EQUITY RESEARCH

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The Future of Water Conference 2024 Takeaways

All-Star Panels Dive Deep

Our one-day, all-panel conference featured a prestigious lineup of more than 25 water industry experts across six panels addressing the hottest topics/debates in the global water sector.

The panelists included CEOs, CFOs, COOs, and chief technology officers from market-leading water technology, infrastructure, and utilities; the NYC Water Commissioner; a top PFAS attorney; PMs from dedicated water funds; and the largest private equity partner specializing in water startups. Our keynote speaker was Radhika Fox, the former Assistant Administrator for the US EPA's Office of Water. We co-hosted this conference with the leading global water sector advisory firm, Roland Berger. The day before our conference, we hosted a wastewater treatment plant tour at Newtown Creek in Brooklyn.

Panelists represent the who's who in the global water sector. Xylem, Pentair, Badger Meter, IDEX, Tetra Tech, Stantec, Aris Water, SJW Group, Essential Utilities, American Water Works, Advanced Drainage, and AB InBev. Other notable panelists included a representative from CDP, a datacenter expert, Aclarity (the PFAS destruction startup), and one of the top PFAS attorneys.

Water Conference Panel Topics

- **Future-Proofing Water Infrastructure**
- **PFAS Remediation**
- **Water Utilities of Tomorrow**
- **Corporate Water Risk**
- **Perspectives on Water Investment Strategies**
- **Next Big Things in Water**

Key Takeaways

- **PFAS was a hot topic.** The implications of the recently announced federal regulations of PFAS, including the MCL trace-level detection of 4 parts per trillion, five-year remediation timeline, and Superfund (see notes here and here), are still rippling through the water sector. We like XYL's positioning in remediation. TTEK, and STN-CA also discussed their budding remediation opportunities as E&C companies. Aclarity is one of several promising PFAS destruction startups.
- **Far more utilities are expected to exceed the new 4 parts per trillion MCL.** The E&C companies believe the number of utilities that will test above the new 4 parts per trillion limits will be "multiples" higher than the EPA's preliminary 5,000 forecast, and remediation will ultimately cost more.
- **The market still has no economical PFAS test or scalable destruction technology.** There continues to be an arms race to develop these two capabilities.
- **More specifics on how the water sector can benefit from AI.** There was far more interest this year in the ways in which the water sector can harness the power of AI to improve treatment efficiencies, detect nonrevenue water, prevent water main breaks, and monitor water quality. It starts with the need for more sensors in the network to capture a growing number of parameters.
- **Stormwater management is integral for water infrastructure resilience to climate change.** Stormwater awareness and regulations are gaining momentum. Panelists sized the stormwater management opportunity at $15 billion, with a growing need to facilitate cross-system/state solutions.
- **Big water usage by datacenters is gaining scrutiny.** Datacenter expert Sam Allen caught everyone's attention with the claim that each ChatGPT search uses a gallon of water. Industry is moving to incorporate water usage effectiveness (WUE), in parallel with power usage effectiveness (PUE).

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Agenda

The Future of Water Conference — May 16, 2024

Hosted by RBC Capital Markets and Roland Berger

The Intercontinental New York Barclay
111 E 48th Street, NYC

8:00 AM	**8:15 AM**	**Welcome & Opening Remarks**			
		Deane Dray		RBC Capital Markets	
		Thierry Noel		Roland Berger	
8:15 AM	**8:35 AM**	**Keynote**			
		Radhika Fox			
8:45 AM	**9:45 AM**	**Future-Proofing Water Infrastructure**		**Moderators: Deane Dray + Thierry Noel**	
		Michael Higgins	VP, Corporate Strategy & IR	Advanced Drainage	WMS
		David Choate	VP of Engineering	American Water Works	AWK
		David Stanton	CEO	Cleanwater1	Private
9:55 AM	**10:55 AM**	**PFAS Remediation**		**Moderators: Deane Dray + Thierry Noel**	
		Julie Bliss Mullen	CEO	Aclarity	Private
		Ned Witte	Attorney & Leader for Environmental Strategies Practice Group	Godfrey & Kahn	
		Ryan Roberts	EVP, Water	Stantec	STN-CA
		Dan Batrack	Chairman & CEO	Tetra Tech	TTEK
11:00 AM	**12:00 PM**	**Water Utilities of Tomorrow**		**Moderators: Thierry Noel + Shelby Tucker**	
		Matt Rhodes	EVP, Strategy & Corporate Development	Essential Utilities	WTRG
		Rit Aggarwala	Commissioner and New York City's Chief Climate Officer	NYC Department of Environmental Protection	
		Andrew Walters	CFO	SJW Group	SJW
		Zach Gallagher	President & COO	Natural Systems Utilities (NSU)	Private
12:00 PM	**12:45 PM**	**Lunch**			
12:45 PM	**1:45 PM**	**Corporate Water Risk**		**Moderators: Thierry Noel + Sara Mahaffy**	
		Sam Stephens	President & CEO, AB InBev Foundation	Anheuser-Busch InBev	ABI-BE
		Radhika Mehrotra	Associate Director, Capital Markets	CDP North America	
		Sam Allen	General Manager	Inova	Private
		Gagan Sood	EVP, Chief Strategy & Growth Officer	Reworld	Private
1:55 PM	**2:55 PM**	**Perspectives on Water Investment Strategies**		**Moderator: Deane Dray**	
		Nick Holmes	Portfolio Manager	Duff & Phelps Investment Management	
		Roopa Unnikrishnan	SVP, Chief Strategy & Innovation Officer	IDEX Corporation	IEX
		Marc Robert	Partner & COO	Water Asset Management	
		Sam Saintonge	Investment Partner	XPV Water Partners	
3:05 PM	**4:05 PM**	**Next Big Things in Water**		**Moderators: Deane Dray + Thierry Noel**	
		Amanda Brock	President & CEO	Aris Water	ARIS
		Ken Bockhorst	Chairman, President & CEO	Badger Meter	BMI
		Dr Phil Rolchigo	EVP, Chief Technology Officer	Pentair	PNR
		Mike McGann	SVP, President MC&S and Americas	Xylem	XYL

