

Monday, September 29, 11:00 am - 12:00 pm
Water Entrepreneur Showcase I: What's BREWing in Milwaukee?
Moderator: E. Thelen
Water innovation clusters are helping companies innovate and commercialize water technology, while stimulating economic development and job creation. The BREW, which stands for Business. Research. Entrepreneurship. In Wisconsin., is the only mentor-driven seed accelerator program solely focused on solving freshwater issues with innovative startups producing cutting-edge technology. This session features the current winners. After a comprehensive application and judging process, six entrepreneurs and their respective businesses were chosen to participate in the second year of the accelerator program, including 2 that also won the Imagine H2O Competition:

- **Cadens –** A Wisconsin-based company that assists in the design, manufacture, installation, and operation of economical small and micro-scale hydropower systems
- **Pellucid Water** - Out of UW-Madison, the company focuses on decontamination of water through its unique application. They are able to remove dissolved chemicals from water and other solutions.
- **Hydrolight –** A patented water sterilization device that uses ultraviolet (UV) light to eliminate bacteria, viruses and protozoa from freshwater sources.
- **phinding Solutions –** A biotechnology water company that wirelessly measures and transfers the ionic levels of water, through a patent pending technology, improving productivity while reducing associated costs.
- **WatrHub, Inc.** (also Imagine H2O Winner) **–** An award winning Data & Analytics company delivering timely, tailored market intelligence solutions which help technology providers in the water industry shorten their sales cycles, target prospects more efficiently, and uncover strategic market insights.
- **WelIntel** (also Imagine H2O Winner) **–** A real-time understanding of well and surrounding water table dynamics, provided through constant measuring and reporting of water levels on a private website or app.
- **Ijinus –** (Honorable Mention) - A French company that offers autonomous ultrasonic level sensors.

Session 233

Monday, September 29, 1:00 pm - 1:30 pm
Energy Conservation and Recovery: The EPA Water Technology Innovation Blueprint Series
Moderator: E. McCormick
"Imagine a future when water, wastewater and agricultural activities can cost-effectively generate as much energy as they consume!" Come to the session to give feedback to EPA on this area of the Water Technology Innovation Blueprint. This is your opportunity to have early input on behalf of the industry on this important topic.

Session 234

Monday, September 29, 1:30 pm - 2:00 pm
Recovering Nutrients: The EPA Water Technology Innovation Blueprint Series
Moderator: C. Hornback
"Imagine if we could recover nutrients from human and animal wastes and convert them into marketable commodities before they negatively impact surface and ground water!" Come to the session to give feedback to EPA on this area of the Water Technology Innovation Blueprint. This is your

opportunity to have early input on behalf of the industry on this important topic.

Session 235

Monday, September 29, 2:00 pm - 2:30 pm
Water Reuse: The EPA Water Technology Innovation Blueprint Series
Moderator: M. Meeker
"Imagine if we could increase water reuse to support the water needs of our burgeoning population!" Come to the session to give feedback to EPA on this area of the Water Technology Innovation Blueprint. This is your opportunity to have early input on behalf of the industry on this important topic.

Session 236

Monday, September 29, 2:45 pm - 3:45 pm
Water Entrepreneur Showcase II: WEF's Innovative Technology Award Winners
Moderator: A. Mackie
Assistant Moderator: B. Domkowski
WEF's award for Innovative Technology recognizes companies that have introduced new innovative products and services. The winners will present their ingenious ideas and new products and let you learn directly from the source. This year's Innovative Technology Award winners cover a broad spectrum of technologies including lagoons, energy recovery, energy efficiency, and water quality sampling. Below are the descriptions and speakers from the winners of the 2014 WEF Innovative Technology Award:

Webitat for Lagoons
S. Hubbell, Entex Technologies
Lagoons have traditionally been low tech treatment facilities. Entex Technologies Webitat brings modular units with aeration and surface area for attached growth to enhance BOD and ammonia removal and improve the overall performance of a lagoon.

Thermwin Energy Recovery from Wastewater
TR Gregg, Huber Technology
Embedded within wastewater is five times the amount of energy that is needed to treat it. Unfortunately, 80 percent of this amount is in low grade thermal energy. The Thermwin systems from Huber can effectively recover this heat out in the sewer system and put it to good use.

WAVE – Water Analysis via Exploration
D.M. Anderson, IEC
Water quality sampling of large bodies of water like rivers, lakes, and oceans can take months and the conditions will have changed by the time analysis is completed. The WAVE sampling system allows real time, GPS based sampling of 22 parameters from a boat at speeds up to 40 miles per hour, increasing response times by an order of magnitude.

Flygt Experior Pumps
L. Riles, Xylem
Pumping can use a significant amount of energy within a WRRF. The Flygt Experior variable speed pump can save up to 50 percent energy use, while proving a clog free design, also minimizing maintenance.

Session 237

Monday, September 29, 3:30 pm - 4:00 pm
Exclusive Access to Water Start-ups: Guided Tour of the Innovation Pavilion
Moderator: P. O'Callahan
Whether you are a municipality, manufacturer, investment professional, or engineer, this exclusive access will give an overview of the award-winning companies. Be on the cutting edge of technology development, learn new ideas, identify partner possibilities, and evaluate investment potential.

Session 238

Monday, September 29, 4:00 pm - 5:00 pm
Water Innovation in the Beverage Industry: Market Dynamics, Case Studies, and Technology Opportunities
Moderator: T. Algeo
This session will feature a high-level analysis of the role water plays within the beverage industry, including case studies, market overview and developments, and key areas of innovation. Paul Bowen, Director of Sustainable Operations, will discuss the current sustainability practices at The Coca-Cola Company, as well as future directions for water reuse and conservation. BlueTech Research will present the innovation landscape on water within the beverage sector, covering key technology trends and opportunities, and areas for investment. This session will conclude with an innovation spotlight on Cambrian Innovations and Nutrinsic, who will present on their innovative technologies and their potential to disrupt the beverage industry.

Innovation Showcase Program at a Glance
Tuesday, September 30, 9:00 am - 5:00 pm

9:00 am 330 Water Entrepreneur Showcase III: BlueTech Research Entrepreneurs
10:00 am 331 Water Entrepreneur Showcase IV: Imagine H2O Entrepreneurs
11:00 am 337 Smart Water Infrastructure for Sustainability *Note: This session will take place in the Exhibit Hall.
12:30 pm 438 Innovations in Monitoring presented by Imagine H2O
1:30 pm 439 Reducing Costs and Improving Techniques for Water Monitoring: The EPA Water Technology Innovation Blueprint Series
2:00 pm 440 LIFT Technology Scan Round Robin
3:00 pm 448 LIFT Presents: Fostering Innovation Through Collaboration
4:00 pm 449 Johnson Foundation Charting New Waters

Session 330

Tuesday, September 30, 9:00 am - 9:45 am
Water Entrepreneur Showcase III: BlueTech Research Entrepreneurs
Moderator: J. Guild
This session features winners from 2014 BlueTech Awards who will explain their groundbreaking water solutions. Come see the water industry of tomorrow through these imaginative, creative, and award-winning products. This session will also be streamed via Google+ Hangouts on air.

