

THE **DISRUPTIVE** WATER MAGAZINE

smart

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MAY
2022
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Patrick Decker

President and Chief Executive
Officer of **Xylem**

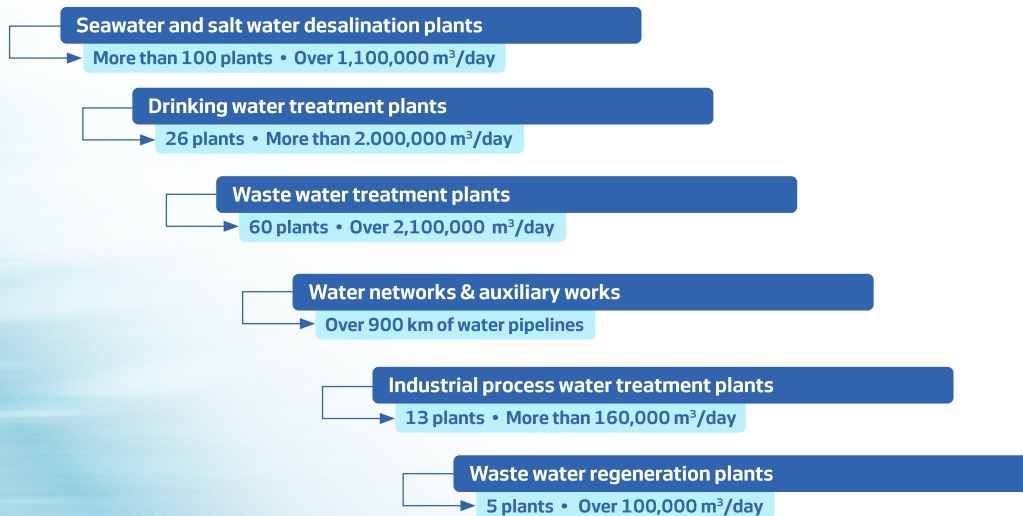
Xylem's partnerships:

REINVENTING
SUSTAINABILITY



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FROM THE EDITOR

ONE STEP CLOSER TO A BETTER WORLD



Since the recognition of the human rights to water in 2010 and sanitation in 2015, and the inclusion of clean water and sanitation as goal number six of the Sustainable Development Goals, there has been much progress to close the gap in access to safe drinking water and sanitation. After a huge political and diplomatic effort to put water on the international agenda and the titanic efforts of different actors throughout the world, the percentage of people with access to water and sanitation is increasing.

However, we are still faced with staggering figures. More than 2 billion people do not have access to safe drinking water and almost half of the world's population does not have access to decent sanitation. Clearly, there is much

work to be done. The trend has been corrected in the right direction but the pace is not fast enough.

This change has been historically promoted by entities and professionals working in water management around the world. To speed up this action plan, it is necessary to involve organisations and people from other sectors, all levels of government and agency types, and, above all, all segments of the population.

This is the paradigm in which global leader Xylem operates: thinking differently, committing to sustainability and shaping creative partnerships on a global scale. The 2015 Sustainability Goals set by the company in 2009 led the way to understand business differently and place sustainability at the centre of all business operations and functions.

Patrick Decker, President and CEO of the company, recently presented Xylem's partnership with the Guardiola Sala Foundation and the involvement of internationally recognized soccer coach Pep Guardiola. This partnership, based on Xylem's alliance with Manchester City Football Club, was created to raise awareness of global water scarcity issues by involving young people in the sport they love.

In the words of Pep Guardiola: "Youth hold the key to our future, and by inspiring them to take action now, the world will be one step closer to becoming a better place for everyone." Let's hope so.

DAVID ESCOBAR - PARTNER AT SWM

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smart
water magazine



INTERVIEW

A PARTNERSHIP TO DRIVE REAL CHANGE

Pg. 14 SWM interviews Xylem's CEO Patrick Decker on their CSR initiatives and the collaboration with the Guardiola Sala Foundation.

FEATURE

DESALINATION MEETS SUSTAINABILITY

Pg. 38 Almar Water Solutions guides us through the innovative technical aspects of a unique desalination facility, Shuqaiq 3 in Saudi Arabia.