The Future of Water Conference Takeaways

Exhibit 1 - The Future of Water Conference Takeaways

Our One-Day, All-Panel Conference Featured +25 Water Industry Experts

- We hosted our fourth annual *The Future of Water Conference* on May 16, 2024
- One-day, all-panel format featured 25 C-suite executives and industry thought-leaders
- Co-hosted with prominent water advisory firm Roland Berger

Panel Topics

- **Future-Proofing Water Infrastructure**
- **PFAS Remediation**
- **Water Utilities of Tomorrow**
- **Corporate Water Risk**
- **Perspectives on Water Investment Strategies**
- **Next Big Things in Water**

Key 2024 Conference Takeaways

- **Everyone was talking about PFAS given the recent EPA Regulations=> Positive for XYL.** There is an expectation that the number of utilities that have PFAS in their system is greater than the EPA's forecast, and it will ultimately cost more. Wastewater utilities are likely next in line to deal with PFAS, then international. There is still no viable PFAS test or scalable destruction technology, but there is an arms race to be the first to market with one.
- **AI can leverage all the digitization and smart water applications that are reshaping the water industry => Positive for XYL, ROP, and MWA.** The most innovative water equipment and utilities have digitized workflows, and are finding new ways to deploy sensors, capture data, and generate algorithms to automate workflows and engineer predictive solutions.
- **Datacenters are big consumers of water.** Each ChatGPT search uses a gallon of water. Industry is moving to incorporate water usage effectiveness (WUE) metric, in parallel with power usage effectiveness (PUE).

Our Water Investment Thesis

Global Water Sector Profile

- +$655 bil global water market, comprised of over +17 subsectors
- Positioned for long-term, mostly defensive 4%-6% growth
- Megatrend drivers of water quality, water scarcity, and water security
- Not all water businesses are valued equally, as evidenced by the water technology curve

Our Water Investment Framework

- **Focus on best-in-breed water companies** levered to the high-end of the water technology continuum, which commands higher growth, margins, barriers to entry, and valuations
- **Higher-end water technologies have faster growth, better margins, and wider moats:** Smart water systems, outsourced water, desal, filtration, UV disinfection, test/analytics
- **Harder to generate sustainable outperformance in more commoditized water subsectors:** Pipes, pumps, valves, chemicals. Best business models ultimately prevail

Water Names in our Coverage

Company	Rating	Water as a % of Revenues
Pentair (PNR)	Outperform	100%
Xylem (XYL)	Outperform	93%
Mueller Water (MWA)	Sector Perform	90%
Veralto (VLTO)	Sector Perform	60%
Roper Technologies (ROP)	Outperform	12%
IDEX (IEX)	Outperform	10%

Our Outperform-Rated Water Pure-Plays: XYL, PNR

Source: RBC Capital Markets, Company reports

Takeaways from Newtown Creek Wastewater Treatment Plant Tour

We hosted an investor tour of the Newtown Creek Wastewater Treatment Plant in Brooklyn, NY, the day before our Future of Water Conference. Newtown Creek Wastewater Treatment Plant in Greenpoint, Brooklyn, stands out for its innovative architecture, which includes eight egg-shaped digesters visible from miles away. It is the largest of NYC's 14 wastewater treatment plants by flow rate, processing 310 million gallons per day on average but capable of handling up to 720 million gallons per day during rainstorm events. The facility sits on a sprawling 53 acres. The NYC DEP team walked us through treatment train of primary and secondary treatment, but there was no advanced treatment. The water treatment standard requires that Newton Creek remove at least 85% of the total suspended solids coming into the plant; Newtown Creek is actually closer to 90%-94% before pumping the treated effluent into the East River.

The big focus of the tour was on resource recovery. The Newtown Creek tour had a particular focus on resource recovery, whether through its methane (anaerobic) digesters or its partnership with Waste Management to utilize food waste and turn it into energy. The methane digesters break down organic waste (such as food and sewage), which produces biogas (a mixture of methane and carbon dioxide). Newtown Creek then takes the methane and uses it to power its boilers. Additionally, some of the biogas is processed on site to

separate the methane from the carbon dioxide, before the methane is sold back to the gas utility (National Grid). In addition, Newtown Creek partnered with Waste Management to take 10 truckloads of food waste daily to feed its digesters. Conversion of food waste to biogas converts at ~70%, which compares to wastewater solids at ~50%. Since this agreement, Newtown Creek has increased its biogas production by 20%-25%. Waste Management pays the NYC DEP for this agreement.