- **Puralytics** (Beaverton, Oregon) developed a photochemical water purification process that uses only light energy either from LEDs or sunlight to activate an advanced nanotechnology coated mesh.
- **Cerahelix** (Orono, Maine) produces a patented ceramic nanofiltration membrane (helix-NFM™) for high purity separations under harsh operating conditions.
- **OxyMem** (Athlone, Ireland) produces a Membrane Aerated Biofilm Reactor (MABR) whose bubbleless aeration system reduces the biggest consumable of the wastewater industry – energy.

Session 331

Tuesday, September 30, 10:00 am - 11:00 am
Water Entrepreneur Showcase IV: Imagine H2O Entrepreneurs
Moderator: S. Bryan
This session features winners from Imagine H2O accelerator who will explain their groundbreaking water solutions. Come see the water industry of tomorrow through these imaginative, creative, and award-winning products. This session will also be streamed via Google+ Hangouts on air.

BioGill (Sydney, Australia) uses above ground, non-submerged bioreactors that provide the ideal oxygen rich environment for microoganisms to thrive and break down nutrients in the waste stream. BioGills are helping businesses achieve regulated discharge standards at low cost and low energy.

Silver Bullet Water Treatment Company (Denver, CO) provides a safe, proven and patented water treatment system for HVAC cooling towers and livestock drinking water systems that controls bacterial growth and reduces calcium scale buildup and corrosion.

WatrHub Inc. (Toronto, Ontario) is an award-winning Data & Analytics company delivering timely, tailored market intelligence solutions which help technology providers in the water industry shorten their sales cycles, target prospects more efficiently, and uncover strategic market insights.

Wellntel (Shorewood, WI) A real-time understanding of well and surrounding water table dynamics provided through constant measuring and reporting of water levels on a private website or app.

OndaVia (Hayward, CA) delivers a fast, laboratory accurate, microfluidics-based water analysis system that enables real-time, trace-level chemical analysis. Using Ondavia's portable instrument and analyte-specific, consumable cartridges, users can measure water contaminants down to part-per-billion levels on-site, in under five minutes.

WaterSmart Software (San Francisco, CA) provides engagement solutions that save water and money and transforms meter data into an effective water conservation and customer engagement program.

Session 337

Exhibit Hall, Booth 3301
Tuesday, September 30, 11:00 am - 12:30 pm
Smart Water Infrastructure for Sustainability
Moderators: C. Kransler, T. Pechet
From Smart Water Grids to sustainable pipe manufacturing, this session will share advances in sustainability in the distribution, collection, and conveyance systems. Presenters are:

Sustainable Wastewater Technology: Manufacturing Processes and Corporate Social Responsibility
M. Costello

Smart Water Grids: Roadmap Towards Secure and Interoperable Systems
A. Hauser

How Is Technology Changing Sustainability in the Water Utility Industry?
G. Waltman

Session 438

Tuesday, September 30, 12:30 pm -1:30 pm
Innovations in Monitoring presented by Imagine H2O
Moderator : S. Bryan
The Water Resources Utility of the Future will demand intensive automation, sensors, and data management. See entrepreneurial companies in the sensor and data management arena and then stay around to have your say with EPA as the Agency seeks comment on how to reduce costs and improve water monitoring techniques. Imagine H2O companies presenting are:

OndaVia (Hayward, CA) delivers a fast, laboratory accurate, microfluidics-based water analysis system that enables real-time, trace-level chemical analysis. Using Ondavia's portable instrument and analyte-specific, consumable cartridges, users can measure water contaminants down to part-per-billion levels on-site, in under five minutes.

Wellntel (Shorewood, WI) A real-time understanding of well and surrounding water table dynamics provided through constant measuring and reporting of water levels on a private website or app.

BluCarbon (New York, NY) Complete water transparency through advanced microbial diagnostics and system visualization.

Session 439

Tuesday, September 30, 1:30 pm - 2:00 pm
Reducing Costs and Improving Techniques for Water Monitoring: The EPA Water Technology Innovation Blueprint Series
Moderator: R. Smith, K. Patel
"Imagine collaborative monitoring efforts that provide low-cost, watershed-scale, real-time data on water quality and quantity that facilitate protection and wise use of our water resources!" Come to the session to give feedback to EPA on this area of the Water Technology Innovation Blueprint. This is your opportunity to have early input on behalf of the industry on this important topic.

Session 440

Tuesday, September 30, 2:00 pm - 3:00 pm
LIFT Technology Scan Round Robin
Moderator: J. Moeller

The WEF-WERF LIFT program helps move innovation into practice. One component of the program is LIFT Technology Scans. Technology Scans identify and evaluate innovative technologies to inform water facility owners, funders, advisors, and end users and promote early adoption of technologies.

The LIFT Pilot Technology Scan received 28 applications from technology providers on innovative technologies that enhance digestion operations and/or thickening and dewatering operations. Expert panels reviewed applications and recommended technologies to advance to the next stage of the process – assessment by interested parties. In this stage, technology providers are invited to present to LIFT audiences to garner interest in early adoption of the technology or exploring these technologies further through a collaborative pilot or demonstration. This session will feature several technologies from the LIFT Technology Scan program.

Featured Technology Providers and Speakers:
Bob Dabkowski, Hach – Sludge Thickening and Dewatering Real Time Control
With the Hach real time control system, suspended solids concentrations and sludge flow values are used to calculate the optimum polymer feed for user entered solids set-point. Polymer feed is output for consistent thickening and dewatering results.

Hao Pham, Infilco Degremont Inc.- Dehydris Twist
The Dehydris™ Twist is an advanced dewatering technology designed to significantly improve sludge dryness at minimum operational cost and labor input.

George Smith, Evoqua Water Technologies – The Captivator System
The Captivator consists of a short aerated contact zone in front of a Folded-Flow™ DAF in which primary removal and sludge thickening are provided; up to 40% more BOD is removed and up to 40% more digester biogas is produced through use of this technology.

Session 448
Tuesday, September 30, 3:00 pm - 4:00 pm
LIFT Presents: Fostering Innovation Through Collaboration
Moderator: J. Zuback
The water sector needs to innovate to continue to meet customer needs and comply with regulations. Technology is a key component of that innovation. Facility owners and their consultants, technology providers, entrepreneurs, venture capitalists as well as regulators are all partners in bringing new technology to the water sector. All parties benefit when collaborating to foster innovation. A collaborative approach can help to secure the necessary investment, minimize the risk of failure, and achieve successful implementation.

How can you collaborate to help move innovation into practice? This panel discussion will highlight a variety of opportunities and mechanisms for collaboration on new technologies using real world examples ranging from utility data sharing, partnerships on co-digestion technology research, and new technology development. Ample opportunity will be provided for audience engagement and discussion.
Panelists:
Joseph Kozak, Metropolitan Water Reclamation District of Greater Chicago, David Parry, CDM Smith, Ostara

Session 449
Tuesday, September 30, 4:00 pm - 5:00 pm
Johnson Foundation Charting New Waters
Moderator: L. Broaddus
Join The Johnson Foundation at Wingspread for a briefing and discussion of Charting New Waters – the Foundation's initiative to address U.S. freshwater challenges. This event will dig deep into the core aspects and opportunities for water resources management laid out in Charting New Waters' culminating report, Navigating to New Shores: Seizing the Future for U.S. Freshwater Resources. An expert panel of key partners will be on hand. The Foundation's recent examination of distributed water infrastructure will also be discussed.