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IoT CAPABILITY FOR POOL MANAGEMENT

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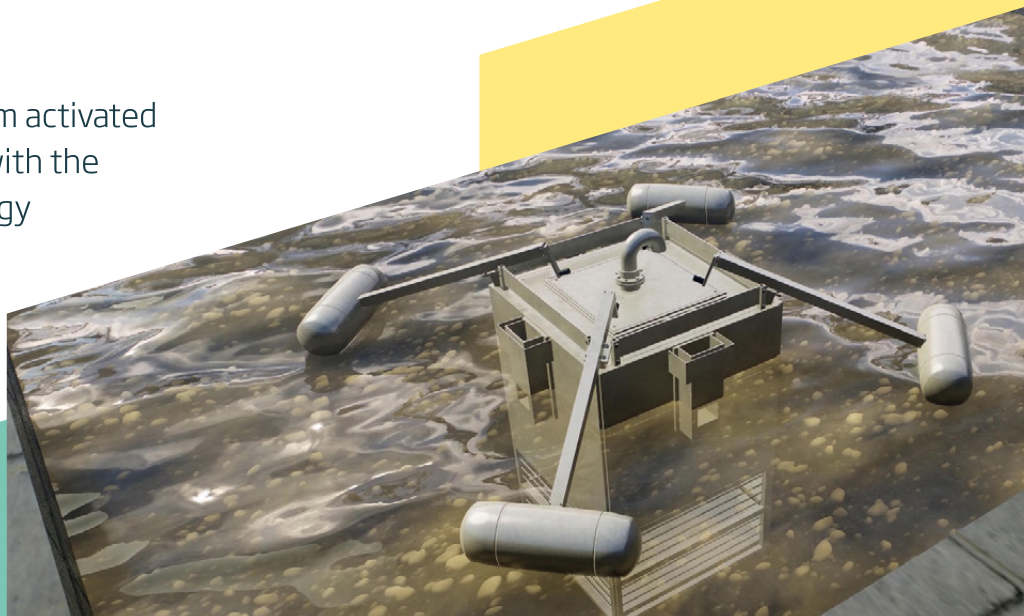
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NEEDED: AMBASSADORS FOR WATER

Pg. 105 Human-water interactions are out-of-sight or not well-known. Sarah Ransom reflects on how to ensure water has the profile it deserves.

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FEATURE

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PLASTIC CLEAN UP**

Pg. 48 A floating barrier system by Bolina, an Ecocoast company, is using AI to remove floating debris in the river Scheldt, Belgium.

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INTERVIEW

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WATER SECURITY**

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THE MAGAZINE FOR THE KEY PLAYERS OF THE WATER SECTOR

OPINION

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THOUGH AMI**

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INTERVIEW

**GENDER ISSUES
IN WATER GOVERNANCE**

Pg. 106 Liza Debevec tells us about the work of the GWP to integrate gender equality and social inclusion aspects in water governance.



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SWM RANKING

Smart Water Magazine (SWM) launches a Ranking to measure the influence of organizations and professionals in the water industry.

The SWM Ranking is a tool that allows the influence of organizations in the water sector to be measured and ordered according to transparent criteria.

The factors considered for the calculation are the page views on the web, the number of SWM Likes and the contents in Smart Water Magazine Bimonthly.

The ranking order is established by a unit of measurement created for this purpose: SWM Points. This metric is calculated through a mathematical algorithm that takes into account the content published during the 365 days prior to the calculation date and will be updated every month, coinciding with the publication of each issue of SWM Bimonthly. The data of the visits to the web are extracted from Google Analytics, while the amount of SWM Likes are directly counted and can be seen in the different contents of the web.

How are SWM points earned?

Each content published on the web by an entity or blogger gets 1 point for every 10 page views; also, for each SWM Like it gets 2 points, which become 5 in the event that the user who grants it is a verified user. On the other hand, if the content appears in SWM Bimonthly, it gets 250 points. This amount is fixed and corresponds to an estimation of the average audience generated by the bimonthly magazines. It should also be

mentioned that particular content can obtain a maximum of 1,000 points. This is done to prevent the distortion of the entire classification in case a specific content goes viral.