Newtown Creek partnered with Waste Management, which delivers 10 truckloads of food waste daily to feed the plant's digesters. Conversion of food waste to biogas converts at ~70%, which compares to wastewater solids at ~50%.

Exhibit 2 - Newtown Creek Wastewater Treatment Plant Methane Digesters

Source: RBC Capital Markets

Equipment we saw. In the control room, we were informed that the team is in the process of consolidating its SCADA systems to GE Vernova's Cimplicty system. Other equipment in use were Pentair's large 1,500-horsepower Fairbanks Morse pumps. While not on display, we were informed that the facility uses robotic "dogs" to walk through the facilities, taking infrared images to detect leaks. And while not at this wastewater treatment plant, the NYC DEP is installing a massive solar installation at Wards Island. Upon completion in 2025, this installation will provide 10 MW of solar PV capacity and 5 MW of large-scale battery energy storage, making it the largest clean energy installation at a wastewater treatment facility anywhere in the world.

Keynote

Speaker

- **Radhika Fox, Former Assistant Administrator for the US EPA's Office of Water and currently a Senior Advisor at Xylem and Principal at North Star Strategy.**

Key Takeaways

"The future is bright for water". Radhika Fox discussed the key accomplishments achieved during her three-year tenure at the EPA. Importantly, the nation is in a different place today than it was when she started. When she joined the EPA, it was the height of COVID and democracy in the US was arguably at risk. Even during the crisis, water managers/utilities kept water flowing, and the COVID pandemic spurred investments in innovative digital technologies such as remote monitoring. In her view, the water sector is resilient, creative, and can innovate when needed.

Accomplishments at the EPA. Ms. Fox was appointed by President Biden on Day 1 of his administration, and she was confirmed with bipartisan support by the Senate. She served as the chief advisor to the EPA Administrator and to the White House on all water matters. In this role, she oversaw a $4.8 billion annual operating budget and staff of nearly 2,000. Among her accomplishments, she led the development of the water pillar of the Bipartisan Infrastructure Law for the EPA, securing a $50 billion appropriation, the single-largest federal investment in water. She also led the water policy and regulatory agenda for the EPA and was the driving force behind the recently announced PFAS regulations; in addition, she spearheaded the focus on climate change, sustainability, equity, and environmental justice for the Office of Water.

Reflected on three key themes from her time at the EPA: 1) Infrastructure; 2) Regulation; and 3) PFAS. In our view, Ms. Fox's legacy at the US EPA is far-reaching, but some of the highest-profile changes made under her tenure fall within the following three buckets:

Infrastructure. One of the key achievements under Ms. Fox's tenure was securing the largest appropriation of $50 billion allocation to water under the Bipartisan Infrastructure Law (IIJA). Importantly, there is still a lot of money in the system for utilities to tap for investment. According to Ms. Fox, the arc of capital spending is at the tip of the spear. Of the $50 billion in the IIJA, the EPA has announced $30 billion, meaning that states/tribes/territories can apply to the EPA to access that money. Of that $30 billion, only $15 billion has been awarded to states. And of that $15 billion, just $4 billion is out the door for 650 projects funded through the IIJA. Ms. Fox expects this to create a more than 10-year runway of real spending benefits.

- **Ms. Fox is most proud of her work on improving access to funding.** Before the IIJA, the EPA found that only 10% of water utilities ever accessed a single federal dollar for water infrastructure. During Ms. Fox's tenure, the EPA allocated $500 million for technical assistance capabilities to build up the capacity of water systems to be able to access federal funding. This helps underfunded water systems gain access to capabilities such as tapping E&C firms for project assistance. The EPA currently supports +1,500 communities through the $500 million. Ms. Fox believes this technical assistance creates an investment opportunity in the private sector, as these water systems are spending money that they normally would not have spent.

Regulation. The EPA laid out the most robust regulatory agenda in its history. The significant number of regulations issued under Ms. Fox's term was also elevated across other divisions such as land, air, and toxic substance. As part of her regulatory agenda, she made it a point for her staff to focus on implementation, as the choices they make as a regulator have a significant impact on how markets develop. She stressed being careful and thoughtful about how these regulations are imposed.

PFAS regulation. Ms. Fox's work on PFAS regulation of course received a lot of attention. She highlighted that she chaired the PFAS executive council at the EPA, with the idea that the EPA needed to speed up how it addressed "forever chemicals". Before the council, there was no cross-collaboration to remove PFAS from air, land, and water. The EPA then published its strategic road map, stating what it wanted to accomplish, but also putting a timeframe to its initiatives (which is not typically done). Regarding the maximum contamination level of PFAS in water of 4 parts per trillion, she believes there are still 60,000 public water systems that need to test for PFAS, and roughly +5,000 will need to install treatment equipment.

- **What are some of the needs in the marketplace today?** Two big needs/opportunities today are an affordable and democratized PFAS testing option (today, the only way to test PFAS down to 4 parts per trillion is via mass spec at centralized testing labs) and new PFAS

disposal and destruction technologies. Ms. Fox believes that there is a big opportunity in PFAS destruction.

- **What will happen to PFAS regulation if President Biden is not re-elected?** This is a question that Ms. Fox hears regularly. Obviously, no one has a crystal ball, but regardless of the election outcome, PFAS is not going away, and public sentiment has fundamentally changed. Customer demand is there, and her view is that PFAS needs to be removed from the water in one way or another.