Innovation Showcase Program at a Glance
Wednesday, October 1, 11:00 am - 4:00 pm

9:00 am 526 From Operator to Manager: Navigating Your Career
11:00 am 531 Operations Ingenuity Contest Winners
1:30 pm 620 Sustainability and the Utility of the Future - Pulling It All Together: The EPA Water Technology Innovation Blueprint Series
3:30 pm 621 Exclusive Access to Water Start-ups: Guided Tour of the Innovation Pavilion

Session 526
Wednesday, October 1, 9:00 am – 10:30 am
From Operator to Manager: Navigating Your Career
Moderator: K. Jacob
Assistant Moderators: S. Swanback, J. Jarrell
Many seasoned operations supervisors will be retiring in the near future and new leaders will be asked to step into those positions. This means there is the potential for a significant number of openings for advancement into supervision and management positions. This interactive session begins with

a mock interview of a potential candidate rising through the ranks from staff to management. Find out how you can prepare to advance your career in operations with lessons learned from people who have transitioned from a "technical" position to a managerial role.
Interviewers
R. Gerstberger, E.J. Shalaby, P. Zeller, R. McElroy, D. DeWitt, H. Brewen

Session 531
Wednesday, October 01, 11:00 am - 12:30 pm
Operations Ingenuity Contest Winners
Moderator: D. Houdeshell
Innovation is a way of thinking and doing that can help you to do more with less, with more efficiency. It isn't limited to new companies, but is found every day in utilities and companies around the world in the guise of the operators. These plucky professionals have found solutions and made a difference in many different ways, and WEF is pleased to recognize them. WEF's third annual Operations Ingenuity Contest finalists and winners will show their ingenious ideas and chat about how they came up with them.

- Todd Boulden and Justin Myers, Maryland Environmental Service Process Control Time Lord
- Michael Carle, Town of Hampton WWTP
  Wipe Defender and Time Turner
- Walton J. Summers, Jacksonville Wastewater Utility Inflow Fighter
- Armin T. Borick, San Francisco Public Utilities Commission (presented by Bonnie Jones) Maintenance "Ugly Duckling"
- Sam McAdoo, Hampton Roads Sanitation District
  A Clever Release Valve and Blowing Off Gas
- Jim McElvogue, City of Ames WPC Plant (presented by Joe Krebs) Piping Around the Problem

Session 620
Wednesday, October 01, 1:30 pm - 3:00 pm
Sustainability and the Utility of the Future - Pulling It All Together: The EPA Water Technology Innovation Blueprint Series
Moderator: L. Broaddus
During the week at WEFTEC, all ten market opportunities from the EPA Water Technology Innovation Blueprint have been discussed. This session will pull together the discussions, identify common themes, and start discussions on next steps for the water industry. If you haven't had time to stop by some of the discussions, this is your chance to hear the summary and still provide ideas and input. Don't miss it!

Session 621
Wednesday, October 01, 3:30 - 4:00 pm
Exclusive Access to Water Start-ups: Guided Tour of the Innovation Pavilion
Moderator: J. Guild
Whether you are a municipality, manufacturer, investment professional, or engineer, this exclusive access will give an overview of the award-winning companies. Be on the cutting edge of technology development, learn new ideas, identify partner possibilities, and evaluate investment potential.

BioGill
BoGill uses breakthrough technology in the biological treatment of wastewater. BioGills are above ground, non-submerged bioreactors that provide the ideal oxygen rich environment for microoganisms to thrive and break down nutrients in the waste stream.

BlueTech Research
A WEF Innovation Partner, BlueTech Research is an independent market intelligence and consulting firm, focusing on the water technology industry. Our knowledge and understanding of innovative water technologies is unrivaled. The BlueTech Research Advisory Service is cutting-edge and unique, and supports our client's competitive and market strategies.

Cerahelix, Inc.
Cerahelix, Inc. is developing a patented ceramic nanofiltration membrane (helix-NFM™) that provides high purity separations under harsh operating conditions. The helix-NFM is a hydrophilic ceramic membrane that operates in the tight nanofiltration/reverse osmosis range.

Imagine H2O
A WEF Innovation Partner, Imagine H2O is a nonprofit organization with a mission to inspire and empower people to solve water problems. Our vision is to turn water challenges into opportunities. We host business plan competitions and an accelerator program to help competing entrepreneurs turn their plans into transformational solutions.

Ondavia
Delivers a fast, laboratory accurate, microfluidics-based water analysis system that enables real-time, trace-level chemical analysis. Using our portable instrument and analytic-specific, consumable cartridges, users can measure water contaminants down to part-per-billion levels on-site, in under five minutes.

OxyMem
OxyMem, a rising Irish company, has commercialized an innovative solution for wastewater treatment - the Membrane Aerated Biofilm Reactor (MABR). The OxyMem MABR is a bubbleless aeration system that reduces the biggest consumable of the wastewater industry – energy.

PURALYTICS
Puralytics, a water purification equipment company headquartered in Beaverton, Oregon, has developed a patent pending photochemical water purification process using only light energy either from LEDs or sunlight to activate an advanced nanotechnology coated mesh.

Silver Bullet Water Treatment Company
Provides a safe, proven and patented water treatment system for HVAC cooling towers and livestock drinking water systems that controls bacterial growth and reduces calcium scale buildup and corrosion. The system increases the operational efficiency of a cooling tower, saving water and energy.

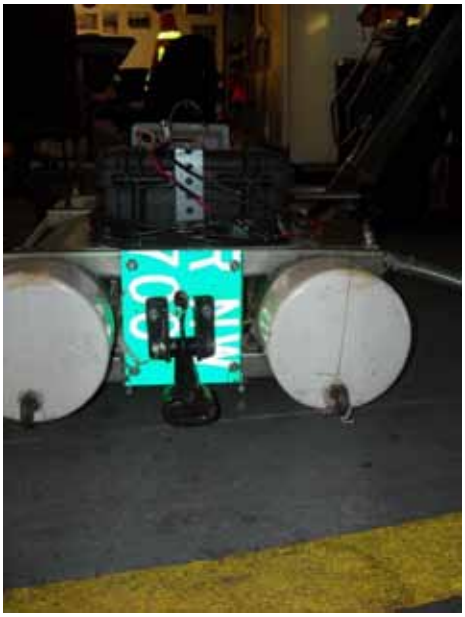
WaterSmart Software
WaterSmart Software helps water utilities educate and engage their customers to save water and money. WaterSmart offers a turnkey, cloud-based engagement, analytics, and water-use efficiency solution that saves up to 5% in as little as six months. Come help us change the way the world uses water.

WatrHub
WatrHub Inc. is an award-winning data and analytics company that matches water and wastewater technology companies with pressing water treatment problems creating greater transparency and better outcomes for our water resources. We deliver timely, tailored market intelligence solutions.