Classification categories

SWM publishes content of all kinds: by companies, public administrations, international organizations, associations, foundations, etc. In addition, SWM bloggers publish their articles in a personal capacity on a wide variety of topics. For all these reasons, the Ranking has several classifications depending on the category of the entity. The most important ones are:

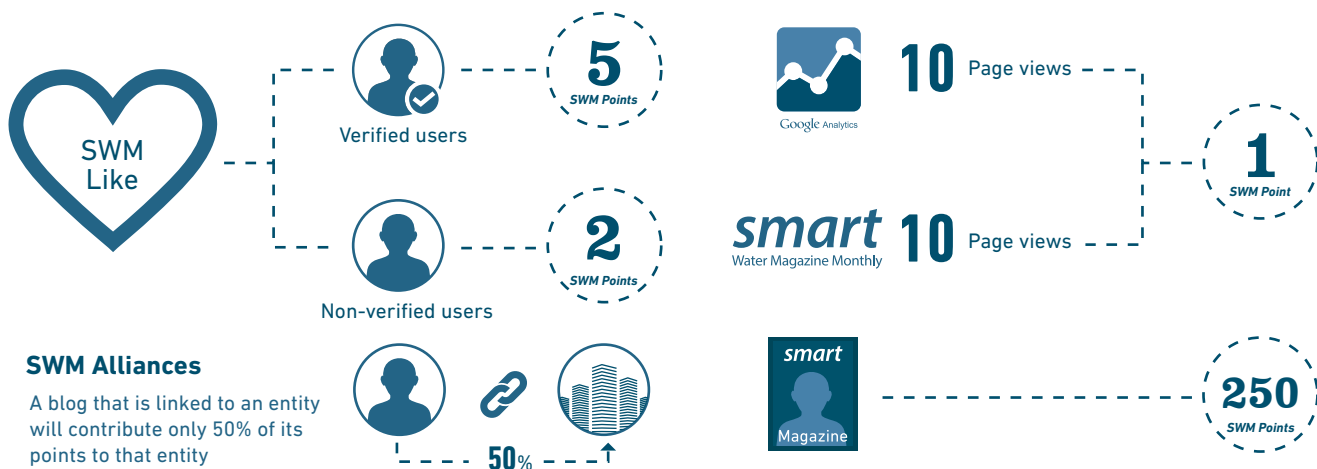
- Companies
- Blogs

In addition, a general classification can be consulted in which all the participating entities are compared regardless of their type.

SWM Likes and Verified Users

Registered users of SWM can click on the blue heart of any content on the web that they like. The number of SWM Likes appears beside the blue heart. The number of likes of a content is used for the calculation, having a different value if the user is verified (5 points) or not (2 points). Verified users are easy to distinguish as a white "check" icon appears on their profile next to their name on a blue circle.

How are SWM points earned?



*The ranking order is established by a unit of measurement created for this purpose: SWM Points.

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*A specific content piece can obtain a maximum of 1,000 SWM Points.

*The maximum number of content pieces in SWM Bimonthly that will be considered for the calculation is 16.



TOP 10 - COMPANIES

RANK	COMPANY	SWM POINTS
1	ACCIONA	2.389 points
2	Aqualia	1.339 points
3	Xylem. Inc.	1.212 points
4	Tedagua	1.023 points
5	Hidroconta	845 points
6	Droople	830 points
7	Almar Water Solutions	759 points
8	Idrica	700 points
9	Schneider Electric	690 points
10	Isle Utilities	665 points

TOP 5 - PUBLIC ADMINISTRATIONS

1	U.S Department of Energy	295 points
2	Atlanta Watershed Management	288 points
3	City West Water	280 points
4	WRC South Africa	271 points
5	LIS-Water	265 points

TOP 5 - BLOGS

1	Alain Dedieu	389 points
2	Ali Saeed	78 points
3	Zaid Railoun	75 points
4	Hassan Tolba Aboelnga	74 points
5	Chaim Kolominskas	72 points