- **The EPA intends to protect passive receivers of PFAS.** Related to the hazardous substance designation under CERCLA, several "passive receivers" have been vocal about their desire to be shielded from liability. Water utilities did not put PFAS in their systems, so they do not think they should be liable. Ms. Fox believes that the EPA agrees. The goal of the hazardous substance designation was never to go after passive receivers. The EPA cannot blanket exempt utilities or industries, which is why that was not done, but it will attempt to go through Congress as best it can to protect passive receivers.

Corporate water risk should also factor in reward. Ms. Fox believes that corporations need to focus on more than just corporate water risk, but also reward. There is tremendous upside to corporate water stewardship. Water has moved from an ESG discussion to conversations in the Boardroom. Lots of technology solutions are being deployed, and ample corporate water commitments are coming out.

If the Supreme Court were to strike down Chevron Doctrine, Ms. Fox believes this would have a chilling effect on the market. If this were to happen, it would have a "chilling effect", not just on the EPA, but every agency that is focused on the economy, food safety, and regulation.

Panel 1: Future-Proofing Water Infrastructure

Panelists

- **David Choate, VP of Engineering, American Water Works**
- **Michael Higgins, VP, Corporate Strategy and IR, Advanced Drainage Systems**
- **David Stanton, Chief Executive Officer, Cleanwater1**

Moderators

- Deane Dray of RBC Capital Markets
- Thierry Noel of Roland Berger

Key Takeaways

Besides the investments to improve existing water infrastructure, onshoring of semiconductor fabrication facilities and datacenters in water-stressed states is projected to change the water infrastructure landscape.

Three "R's" of focus for water infrastructure investments are: 1) renewal; 2) regulations; and 3) resilience. The panel discussion centered on problems that aging US water infrastructure is facing and on the various ways to address the impact of ongoing climate change, stormwater management, and emerging contaminants. Notably, there are more than 55,000 miles of pipeline in the system today that are barely maintaining a 200-years replacement cycle, posing aged/leakage issues and suboptimal storm/wastewater management. To address the growing regulatory push, there are dedicated industry-wide initiatives to optimize renewal of treatment plants systems, pumps, and tanks, partially funded by $50 billion of federal infrastructure funding designed to help utilities meet regulatory requirements. Of the $50 billion appropriation, roughly $30 billion has been announced for states, tribes, and territories to file applications and roughly $15 billion has been approved/award to state projects, including pumps and pipes renewal/replacement, which contributes to the resilience of infrastructure.

There are at least 20 different types of technologies that can remove PFAS from water, but the panelists believe that a majority of them are not yet mature and scalable.

As expected, PFAS has become a hot-button topic for the future of water infrastructure. The panelists agreed that currently there are proven methods to detect and remove PFAS from water systems (i.e., ion exchange, activated carbon treatment), but the real issue is finding solutions to completely remove PFAS from the environment (from residuals, landfills). There are regulatory initiatives to address these challenges (see our panel 2 PFAS remediation takeaway here), but to cost effectively and sustainably destroy PFAS from an entire ecosystem will likely require many years of R&D and pilot testing. The panelists noted that once residents start to be notified of the existence of PFAS in their water system, it could spark a surge in demand for bottled water usage, under-sink treatment, and whole home water filtration investments.

One of the underdiscussed topics in water is stormwater infrastructure. Michael Higgins of Advanced Drainage Systems noted that this year alone, there were 27 severe weather events causing ~$88 billion in damage. Advanced Drainage Systems is focused on four areas of stormwater lifecycle: 1) capturing; 2) conveying stormwater away from sites; 3) treatment; and 4) removal. Capturing and treating stormwater is a +$15 billion market opportunity. Notably, upstream management can help keep PFAS and other contaminants from foreign objects on roads (e.g., tires) from flowing into the utility water system through stormwater runoff. That said, the panelists stressed the importance of federal funding for projects that only federal money can do, including cross-system stormwater/overflow management (i.e., investigating and implementing technology to discharge stormwater smarter and manage runoff across multiple towns/districts cohesively). Additionally, there are ongoing efforts to capture, treat, and reuse stormwater for irrigation, car washes, and toilets. If it is ever going to be used for drinking, further regulations and testing would be needed.

Increasing wastewater utility rates is another tailwind. In the last 10 years, wastewater utility rates have increased by ~7% p.a., which has allowed self-funded maintenance and expansion projects. Although inflation and higher-for-longer interest rates pose near-term headwinds, the panelists agreed that increasing utility rates is a tailwind, as it could help change the public perception that "water is too cheap to address the issue of resilience." For reference, Germany has 4x and Denmark has 7x the US water rates.

Industry-wide labor/experience shortage and availability should warrant investments into sensors and AI deployment. All panelists agreed that the surge in federal funding and growing awareness of aging infrastructure have created a supply-demand imbalance for contractors. To begin with, there are only a certain number of contractors that service the water industry due to its specialized systems and regulations. While the allocation of the infrastructure bill funding could help lure new contractors to enter the market, the stimulated demand for overall infrastructure projects including in water requires a structural solution. The panelists called out the need to deploy more sensor technologies to collect data for improved detection, monitoring, and metering. Currently, less than 5% of utilities have fully adopted these sensor and data technologies. On AI, the industry is willing to adopt new AI-driven solutions to help operators monitor their systems and diagnose the problems, but the priority is implementing sensors to expand the scope of data collection.