WellIntel
WellIntel (Shorewood, WI) develops groundwater technology and information systems to help homeowners and farmers learn about and manage their groundwater resources. With these insights, customers secure property value, improve service, lower costs, and make groundwater sustainability possible.

Duct tape wizards

Operator Ingenuity Contest showcases the beauty of simple, creative solutions



Combining ingenuity and some simple materials, Jerry W. Smith from the City of Salem, Ore., created a useful pipeline inspection tool and earned a 2013 Operator Ingenuity Contest award. Jerry W. Smith

Not all innovations come from years of in-depth research. Some come from the need to tackle a persistent problem with nothing more than the materials at hand and a hearty dose of ingenuity. Sometimes the big solutions come from a tweak here or a little fix there.

In 2013 WEF held its second Operator Ingenuity Contest to highlight these "duct-tape fixes." The content received almost 70 entries – a major jump from the two dozen entries in 2012. The entries received ranged from how to deal with rate increases to data collection apps for mobile devices to resolving sampling predicaments.

Each entry is judged based on

- relevance/usefulness – *is this transferable to other facilities*;
- originality/creativity – *but also safe!*; and
- resourcefulness – *did they use easily accessible materials?*

For example, Jerry W. Smith from the City of Salem, Ore., turned a fish finder, a motorcycle battery, a waterproof case, a battery charger, some polyvinyl chloride (PVC) pipe, an old aluminum street sign and a closed circuit television (CCTV) camera into floating depth gauge for collection system inspection. The device gives operators an idea of how much settled debris is on the bottom of the pipe. The information helps them to better plan their cleanings.

The camera looks at the fish finder monitor as the unit floats down the pipe. The CCTV displays the date, manhole numbers, and footage, as the unit is pulled down the pipe by a cable, and the fish finder display shows the bottom contour of the pipe. The operators record the data as it scrolls across the fish finder display to provide a basic idea of the location and the depth of debris in the pipe.

- **Read about all of the 2013 winners online at www.wef.org/OperationsResources.**
- Attend the 2014 Operator Ingenuity Contest awards celebration at WEFTEC 2014.
- Collect your ingenious solutions to enter the 2015 contest in spring 2015.

The All Around Resourcefulness Award
"Fish Finder Pipe Inspection System"
Jerry W. Smith, City of Salem, Ore.

The Pesky Problem Solver Award
"Secondary Clarifier Nocardia Foam Control Solution"
Alfred Waitt, Veolia Water North America (Lynn, Mass.)

The Mess Prevention in Process Control Award
"Aerated Sludge Tank Sampler
Raymond Vermette, City of Dover, N.H.

The Waste Not, Want Not Award
"Polymer Tote Rack"
Raymond Vermette, City of Dover, N.H.

The Extraordinary Productivity Award
"Septage PD Blower"
Doug Sweeris, Allegan Wastewater Plant (Allegan, Mich.)

The Outstanding Maintenance Headache Relief Award
"Flow Equalization Tank Problem Solver"
Justin Myers, Environmental Service, Howard County, Md.

The Vital Communication Award goes to…
"Reverse 911"
Don B. Wasko, City of Carlsbad, Calif.

The Safety Is Job No. 1 Award
"Safe Lift"
Mike Lindsay, King County South Treatment Plant, Renton, Wash.

The Special "CSI" Award for Extraordinary Detective Work
"PARSA Flow Bench"
Steve Grosso, Bob Snyder, and Frank Kunz, Plainfield Area Regional Sewerage District (Middlesex, N.J.)
and
"PARSA Potty"
Steve Grosso and Bob Snyder, Plainfield Area Regional Sewerage District (Middlesex, New Jersey)

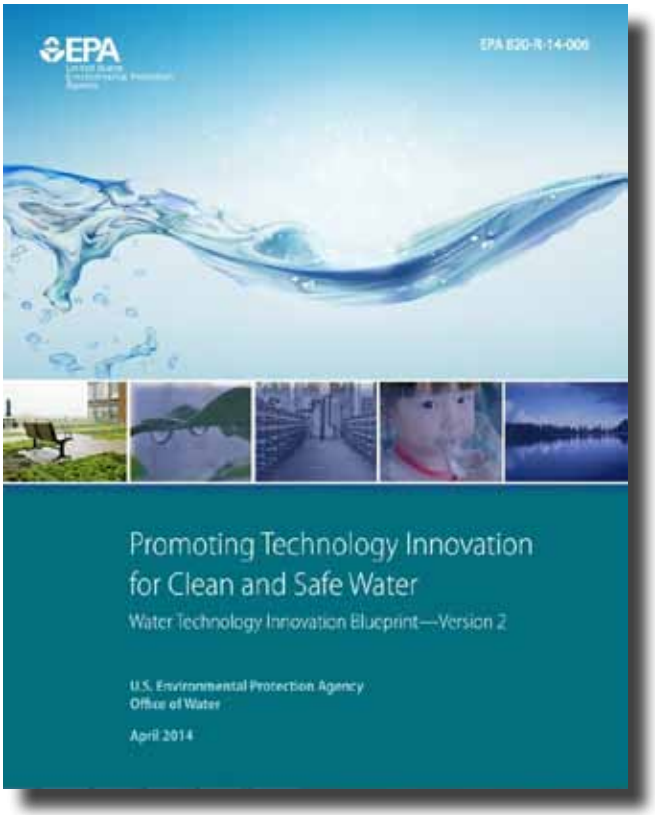
Sketching a water technology innovation blueprint

Our freshwater resources are limited and face mounting pressures from drought, flooding, pollution, population growth, an aging water infrastructure, and competition for many uses (*e.g.* ecosystem protection, drinking water, agriculture, energy production, recreation). Technology innovation can help address our water challenges and help put us on a more sustainable path while also supporting economic growth. The U.S. Environmental Protection Agency aims to be a catalyst to promote and support technology innovation to restore, protect, and ensure the sustainability of our water resources.

Clean and safe water is essential for public health and healthy ecosystems, for the nation's economic well-being, and for the welfare of our families and communities. Many aspects of the U.S. economy depend on large supplies of water. Hundreds of billions of gallons of water are needed each day to sustain our industry, agriculture, homes and businesses. Further, billions of dollars are spent each year on water-related recreation activities as well as for use of water in production operations.

In 2012, total revenue for the domestic U.S. water and wastewater industry was $139 billion. The value of the global water market—for the control and cleanup of water—is estimated at $500 billion per year.

EPA identified 10 "market opportunities for technology innovation" in its Water Technology Innovation Blueprint—Version 2 (http://www2.epa.gov/sites/production/files/2014-04/documents/clean_water_blueprint_final.pdf).



1. Conserving and recovering energy
2. Recovering nutrients
3. Improving and greening of water infrastructure
4. Conserving and eventually reusing water
5. Reducing costs and improving techniques for water monitoring
6. Reducing water impacts from energy production
7. Improving performance of small drinking water systems
8. Improving resiliency of water in frastructure to the impacts of climate change
9. Improving access to safe drinking water and sanitation
10. Improving water quality of our oceans, estuaries and watersheds

At WEFTEC® 2014, attend 30-minute discussions on each of the opportunities listed above to provide input to EPA and the U.S. Department of Energy. A report of the information gathered will be published in 2015.