PROFESSOR KAZUO YAMAMOTO

NEW LEE KUAN YEW WATER PRIZE LAUREATE

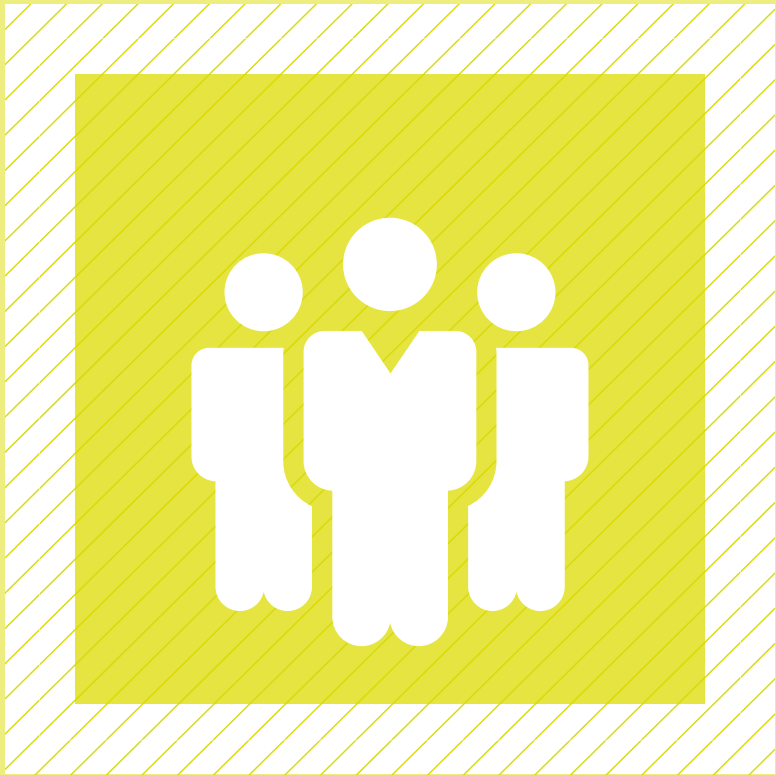


The Lee Kuan Yew Water Prize 2020 has been awarded this past March in Singapore to Professor Kazuo Yamamoto, in recognition of his pioneering invention of the world's first operationally and commercially viable submerged membrane bioreactor (MBR).

Currently an Emeritus Professor at the University of Tokyo and an Audit & Supervisory Board Member of IDEA Consultants, Dr Yamamoto first shared his idea in the 1980s. Though it was initially met with scepticism, he persevered and developed the first prototype in 1988: using intermittent filtration, it addressed membrane fouling issues and lowered energy use. Dr

Yamamoto chose not to claim patent rights, a decision that allowed for extensive R&D and commercialisation efforts, thereby accelerating the adoption of the submerged MBR technology.

A breakthrough in used water treatment and water reuse, his invention has benefitted millions of people, contributing to improved public health and water security. Today, submerged MBRs are commonplace in wastewater treatment. The technology allows building very compact water reclamation plants with high quality effluent, key in places like land-scarce Singapore, where it has facilitated water reuse and contributed to advancing the circular water economy.



PATRICK DECKER

PRESIDENT AND CHIEF EXECUTIVE OFFICER OF XYLEM

“The water sector, and utilities specifically, are in a unique position when it comes to cutting carbon emissions”

The global water technology company, Xylem, founded Xylem Watermark, its corporate social responsibility programme, over ten years ago. The programme empowers the U.S.-based giant to pursue its mission of solving the world's most challenging water issues by working with nonprofit partners on sustainable development projects around the world.

 OLIVIA TEMPEST

Through Xylem's Watermark programme, the company has recently joined forces with Pep Guardiola and the Manchester City Football Club manager's philanthropic foundation – the Guardiola Sala Foundation – to further promote public engagement in the world's water challenges. This partnership builds on Xylem's existing alliance with Manchester City Football Club and City Football Group. In a joint interview, Pep Guardiola and Patrick Decker, President and Chief Executive Officer of Xylem, speak to us about this unique and distinctive collaboration, a critical step towards achieving Xylem's vision of a world where water issues are no longer a barrier to human health, prosperity and sustainable development.