Panel 2: PFAS Remediation

Panelists

- **Dan Batrack, Chairman and Chief Executive Officer, Tetra Tech**
- **Julie Bliss Mullen, Chief Executive Officer, Aclarity**
- **Ryan Roberts, Executive Vice President, Water, Stantec Inc.**
- **Ned Witte, Attorney and Market Team Leader for Environmental Strategies Practice Group, Godfrey & Kahn**

Moderators

- Deane Dray of RBC Capital Markets
- Thierry Noel of Roland Berger

Key Takeaways

For more on the EPA's latest regulation on PFAS, see our notes on the drinking water standards (here) and CERCLA designation (here).

This panel was particularly timely given the EPA's recent regulations on PFAS. First, on Apr-10, 2024, the EPA issued the nation's first enforceable drinking water standard concerning PFAS, marking a pivotal step in the EPA's long-announced plan to address these chemicals in water. Second, on Apr-19, 2024, the EPA took further action by designating two PFAS compounds as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or Superfund.

There was a consensus among panelists that the EPA's estimate of impacted utilities is too low, as is the cost to remediate below 4 parts per trillion. The EPA previously estimated that its PFAS maximum contamination level (MCL) of 4 parts per trillion regulation will cost ~$1.5 billion per year for drinking water systems to comply, though our panelists were in agreement that this number is likely to be much higher. The EPA's estimate includes monitoring, equipment, capital costs, operations and maintenance, regulatory reporting, and public communications. Dan Batrack, CEO of Tetra Tech, noted that the EPA's assumption that 6%-10% of the 66,000 public drinking water systems will need to take action to treat PFAS falls short of the reality, as it was based on a prior study that sampled only large water utilities and at a level of 100 parts per trillion. Ultimately, he would not be surprised if the number of utilities that need to take actions against PFAS is closer to 50%. This is based on a simplified view that an overlay of a PFAS exposure map and US water systems would have meaningfully more overlap than 6%-10%. Other market estimates include AECOM's PFAS cleanup TAM of $50 billion over the next decade and $200 billion over the next 20 years.

There are many promising technologies for removing PFAS from water. However, treating PFAS for large treatment plants processing hundreds of millions of gallons per day becomes a challenge. The panel agreed that the technologies to treat PFAS today are well known, including granular activated carbon, ion exchange, and reverse osmosis. However, for plants processing hundreds of millions of gallons per day, using granular activated carbon would be a challenge. The panel noted that the EPA's regulation has language that provides extra time for larger utilities to implement the required PFAS treatment equipment, and there is an expectation that a number of these larger utilities may have to explore adopting emerging PFAS technologies to help address their PFAS challenges.

PFAS pose a significant challenge when it comes to managing biosolids. Biosolids are the nutrient-rich organic materials resulting from wastewater treatment, which are regularly used for fertilizers. When used as fertilizers or disposed of in landfills, they can leach into soil and groundwater, leading to widespread contamination. Addressing PFAS in biosolids requires advanced treatment technologies, which can be costly and complex, highlighting the need for ongoing research and oversight to mitigate their environmental impact. Ned Witte of Godfrey & Khan discussed how one of his clients, a paper manufacturer that used PFAS in its

manufacturing, had contaminated wastewater, and the biosolids were then used as fertilizers and spread all over crops. This highlights the complexity of PFAS and how widespread the contamination is throughout the environment.

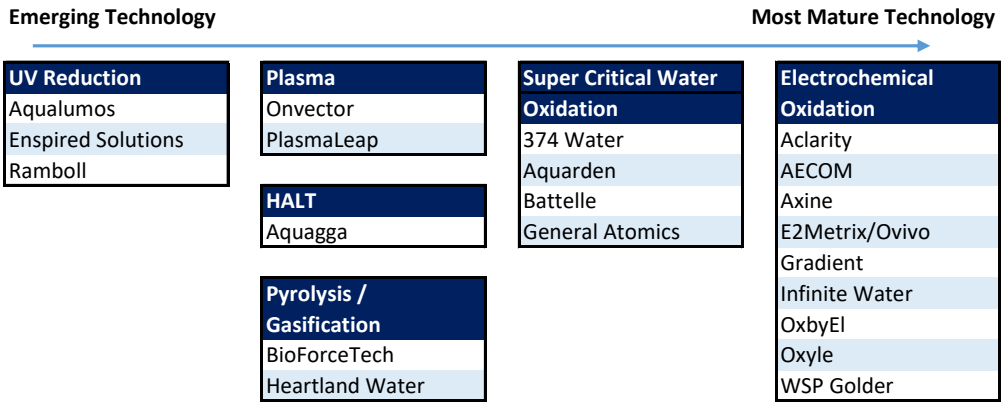
While there is a list of proven PFAS treatment technologies in the market today, the issue becomes dealing with / disposing of the PFAS-concentrated media after treatment.

It was noted multiple times that there is a huge opportunity for economically viable onsite PFAS destruction technologies. With a growing urgency to remediate for PFAS, the race is on to find a viable and cost-effective PFAS-destruction technology. Onsite destruction technologies would allow facilities to break down PFAS contaminations directly and effectively, preventing their spread and mitigating their environmental impact. With the CERCLA designation, PFAS is now a hazardous substance, so transporting PFAS-filled media to a landfill now has an added complexity (mishandling the PFAS can make the transporter a liable contaminator) and some landfills do not want to take in PFAS. Several emerging technology startups are working in the PFAS destruction space, but challenges such as scalability, affordability, and energy use are all front and center in the minds of utilities.