- Excerpted and adapted from *Water Technology Innovation* on EPA's website at www2.epa.gov/innovation/water-technology-innovation.

Navigating the nutrient roadmap

In October 2013, the Water Environment Federation, the Environmental Defense Fund, and the Johnson Foundation at Wingspread sponsored a 1.5-day meeting in Airlie, Va., to take the next steps in developing a roadmap for the implementation of a nutrient management (primarily nitrogen and phosphorus) vision. Attendees built on results from a February 2013 meeting sponsored by the same three organizations where the following draft aspirational goal was developed:

> *The next generation of wastewater treatment has zero net impact with regards to energy use, greenhouse gas emissions, and nutrient discharge by 2040. Achieving this goal will require a dedication to overcoming the technical barriers, financial constraints, and regulatory disincentives limiting nutrient removal, GHG emission reduction and energy neutrality in the treatment of wastewater.*

Accordingly, this aspirational goal is informing the development of the Nutrient Roadmap, which will serve a shorter-term need for achieving smarter nutrient removal and recovery, as well as considering opportunities for reducing energy and greenhouse gas emissions associated with wastewater treatment, enhancing public engagement, exploring regulatory opportunities, expanding water resource recovery facility operator capabilities, and benchmarking current resource recovery facility performance. Smarter nutrient management includes a cost-effectiveness component to help identify those activities that produce the optimal reductions on a unit cost basis.

The development of the Nutrient Roadmap will progress in two phases. In the first phase, a "matrix" was developed from the major topics and subtopics identified by the Airlie meeting participants and will be released at WEFTEC 2014. This matrix will be further developed by a larger group of subject matter experts into a guidance document to be published in 2015.

The guidance document will be supplemented with case studies and additional resources. The roadmap also will inform future research, training, and advocacy programs to support the movement toward smarter nutrient management in water resource recovery facilities.

The Water Environment Federation's mission is to "provide bold leadership, champion innovation, connect water professionals, and leverage knowledge to support clean and safe water worldwide." The development of the Nutrient Roadmap supports WEF's mission and those objectives for the specific topic of nutrient management via point source discharges from water resource recovery facilities.

The Environmental Defense Fund's mission is to "preserve the natural systems on which all life depends. Guided by science and economics, EDF finds practice and lasting solutions to the most serious environmental problems." EDF has set a goal of cutting nitrogen pollution in half over the coming decades. EDF is engaged in a large effort to help farmers become more efficient in their use of nitrogen fertilizers, reduce fossil fuel combustion through increased energy efficiency and increased use of renewable energy.

The Johnson Foundation at Wingspread's mission is to "be a catalyst for positive and lasting change leading to healthier environments and communities." Their Charting New Waters (CNW) multi-year program engages a network of organizations dedicated to catalyzing new solutions to U.S. freshwater challenges.

- Attend the Johnson Foundation press event on *Charting New Waters*, Monday, September 29 at 12:15 pm, Great Hall Foyer.

Industrial water (re)use in the textile and beverage industries

Water is a vital element in both the beverage and textile industries. Industrial processes use water for washing, mixing, cooling, etc. This use and reliance presents the potential for water treatment and reuse as well as overall market growth.

Several companies in the brewing and soft drink sector — including Miller and Coca-Cola — are changing the wastewater treatment landscape and have begun to develop sustainability plans.

BlueTech Research found that the beverage industry, in combination with the food industry, generates approximately 2.07 million m^3/d (547 mgd) of wastewater in the U.S. and 2.17 million m^3/d (573 mgd) of wastewater in the European Union. These numbers represent a market opportunity of $1.9 billion for wastewater treatment systems. New entrants into the arena, such as Nutrinsic and Cambrian Innovation, have technologies with disruptive potential within the beverage industry.

The textile industry is not only water intensive but also energy and chemical-intensive. It uses an average of 200 L of water to produce 1 kg of textiles. These large volumes of wastewater often contain a wide range of hazardous materials, including heavy metals and dyes. With this in mind, environmental and sustainability pressures increasingly face the textile industry, specifically in regards to wastewater treatment and the toxicity of the wastewater that is disposed.

DyeCoo and Nike developed a strategic alliance to minimize water use and its effect on the textile industry. In its most recent corporate responsibility report, Nike states that it hopes to improve water efficiency by 15% per unit in apparel materials (dyeing and finishing). To emphasize this, Nike recently opened a water-free dyeing facility that incorporates DyeCoo's supercritical carbon dioxide equipment to eliminate water and associated waste streams from fabric dyeing at Nike's Taiwanese contract manufacturer. For every 1L of dye, 4L of water are required, resulting in a huge demand and dependence on this limited resource

- Attend the BlueTech Research technical sessions, *Water Innovation in the Beverage Industry*, Monday, September 29, 4:00 pm - 5:00 pm.

BlueTech RESEARCH

AN O_2 ENVIRONMENTAL COMPANY

Actionable Water Market Intelligence™

BlueTech® Research, an O_2 Environmental company, is the leading authority on innovative water technologies, focused exclusively on identifying key opportunities and emerging trends in the global water industry.

We are the premier source of actionable water market intelligence for strategic business decisions on innovative technologies and companies.

Our clients use BlueTech® Research for:

- Identifying and assessing water companies and technologies
- Understanding new water technology market opportunities and identifying areas for growth
- Analyzing water technology patent trends and identifying water technology licensing, investment and acquisition opportunities

BlueTech® Research offers analyst directed advisory services, providing market intelligence, technology assessments and strategic advice.

BlueTech® Intelligence Briefings

Need-to-know briefings on key water technology industry developments. Snappy and informative,with distilled details prepared by BlueTech® Research water industry experts.

BlueTech® Innovation Tracking

Innovation Company Tracker tool to map and analyse water technology companies. Complimented by Patent and Licensing Trackers.

BlueTech® Insight Reports

Detailed reports providing insight and analysis on key water technology market areas.

BlueTech® Webinars

Technology and Market updates and insight into key emerging areas of innovation and opportunity.

Analyst Access

Access to BlueTech Research Analyst Support to provide expertise & insight and help answer specific queries.

Custom Research

Bespoke deliverables made exclusively for company's mission critical needs. Areas of expertise include: global and regional market assessment, M&A pipeline development and technology due diligence.

Europe: +353 21 240 9133 | North America: +1 604 676 3581
Cork | Vancouver | Boston | Singapore
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WEF Innovation Partner | Visit us at Booth 4029B in the Innovation Showcase Pavilion

2014 water challenge winners take a spot in WEFTEC 2014 Innovation Pavilion

The Idea Village (New Orleans) and Greater New Orleans Foundation hosted the fourth annual water challenge to harness entrepreneurial expertise and address flooding, water quality, and coastal restoration. It included a morning session examining the international trend of clustering regional water expertise and an afternoon session addressing Louisiana's major water issues and opportunities. The challenge culminated in a $50,000 business-pitch competition showcasing four entrepreneurs tackling flood protection, coastal restoration, rainwater management, and technology.