Xylem joined forces in 2021 with Manchester City Football Club manager, Pep Guardiola, to promote public engagement in the world's water challenges. What motivated this partnership and what do you hope to achieve? In addition to being a world-renowned football manager, Pep is also a philanthropist, and Xylem's partnership with him is an extension of our innovative work with Manchester City Football Club (MCFC) and other clubs within the City Football Group. We can only tackle global water challenges if we raise awareness of those challenges *and* the opportunities available to solve them. So, we are using creative partnerships on a global scale to do just that, and empower the next generation of water advocates. Some might consider our partnership with MCFC as an unconventional pairing, but it gives us a route to tap into



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We can only tackle global water challenges if we raise awareness of those challenges and the opportunities available to solve them



a massive global fanbase and drive real change. We've already reached over a billion people and, by teaming up with Pep, we can take this even further. It's a unique partnership, and one that Xylem, and I personally, are incredibly proud of.

In what other ways can the water industry propel public engagement around water issues?

The scale and urgency of global water challenges requires us to think differently. We need innovation – in the broadest sense – across mindset, products, processes and the way in which we collaborate with partners both within and beyond our industry. Technology is just one part of the solution; we need bold thinking and new ideas to really drive change, and our youth can fuel that progress.

"Technology is just one part of the solution; we need bold thinking and new ideas to drive change, and our youth can fuel that progress"

By leaning into their passion and creativity, we have an opportunity to make a real difference and create a more sustainable world.

Last year, Xylem celebrated its 10th anniversary tackling water issues around the world. What are some of the key lessons your company has learned along the way?

Over the last ten years we have really evolved as a company, particularly in the way we do business. Given that we are a water technology company, we've always had a clear purpose and a commitment to sustainability – it is essential to who we are and what we do. We doubled down on this commitment about five years ago by putting sustainability at the centre of all of our business operations and functions.

In 2019 we laid out a set of ambitious 2025 Sustainability Goals, which helped focus our efforts in a way we had never done before. We dramatically increased the emphasis on advancing sustainability in our products and solutions. We also advanced sustainability-driven financing, which has been a powerful catalyst for change.

The biggest lesson we have learned is that, in order to do good business, we

need to *be* a good business. It's about more than delivering on sustainability targets. It's about constantly reinventing our vision for sustainability, so that we can deliver positive outcomes for our people, our customers and our communities.

During your time as CEO of Xylem, Xylem Watermark, the company's



corporate citizenship initiative, has quickly expanded. What lies in the future for Xylem Watermark in the following years?

Our Xylem Watermark programme has delivered some remarkable projects in recent years, and it all comes down to our employees, volunteers, customers, suppliers and NGO partners that com-

bine their efforts to bring it all together. Last year, Xylem employees alone clocked 113,000 volunteer hours, helping to solve local water challenges in 55 countries.

Our efforts through the Watermark programme all tie back to our 2025 Sustainability Goals. Under those goals, we aim to provide access to clean water and

sanitation for people living at the lowest levels or the base of the global economic pyramid, and to provide water and sanitation education to help improve their quality of life. The goal here is to provide them with an equitable chance for personal achievement.

So far, we've enabled clean water and sanitation access for 6.5 million people



living in some of the most economically challenged communities, and provided education for more than 5 million people – so we're on our way to achieving those goals. Our focus over the next couple of years will be on driving this effort forward so we can continue to create economic and social value through our humanitarian work.

What trends would you highlight in the digital transformation of the water sector?

Delivering safe, reliable and affordable water is challenging, and water utilities around the world are under tremendous pressure. But digitally enabled solutions can solve that by futureproofing water

networks in an affordable way. Around the world, utilities are already seeing major operational and environmental gains and the water sector's transformation is gaining pace.

And it isn't just large utilities at the forefront of innovation. More and more small to mid-sized utilities are migrating to digital, and this is largely down to the ability to combine foundational technologies with tools like sensing, monitoring and analysis to support better decision making and overcome resource constraints.

From smart and connected devices to advanced metering infrastructure and advanced analytics, these digital tools

can optimise existing solutions by linking together to drive outcomes with ease. This helps us and other solution providers meet customers wherever they are in their digital journey, and enables them to move faster with their transformation.

What role does smart water play in the roadmap in utilities' 'race to zero'?