- **What can the market do to speed up adoption of these emerging-tech PFAS-destruction companies?** When asked what the market can do to speed up the adoption of PFAS-destruction technologies, Aclarity CEO Julie Bliss Mullen suggested that the industry should get better at sharing data so that each municipality does not have to independently pilot and validate the success of these technologies.

Exhibit 3 - Select PFAS Destruction Technologies and Maturities

We expect that several of these companies could be takeout candidates for larger water companies such as Xylem or Veralto.



Source: Global Water Intelligence, RBC Capital Markets

Finding a fast, affordable, and on-site PFAS test is a significant opportunity. At this time, the only commercial way to test for PFAS at anything close to the 4 parts per trillion precision is using an expensive mass spectrometer, which can cost $0.5-$1.0 million. Essentially, no US utility has/will purchase this sophisticated test capability in-house, meaning that everyone will have to ship samples to a lab. Many of these labs are already backed up on turnaround times, taking weeks to even months to get results. Tetra Tech's CEO Dan Batrack discussed how there could be some inference testing done for higher levels of contamination, but nothing down to the 4 parts per trillion. However, in a situation where you can test for the higher levels in your system, you can then use hydraulic modeling to better assess where in your system you need to test for PFAS at a more stringent 4 parts per trillion level.

While the EPA does not intend to go after passive receivers, there is still a concern that third parties will still sue passive receivers such as airports and utilities. Third parties, including affected communities and environmental groups, are likely to pursue litigation against entities, arguing that their handling of PFAS contributed to environmental contamination and/or public

health risks. For instance, a vegetable may be found to have traces of PFAS, so a farmer gets sued. The farmer blames the biosolids/fertilizer for having PFAS, so he sues the wastewater treatment plant. The wastewater treatment plant sues the industrial user that put it in the water source, so on and so forth. The EPA is not part of this litigation, so it is easy to see how a scenario could play out.

Panel 3: Water Utilities of Tomorrow

Panelists

- **Rit Aggarwala, Commissioner, NYC Department of Environmental Protection**
- **Zach Gallagher, President and COO, Natural Systems Utilities (NSU)**
- **Matt Rhodes, EVP, Strategy & Corporate Development, Essential Utilities**
- **Andrew Walters, CFO and Treasurer, SJW Group**

Moderators

- Thierry Noel of Roland Berger
- Shelby Tucker of RBC Capital Markets, Senior Power and Utilities Analyst

Key Takeaways

Water utilities are facing a future of substantial capital expenditures driven by impacts of climate change, emerging contaminant regulations such as PFAS, and long-overdue infrastructure replacement needs. Enhancing resilience against climate effects, compliance with anticipated EPA rules around PFAS in drinking and wastewater, and renewing aging pipelines through technology-driven approaches were cited as key priorities.

Mr. Aggarwala stated that achieving a basic level of stormwater resilience for New York City could cost ~$30 billion over time.

Climate change and mechanisms to address. Resiliency continues to come up in discussions around water utilities and how they can mitigate climate change impacts. Commissioner Rit Aggarwala of the NYC Department of Environmental Protection (DEP) added that climate change has forced the DEP to change due to NYC encountering severe weather patterns. Stormwater management remains top of mind for the DEP, as it now controls costal defenses and focuses on the risk of waste spilling into the water systems. Conversations also came up around resiliency as it relates to the over/under-supply of water. On the under-supply side, the reuse of stormwater was mentioned as a potential way to provide irrigation, industrial uses, and toilets after being treated.

Mr. Rhodes of Essential Utilities disclosed that his company has already earmarked $450-$500 million to address PFAS over the next few years.

Complying with anticipated EPA regulations around PFAS substances in drinking water emerged as potentially the single-largest capital burden facing the water utility industry in coming years. Matt Rhodes of Essential Utilities disclosed that his company has already earmarked $450-$500 million to address PFAS over the next few years while also stating that the EPA's current cost estimates could be conservative and that the total price tag could likely be much higher. Mr. Rhodes expects the PFAS issue to extend beyond just drinking water into wastewater treatment as well, further driving up costs. Mr. Aggarwala raised concerns around potential liability exposure, stating that the EPA doesn't always protect municipalities as it does corporations once a site is designated with PFAS contamination. Overall, the panelists portrayed PFAS compliance as an enormously costly undertaking already extending into the hundreds of millions of dollars for some utilities.

Costs and underinvestment. Capital investment for investor-owned utilities and affordability for customers were key topics. Matt Rhodes, EVP of Strategy & Corporate Development at Essential Utilities, noted that underinvestment in water systems has led to artificially low customer bills. Now, as utilities increase capital investment, customer bills will increase to

meet the regulatory standards set out by the EPA. Essential Utilities will look to state revolving funds, grants, and low interest rate loans to offset the increases in customer bills. Both companies provided examples of operational efficiencies they have seen, from acoustic detection to the use of AI in customer service applications. Overall, the panel was positive on the impact of investment on customer bills due to the nature of the system updates.

Much room for alternative solutions. Our panel also featured Zach Gallagher, President and COO of Natural Systems Utilities (private), which specializes in decentralized wastewater management. By collecting wastewater within a building, the process allows for localized treatment independent of the water utilities. On the surface, it would seem to be a source of competition for utilities, but panelists saw it more as another tool at their disposal for addressing the many challenges facing the water sector.