Tyler Ortego of ORA Estuaries (New Orleans) won the grand prize for the OysterBreak, which uses the shell building nature of oysters to create a living, engineered infrastructure for coastal restoration. ORA Estuaries works with oyster growers, provides installation services, and offers engineering consulting services related to estuarine sustainability.

Challenge finalists were

- Demetria Christo of EcoUrban Landscaping (New Orleans), a landscaping company specializing in sustainable products and eco-friendly practices, including decorative cistern-cladding solutions, rain water irrigation, pervious patios, LED lighting, and native and edible plants;
- Julia Kumari Drapkin of iSeeChange (Paonia, Colo.), a climate almanac and information service using aggregated analysis to help clients make informed business decisions and save money by staying weeks or months ahead of the mainstream news on potential climate and weather risks in the marketplace; and
- Wayne Erdman of RiverView Construction (New Orleans), which designs and markets an innovative flood barrier product called the Aqua Flood Barrier™, a fast-deploying water barrier system.

The audience listened to business pitches by entrepreneurs tackling flood protection, coastal restoration, rainwater management, and technology during the challenge.

Past challenge winners include Pierce Industries (Cut Off, La.), which developed the sediment-capturing Wave Robber, Tierra Resources (New Orleans), and NanoFex (New Orleans). ORA Estuaries, 2014 finalists, and past winners will all be featured in the Innovation Pavilion Theater at WEFTEC® 2014 in New Orleans

The contest will be held again during 2015 New Orleans Entrepreneur Week March 20-27, 2015.

Barry Liner, director of the Water Environment Federation (Alexandria, Va.) Water Science and Engineering Center, participated as a judge at the challenge. From left, Liner stands with Steve Picou, from NOLA Vibe Consulting Inc. (New Orleans) who was moderator, and Harry Shearer, comic personality who was the master of ceremonies for the challenge. Grasshopper Mendoza.

- Adapted from "2014 Water Challenge Winners Take a Spot in WEFTEC 2014 Innovation Pavilion" from *WEF Highlights,* May 2014.

wef membership

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Join a network of more than 35,000 water professionals across the world.

Experience the innovation, expertise, and impact of WEFTEC year-round.

Visit the membership booth in the WEF Plaza to learn more.

www.wef.org

Developing potable reuse guidelines

As the population grows and water demands increase, more and more communities in the U.S. are focusing on developing sustainable water supplies. Climate change concerns also are leading many organizations to become more proactive concerning water availability. At the same time, the public increasingly is responding to the need to implement "green" practices that are more sustainable, less wasteful, more efficient, and less environmentally damaging. Water reuse, including the use of both indirect potable reuse (IPR) and direct potable reuse (DPR), can be used enhance the nation's water supplies.

At present, federal guidelines on potable reuse do not exist. Only six U.S. states have standards and/or guidelines for potable reuse under development, while many more are interested in receiving guidance. As a result, the public is naturally is skeptical about the consumption of reclaimed wastewater when provided with incomplete information on the safety of the processes and product water quality. Having authoritative guidelines on the practice of potable reuse (including both IPR and DPR) would significantly assist decision-makers. It would help clarify issues about the safety and quality of purified wastewater (including appropriate water quality goals); provide justification for the need, costs; and benefits of potable reuse, and help resolve controversies about unknowns. As a result, confidence in the safety and viability of potable reuse projects would increase nationwide.

In order to address this concern, an expert panel currently is working to prepare a white paper on developing portable reuse guidelines. This effort is being led by the National Water Research Institute (NWRI) with strong support from WateReuse Association, WEF, and the American Water Works Association (AWWA). The panel's purpose is to document topics and issues that need to be addressed in the development of future potable reuse guidelines.

Guidelines for potable reuse will focus on issues such as public health protection, sufficient multiple barriers, risk assessment, water quality monitoring, and operation management.

For more information, check out WEF's Innovation session at Americana 2015 which will discuss the progress towards the DPR guidelines. The final report is to be released in the summer of 2015.

Don't miss these exciting events from WEF and our partners!

Updated as of September 3, 2014

ACEEE Intelligent Efficiency Conference
San Francisco, Calif.
November 16 - 18, 2014

AWWA/WEF The Utility Management Conference 2015
Hyatt Regency Austin
Austin, Texas
February 17 - 20, 2015

Imagine H2O Gala
San Francisco, Calif.
March 2015

WEF Great Water Cities: New Orleans
New Orleans, La.
March 2015

Americana 2015: WEF Sessions – Innovations for Utilities of the Future, Stormwater Innovations
Montreal, Canada
March 17 - 19, 2015

Collection Systems 2015: Collection Systems Taking Center Stage
Duke Energy Convention Center
Cincinnati, Oh.
April 19 - 22, 2015

Water and Energy 2015: Opportunities for Energy and Resource Recovery in the Changing World
Walter E. Washington Convention Center
Washington, D.C.
June 7 - 10, 2015

Fats, Oils, and Grease Management Seminar
Washington, D.C.
June 8 - 9, 2015

Disinfection Along the Potomac:Reaching into the Future Seminar
Washington, D.C.
June 8, 2015

Odors Seminar - TBD
Washington, D.C.
June 9, 2015

Resiliency Seminar – TBD
Washington, D.C.
June 9, 2015

TMDL/Government Affairs Seminar- TBD
Washington, D.C.
June 2015

WEF/IWA Residuals and Biosolids Conference 2015: The Next Generation of Science, Technology, and Management
Walter E. Washington Convention Center
Washington, D.C.
June 7 - 10, 2015

WEF-EESS Asia-Pacific Wastewater Treatment and Reuse Conference 2015
Singapore
June 28 - July 1, 2015

Nutrients Symposium
July 2015 – Final Details Coming Soon!

ACEEE Summer Study on Energy Efficiency in Industry
Buffalo, N.Y.
August 2 - 4, 2015

ISA Water/Wastewater and Automatic Controls Symposium
Orlando, Florida
Aug 4-6, 2015

WEFTEC 2015
McCormick Place
Chicago, Ill.
September 26 – 30, 2015

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Moving from solid waste to solid investment

Biosolid's role is changing from waste to resource. With a continued focus on best practices, quality, and management, coupled with communication, collaboration and innovation, biosolid's true value is being realized.

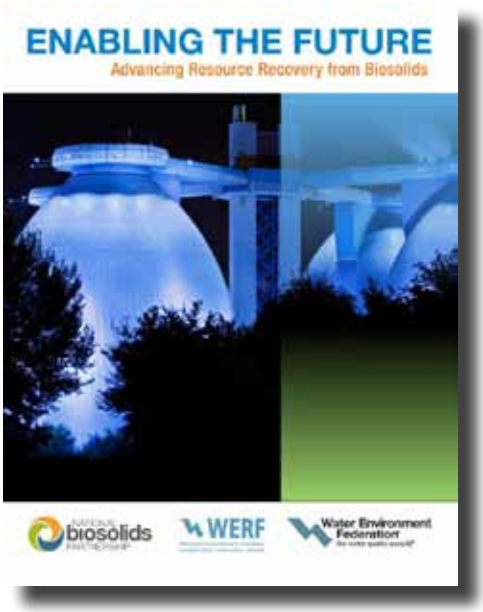
Last summer, the Water Environment Federation's (Alexandria, Va.) National Biosolids Partnership (NBP) released the report *Enabling the Future: Advancing Resource Recovery from Biosolids*. The report examines the changing perceptions of biosolids as a renewable resource and the opportunities to use this resource to meet goals surrounding sustainability, energy, climate change, resource depletion, materials cycling, and zero waste, the report says.