The water sector, and utilities specifically, are in a unique position when it comes to cutting carbon emissions. Water operators have long been stewards of an essential resource, and water infrastructure is vital to every healthy community. At the same time, water systems are a major source of greenhouse gas emissions



(GHGs) and global water utilities emit the same volume of GHGs as the world's shipping industry.

Digital technologies and high-efficiency systems have the power to change that. By using readily available solutions, the water sector could become one of the fastest sectors to decarbonise and become a blueprint for others. Think “smart” pumps, leak detection sensors and other digitally-powered solutions that dramatically reduce the amount of energy used in the treatment and transport of water. These emission reduction opportunities are low hanging fruit and, more importantly, they don't require new infrastructure.



In 2019 we laid out a set of ambitious 2025 Sustainability Goals, which helped focus our efforts in a way we had never done before



Water reuse and pollution prevention are two of Xylem's sustainability goals. How is the company working towards these two objectives?

In terms of pollution, our goal is to prevent over 7 billion cubic metres of polluted water from flooding communities or entering local waterways. Last year alone, through our portfolio of dewatering and digital technologies, we prevented 1.4 billion cubic metres of polluted water from doing so. That's an astounding volume of water – about 2.5 times the size of the Sydney Harbour.

We're also working with our customers to help address issues related to water scarcity. In 2021, our solutions helped our customers reuse more than 1 trillion gallons of water – which is huge in terms of combatting water shortages, and represents about 36% of our 2025 goal. Through continuous innovation and customer collaboration, we're constantly pushing the boundaries of what's possible in order to deliver ever more effective solutions.

In mid-2020, Xylem launched 'Xylem Ignite'. How can the younger generations create a more water-secure future?

Xylem Ignite is a really exciting initiative that was conceived by a team of young professionals in Xylem, and its purpose is to engage the passion and creativity of both high-school and college students around the world. Through the programme, we provide students with access to the resources and tools needed to develop their own ideas and innovations – empowering them to become water innovators from a young age.

We have a long history of engaging young people, particularly with programmes like Ignite and the Stockholm Junior Water Prize. It's incredibly rewarding work. Not only does it generate visibility for young talent within the sector, but it also drives progress towards addressing global water challenges. These young people really are some of the brightest and best, and their creativity has the potential to change the world.

"So far, we've enabled clean water and sanitation access for 6.5 million people living in some of the most economically challenged communities"





Pep Guardiola, Football coach of Manchester City

“WHEN YOU SEE THE IMPACT THAT WATER ISSUES HAVE ON LOCAL COMMUNITIES, YOU SIMPLY CAN’T IGNORE IT”

The Guardiola Sala Foundation was founded in 2021. A project led by four siblings, the Foundation is based on the values of sport, promoting the integration of the least advantaged in society.

 **ALEJANDRO MACEIRA**

Manchester City Football Club manager, Pep Guardiola, has partnered with Xylem to promote public engagement in the world’s water challenges. Through the Guardiola Sala Foundation, the alliance will support numerous community initiatives. Pep Guardiola spoke to Alejandro Maceira, Founder and Director of iAqua and Smart Water Magazine, about this innovative collaboration. Together, Xylem and the Guardiola Sala Foundation aim to reach hundreds of millions of people, and to motivate young people to address water challenges in their own communities.

Why did you choose water as a part of your philanthropic work with the Guardiola Sala Foundation?

My family and I launched the Guardiola Sala Foundation in 2021 in memory of our late mother who passed away in 2020. She was an exceptional person who devoted much of her life to helping people, we wanted to honour her memory by working to improve the lives of underprivileged families and children.

Growing up in Catalonia, I was always aware of the risk of drought – it’s no secret that our country is experiencing difficulties with water scarcity. In fact, this past winter has been one of the driest on record. When you see the impact that water issues have on local communities, you simply can’t ignore it. This is why we wanted to include water and sanitation education programmes into our work, to help young people become more aware of the problem so they can take action.

How did the Guardiola Sala Foundation get involved with global water technology company Xylem?