Water utilities are increasingly adopting artificial intelligence and machine learning technologies to enhance operational efficiency. Panelists highlighted that AI/ML capabilities are being leveraged for predictive maintenance applications, optimizing pipeline replacement schedules based on multiple risk factors, and using acoustic data and sound signatures for early leak detection before pipes rupture. These technologies allow utilities to make more informed capital planning decisions while keeping water losses low through smarter monitoring and prioritization.

Panel 4: Corporate Water Risk

Panelists

- **Sam Allen, General Manager, Inova**
- **Radhika Mehrotra, Associate Director, Capital Markets, CDP North America**
- **Gagan Sood, EVP and Chief Strategy & Growth Officer, Reworld**
- **Sam Stephens, President and CEO, AB InBev Foundation**

Moderator

- Thierry Noel of Roland Berger
- Sara Mahaffy of RBC Capital Markets, ESG Strategist

Key Takeaways

Gagan Sood of Reworld noted that there has been a notable change in the last 5-7 years, with more companies displaying a willingness to pay for sustainable solutions today.

Corporate water risk has become an opportunity for cross-sector and stakeholder collaborations to push for accountability. The momentum in water disclosure, accounting, and reporting has moved the talks around corporate water usage into the company Boardroom. However, the panelists all called out that there are still ample opportunities for companies across various end markets to collaborate to improve the overall water consumption effectiveness. Notably, Sam Stephens of AB InBev Foundation noted that currently in the US, only 0.2% of profits are committed to philanthropic endeavors. Having that mix increased to about 1% of profits would imply incremental ~$100 billion of capital per year available for philanthropic and impact investing, including for water security and drinking water supply. That said, he added that comprehensive solutions need more than just capital, and that tearing down siloes and striking more difficult conversations with suppliers, customers, and competitors to push for cohesive actions and remove duplicated efforts will be the key to make more efficient progress (toward UNEP Sustainable Development Goal 6 for water availability and quality).

Sam Allen noted that newly constructed datacenters typically have better energy effectiveness using less/no water vs. traditional datacenters.

With the surge in AI/datacenter projects, datacenter water usage was a hotly debated topic. From datacenter operators' perspective, water usage is at the center of their operations, not

just because of the amount of water being used, but also because local opposition to new datacenter projects (due to pressures on water availability and power usage) could slow down and limit new expansion. Notably, Sam Allen of Inova noted that a single ChatGPT search could consume roughly one gallon of water in a traditional datacenter. Additionally, a 2018 research paper calculated that all datacenters in North America consumed an amount of water equivalent to Olympic swimming pools covering the entire city of San Francisco. Although some datacenters are pivoting to "gray water" and limiting the water usage within a closed-loop system, there are very few datacenters that do not use any water. Therefore, everyone in the industry is tracking their own water usage, but he believes the industry could do a better job of tracking water usage.

- **Newly constructed hyperscale datacenters require "exponentially less water inputs."** Typically, in newly constructed datacenters, operators can increase the water temperature, which makes the whole datacenter spaces more energy/water-efficient. Mr. Allen added that more datacenters are being constructed/retrofitted with substantial changes to address water usage effectiveness, but he cautioned that colocation datacenters typically cannot be retrofitted/upgraded easily.

- **Given the sheer volume of water being deployed in datacenter, Mr. Allen believes water usage effectiveness (WUE) should be looked at in parallel with power usage effectiveness (PUE).** He commented that while PUE does a good job of capturing the energy effectiveness of datacenters, this metric ironically encourages greater water usage. While PUE will remain effective, he noted that WUE should take a fair share of datacenter assessment as long as PUE stays at 1.2 or below.

Similarly, the semiconductor industry is stepping up to take on more accountability for water usage, in line with the projected production growth. Every layer of wafer means incrementally higher usage of water, with each added layer typically consuming more than 100 gallons of water to wash. Reflecting this dynamic, in 2022, four semiconductor companies (i.e., TSMC, United Microelectronics Corporation, GlobalFoundries, and Samsung) collectively consumed +300 billion gallons of water and the semiconductor as an industry is tracking toward using a record ~600 billion gallons of water in 2024. According to Radhika Mehrotra of CDP, more companies are increasing their disclosures and investments in water systems to offset this dynamic, with TSMC ramping its water-related capex by +50% and United Microelectronics Corporation targeting to reduce its municipal water dependency from ~93% currently to ~50% by 2025. That said, the panelists agreed that it will ultimately come down to moving beyond one's own internal efforts to collaborate on water accounting and usage as a collective industry to decrease water usage and improve wastewater efficiency.

Panel 5: Investing in the Global Water Sector

Panelists

- **Nick Holmes, Portfolio Manager, Duff & Phelps Investment Management**
- **Marc Robert, Partner, Water Asset Management**
- **Sam Saintonge, Investment Partner, XPV Water Partners**
- **Roopa Unnikrishnan, SVP, Strategy and Corporate Development, IDEX**

Moderators

- Deane Dray of RBC Capital Markets

Key Takeaways

The "water investment landscape" is vast and fragmented across numerous distinct verticals and sub-sectors. We believe there are +16 different markets or verticals within water that a given investor could evaluate.