It covers lessons learned and biosolids-related experiences to provide "practical guidance for utilities embarking on the road to resource recovery," the report says.

Working together

In February 2014, WEF and the American Biogas Council (Washington, D.C.) signed a memorandum of understanding. It will accelerate organics recycling by jointly promoting the use of energy and products produced from biogas systems at water resource recovery facilities (WRRFs). WEF and ABC together will promote the use of proven technologies that facilitate energy and nutrient recovery. They also will encourage federal and state legislation that promotes biogas use as a renewable energy source.

The groups also stated the importance of proactive communications and public outreach to further develop



a strong base of support for products made from biosolids. This approach includes enhanced communication and education both within the profession and with the public.

Changing the perception

Also in February 2014, Julian Sandino, a vice president at CH2M Hill (Englewood, Colo.), echoed this concept as he presented his vision of the water sector's future. Sandino spoke at an event of the U.S. chapter of the Inter-American Association of Sanitary & Environmental Engineering (USAIDIS; Arlington, Va.). WEF headquarters hosted the event.

Sandino described how WRRFs produce biosolids-derived products. For example, WRRFs extract energy embedded in biosolids, rely on cogeneration systems using anaerobic digestion to generate biogas, adopt such solids pretreatment systems as thermal hydrolysis, and dose processes with fats, oils, and grease to boost gas production, he said.

He also explained how the sector will need to educate the public to understand the resources available in wastewater. "We're going to produce a product, how are we going to now get the product out?" Sandino asked. "We need to have people who know how to sell things."

The sector works in the resource recovery business already, but these actions will become more intensive and deliberate, he said. This movement into new ventures will be inevitable because it is the only way to survive, Sandino added.

Biosolids as a resource is a building block for environmentally friendly, effective, and efficient utility management. Creating change requires critically analyzing and clearly articulating the necessary changes and path to sustainability that can yield highly innovative solutions; therefore enabling a future where biosolids are a valued resource.

Adapted from the following articles from *WEF Highlights:*

- "Chart a Path to Biosolids Resource Recovery With New WEF Report," July 2013
- "Moving Into a Resource Recovery Paradigm," April 2014
- "WEF and ABC Join To Promote Resource Recovery," June 2014

Reaping the benefits of clusters

Water innovation clusters are helping companies innovate and commercialize technology, while stimulating economic development and job creation. Collaborative water innovation clusters are forming worldwide — from Singapore to Toronto and Canada to Israel — fostering entrepreneurship in water technology to confront critical infrastructure needs and support economic development. In North America, at least 15 areas already have formed or are considering creating water innovation clusters. These include such organizations such as WaterTAP Ontario in Canada, BlueTech Valley in the agricultural center of California, Massachusetts Clean Energy Center, and Confluence located in Cincinnati. As the water sector works to solve current demands on aging infrastructure, funding shortfalls, and a changing climate, these clusters are reaping impressive results.

The story of Vegetal i.D. illustrates the benefits of this collaborative approach. This company is a participant in The Business, Research, Entrepreneurship, and Water (BREW) business accelerator at the Water Council, which Milwaukee-area business leaders, along with education and government leaders, established in 2009. With more than 150 water technology companies in Southeast Wisconsin, the region's water industry is a US $10.5-billion market.The council's network is enabling Vegetal i.D., the US subsidiary of the French firm Le Prieuré, to test and sell its innovative stormwater management technology.

With The BREW support in the Global Water Center, Vegetal i.D. creates alternative solutions for stormwater management by engineering, manufacturing, and growing modular "blue roof"

plant-systems for rooftops with the stated purpose to bring nature back to the city and help decentralize stormwater management. The blue roof system provides a new solution to control runoff from green roofs with a constant and minimal flow rate. The company literally has innovation as its middle name: *Vegetal* is French for vegetation, *i* for innovation, and *D* for development.

In 2013, the company submitted an application to join The BREW. The Water Council and a global panel of water technology professionals, investors, and entrepreneurship experts review applications for the accelerator program to assess various criteria — including the applicant's potential for commercialization, compatibility with existing companies, and long-term interest in growing Milwaukee and Wisconsin's position as a leader in freshwater technology.

In the beginning, Le Prieuré experienced many challenges in growing the France-based Vegetal i.D. on American soil. "Initially, it was very hard to navigate the U.S. tax and legal system, adjust to life here, and find our way as a new company — and add to that, the language barrier," explained Gaelle Berges, Vegetal i.D.'s product manager of North American operations. "We had very little mentoring prior to being selected to participate in The BREW. The perception seemed to be that Vegetal i.D. was a foreign company and it was hard to create a local network to develop our sales and partnerships."

The company's goal is to test their new systems at a Milwaukee Metropolitan Sewage District trial site. For Vegetal i.D., having a local presence and being able to participate directly in Milwaukee's water cluster is a major aid in growing the company's network. Having access to resources and guidance from the University of Wisconsin–Whitewater's (UWW)'s Institute for Water Business, plus the ability to work with international water technology leaders at the center — including A. O. Smith, Badger Meter, Grundfos Pumps, Sloan Valve, and Veolia Water — helps the company in both technology research and development and business process refinement.

Vegetal i.D. and The Water Council collaboration is just one example of how entrepreneurs, long-established companies, educational institutes, and researchers are integrating resources to solve old water management problems and create new economic opportunities.

- Adapted from "BREW fosters innovation and jobs" in *World Water: Stormwater Management*, Summer 2014

Leveling the surface

The need for a national stormwater control measure testing and verification program

Seth Brown

The Stormwater Testing and Evaluation of Products and Practices (STEPP) workgroup formed in 2013 to investigate the feasibility of developing a national testing and evaluation program to meet the needs of the stormwater sector. The Water Environment Federation (WEF; Alexandria, Va.) spearheaded this group, which includes federal and local regulators, academic/researchers, stormwater product manufacturers, technical consultants, and non-governmental organizations.

The STEPP initiative emerged as a reaction to the piecemeal landscape of testing and evaluation programs for stormwater products and practices at the regional, state, and local level. Some states and localities have developed programs to approve new stormwater products and practices, with some going as far as developing testing and evaluation programs. Examples of these programs include the Technology Acceptance Reciprocity Partnership (TARP), the New Jersey Corporation for Advanced Technology (NJCAT), and Washington State's Technology Assessment Protocol-Ecology (TAPE) program. These programs have been developed independently, leading to both programmatic and administrative inconsistencies in testing standards across the country. A varied landscape of water quality studies using different monitoring techniques has hindered how well resource managers can share information about local and regional water pollution and restoration efforts. This inconsistency also creates financial

disincentives and burdens to private businesses that produce innovative proprietary stormwater practices.