Rather than being a neatly defined single sector, the "water investment landscape" is vast and fragmented across numerous distinct verticals and sub-sectors. Part of our water investment thesis is that there are at least 16 different markets or verticals within water that a given investor could evaluate. From public water utilities to industrial equipment and services to niche areas such as water rights, each area requires a specialized investment approach to properly assess percentage of water-related revenues, regulatory environment, market growth drivers, and other unique characteristics.

Due diligence processes can differ depending on the investment approach in the water landscape. For public equities, Nick Holmes of Duff & Phelps discussed his screening methodology based on "water purity"—the percentage of a company's revenues derived from water operations, targeting a weighted average of 75%-85% water exposure in their portfolio. Mr. Holmes's strategy also includes a screen for market leadership in a specific water application across the value chain. Private equity investor Sam Saintonge of XPV Water Partners highlighted that 95% of their deals are proprietary, with extensive upfront work to gauge whether the founder is truly willing to transact prior to proceeding with further diligence, whereas Roopa Unnikrishnan of IDEX emphasized the company's focus on long-term cultivation of relationships, sometimes for more than seven years before an acquisition.

The panel highlighted the water rights market and vertical farming as potentially attractive opportunities. Marc Robert of Water Asset Management, who focuses on water rights in the western states, described repurposing the company's 60,000 acres of farmland from high-water-use, lower-value crops to lower-water-use, higher-value crops. He noted the imbalance where thirsty crops such as alfalfa use tremendous amounts of water compared to their value. Mr. Robert sees a pipeline of $800 million in potential acquisitions in this market. Additionally, while still a niche area today, vertical farming and controlled agriculture could represent promising future investment prospects due to their ability to drastically reduce water usage compared to traditional farming methods. Although agriculture is an inherently difficult business, as water scarcity increases, these types of water-efficient approaches could become increasingly economically attractive investment opportunities over time.

Panel 6: The Next Big Things in Water

Panelists

- **Ken Bockhorst, Chairman, President and CEO, Badger Meter**
- **Amanda Brock, CEO and President, Aris Water Solutions**
- **Mike McGann, SVP, President, MC&S and Americas, Xylem**
- **Dr. Phil Rolchigo, EVP and Chief Technology Officer, Pentair**

Moderators

- Deane Dray of RBC Capital Markets
- Thierry Noel of Roland Berger

Key Takeaways

The next big things in water are technologies that have already been around for the last 5-10 years. One of the key takeaways from the panel was that many of the "next big things" in water are technologies that have been around for a while. Much of this has to do with the glacial pace of the industry's technological adoption. These "emerging" technologies include many digital applications such as remote monitoring for the whole system, including water quality monitoring.

There was ample discussion on AI, but much of the benefit will require the deployment of more sensors/data. There is a growing need for more sensors in the network to capture a growing number of parameters, such as pressure, pH, turbidity, and what's in the water. This can reduce non-revenue water and improve water quality. Badger Meter's CEO, Ken Bockhorst, suggested that AI was more-so leveraging "actual intelligence" and data to make "actionable intelligence" in decision-making. As more and more sensors are deployed throughout the network, AI/ML capabilities will continue to increase.

Amanda Brock of Aris Water discussed how the company's produced water from the Permian basin has elevated levels of minerals such as bromine, iodine, and magnesium. The company can extract and monetize these elements.

Waste-to-value technologies play an important part in the water sector, as transforming waste into valuable resources both reduces the environmental impact and increases ROI. Waste-to-value is a concept that focuses on recovering and reusing resources from waste streams. In the water sector, waste-to-value involves transforming wastewater, biosolids, and other waste products into valuable resources such as energy, nutrients, and clean water. Some of the key applications gaining traction in the water sector include anaerobic digestion (turning organic matter into biogas – a renewable energy source), nutrient recovery (using extracted nutrients from water, such as nitrogen and phosphorus, and transforming them into fertilizer), membrane bioreactors (filtering wastewater for high-quality non-potable water usages), and thermal hydrolysis (using heat and pressure to break down biosolids, producing a more biodegradable product that can be used for energy generation or fertilizer). Aris Water discussed how its produced water from the Permian basin has elevated levels of minerals such as bromine, iodine, and magnesium, which can be extracted and used/sold in other applications.

Water reuse is gaining popularity but will require more testing and more monitoring. By recycling wastewater, communities can reduce their reliance on traditional water sources. Advanced treatment technologies and rigorous testing protocols are essential to detecting and eliminating contaminants. As water reuse becomes more prevalent, ongoing investment in infrastructure and regulatory frameworks will be crucial.

The water-food-energy nexus is becoming increasingly more important, as these three resources are deeply interconnected and essential for life. Producing food requires a lot of water and energy, generating energy often uses significant amounts of water, and water treatment and distribution needs energy. As populations grow and climate change impacts these resources, managing them efficiently is critical.

Companies mentioned

IDEX Corporation (NYSE: IEX US; $222.24; Outperform)
Mueller Water Products, Inc. (NYSE: MWA US; $19.17; Sector Perform)
Pentair Public Limited Company (NYSE: PNR US; $83.59; Outperform)
Roper Technologies, Inc. (NASDAQ: ROP US; $538.80; Outperform)
Veralto Corporation (NYSE: VLTO US; $98.45; Sector Perform)
Xylem Inc. (NYSE: XYL US; $142.68; Outperform)

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