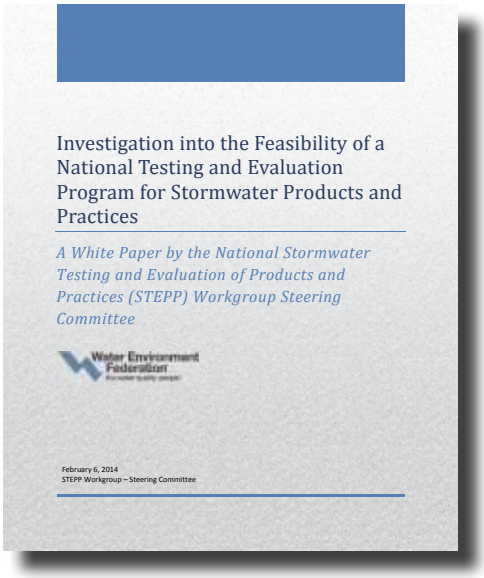
Two factors warranted a fresh investigation into testing and verification. First, the U.S. Environmental Protection Agency recently discontinued its Environmental Technology Verification Program (ETV). Second, some hold the perception that other programs may not have produced expected results.

In February 2014, the STEPP workgroup and steering committee released a white paper titled, *Investigation into the Feasibility of a National Testing and Evaluation Program Stormwater Products and Practices*. The authors also offered a companion webcast in March. The most significant finding in the white paper is that a program is not only feasible, but also needed. WEF has received letters of support from states and organizations underscoring this need.

The document also lays the groundwork to begin developing critical elements of a national program that would include consistent protocol development, sustainable funding source integration, transparent and streamlined programmatic architecture development, widespread stakeholder engagement, and strong national leadership. Efforts associated with this initiative will continue in 2015.

"Future actions by those who led this investigative effort include broader engagement in the sector, further refining the structure and critical issues of a proposed national program as well as technical and process protocol development and information dissemination efforts," the white paper says.

- Read *Investigation Into the Feasibility of a National Testing and Evaluation Program for Stormwater Products and Practices* and view the webcast online at www.wef.org/STEPP.



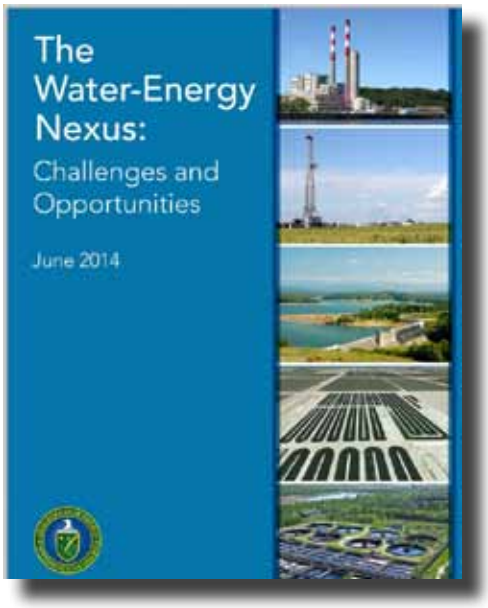
Conserving and recovering energy

Present day water and energy systems are interdependent. Water is used in all phases of energy production and electricity generation. Energy is required to extract, treat and deliver water for human uses. These interdependencies often are referred to as the water-energy nexus, and recent developments have focused national attention on these connections.

The Water Environment Research Foundation (WERF) estimates total U.S. municipal wastewater sector electrical use to be over 22 TWh per year in 2014, an amount greater than both foundries and cement industries. WERF's research shows that even by focusing investment in only proven technologies at only large facilities (5 mgd treated) it is estimated that the U.S. municipal wastewater sector could recover energy and reduce its electricity use by nearly 30 %.

Utilities can use WEF's Energy Roadmap, first released in 2012, as a guide to manage the transition from wastewater treatment to water resource recovery. In addition, the WERF research focuses on the technology performance to achieve the significant energy savings. With advances in the water sector toward biogas for transportation fuels, development of fuel cells, gasification and pyrolysis, algae biomass, and even heat recovery, the potential for energy recovery is leaping forward.

The federal agencies are engaging in the energy/water nexus with unprecedented collaborative approaches. The U.S. EPA specifically identified "conserving and recovering energy" in the water sector and "reducing water impacts from energy production" as two of its key market opportunities



in the *Water Technology Innovation Blueprint—Version 2*.

The U.S. Department of Energy recently formed the Water-Energy Tech Team (WETT) to identify and pursue cross-cutting technology, data, modeling, analysis, and policy priorities for the department relevant to the water-energy nexus (http://energy.gov/water-energy-tech-team). The WETT also facilitates coordination of activities within the department and outreach to other stakeholders. The water-energy nexus is integral to two DOE policy priorities: climate change and energy security.

The WETT approach covers all areas of the water sector and will add to the momentum of the water sector's advances in energy management. The six pillars of the WETT approach are as follows:

- Optimize the freshwater efficiency of energy production, electricity generation, and end use technologies
- Optimize the energy efficiency of water management, treatment, distribution, and end use technologies.
- Enhance the reliability and resilience of energy and water technologies
- Increase safe and productive use of nontraditional water sources through improved technology.
- Promote responsible energy operations with respect to water quality, ecosystem, and seismic impacts.
- Exploit productive synergies among water and energy system technologies.

Energy and water have a well-known relationship that is interconnected and interdependent. The water resource recovery sector has the potential to be a great partner with the energy sector, as a supplier of water and distributed generation.

For more information, check out Water Energy 2015, Energy roadmap (free version and book for sale), WEF water/energy sessions at both ACEEE Intelligent Efficiency Conference Nov. 2014 and ACEEE Summer Study 2015.

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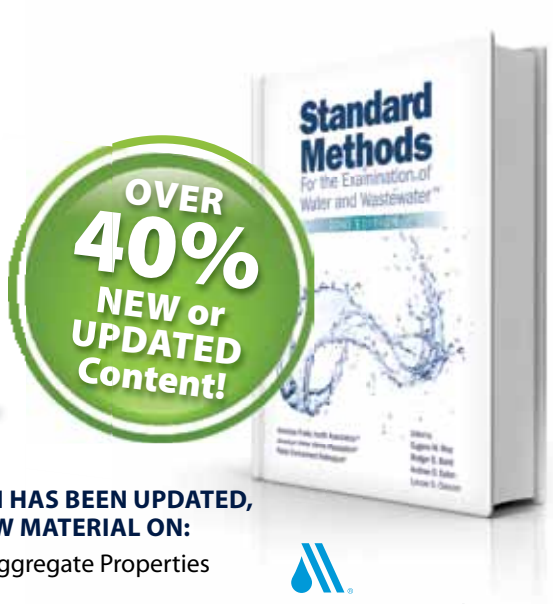

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- Learn technology commercialization strategies and how to integrate diverse resources, stakeholders and disciplines
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