For us, the partnership with Xylem was a perfect match. We were aware of Xylem’s work through its wider partnership with Manchester City Football Club, and how this helped raise awareness of global water issues. Football can be a powerful force for change, particularly when it comes to engaging young people. Young fans are so invested in the game – they live and breathe it. Together, Xylem and Manchester City have reached a global audience with a powerful

message around water issues, so for us, forming a separate partnership through the Guardiola Sala Foundation seemed like a natural extension of this. By combining our efforts, together we can do more.

Which water issues will the Guardiola Sala Foundation focus on through its partnership with Xylem?

We’re very aware that a critical way to make progress in tackling water issues is to raise awareness. By focusing on young people, we can motivate the next generation to help solve these problems before it’s too late. So, for us, it’s about raising awareness of *all* water issues, from accessibility to affordability and resiliency. They are all connected – you can’t address one without the other.

When we launched the Guardiola Foundation last year, we partnered with Xylem and EarthEcho International to launch Water Challenge Catalonia, a series of water education events for young school children in the area. The initiative established a sustainable youth engagement programme around protecting water resources in Catalonia, and we provided training materials for school teachers in the region. We also identified fifteen young leaders to serve as Water Challenge Catalonia Ambassadors to help educate others in the community on local water challenges, and we provided them with tools to test and detect water issues in Spain’s waterways.

What are the short term and long-term goals of the foundation?

Our vision for the foundation is simple. We want to promote better integration of society to create more vibrant and sustainable communities, particularly through youth engagement programmes. The goal is to improve the lives of underprivileged people around the world.

Our partnerships with Xylem and EarthEcho International play a huge part in this, particularly when it comes to increasing access to water. Outside of this, we have worked with local schools in Barcelona to provide summer camp scholarships for disadvantaged children, and we’ve also partnered with the United Kingdom division of The Salvation Army to help address homelessness.

Our aim in the long term is to really continue to help improve the lives of people around the world, to contribute what we can and drive real and lasting change.

How does your experience working with youth and sports come into play here?

As mentioned, football can be a powerful catalyst for change. The potential we have to tackle major societal issues and inequalities through sport, including those related to sustainability and health equity, is really what inspired my family to create the Guardiola Sala Foundation. As a sport, football is associated with passion, emotion, excitement and dedication, and our youth embody those qualities so well. By tapping into their energy, we can drive real change in the world. Youth hold the key to our future, and by inspiring them to take action now, the world will be one step closer to becoming a better place for everyone.

APPOINT

NEW FACES IN THE MOST INFLUENTIAL

In this section we have compiled the most important appointments that have taken place recently, and entail taking up a position or role within influential entities (public, private or mixed) in the water sector.



HP NANDA

**GRUNDFOS APPOINTS HP NANDA AS EXECUTIVE VICE
PRESIDENT AND DIVISIONAL CEO, WATER UTILITY**

*He brings in depth knowledge about the water utility sector
and many years in senior leadership*

Global water technology company Grundfos has announced the appointment of HP Nanda as Executive Vice President and Divisional CEO, Water Utility. He assumes the role on March 1, 2022 and will join Grundfos' Group Management Team.

HP Nanda is a seasoned industrial executive with 23 years of experience gained at DuPont. He joins Grundfos from a role as the Vice President & General Manager of the global DuPont Water Solutions Business, where he led a ~\$1.5B business which comprises a team of 2500 employees, 11 manufacturing sites, 9 technology centres and a commercial presence in most countries.

"HP brings deep knowledge about the water utility sector, many years in senior leadership and a strong and authentic leadership style. He is a true entrepreneur, and I am confident that he is the right person to lead our Water Utility Division," says Grundfos CEO Poul Due Jensen.

HP has a Bachelor of Technology in Mechanical Engineering from Sambalpur University in India and an MBA in Marketing and Finance from Xavier Institute of Management, also in India.

He says: "I cannot wait to join Grundfos. It is a fantastic company that I have followed for years, and I am very excited about the opportunity," says HP and continues, "I am looking forward to bringing my knowledge and experience to work with the amazing colleagues in Grundfos to shape our future together."

HP, who is Indian/American, assumes his role on 1 March 2022 and will be based in Houston, Texas, United States.

MENTS

ENTITIES IN THE WATER SECTOR



WENDY BROLEY

**BROWN AND CALDWELL NAMES BROLEY CHIEF
TECHNICAL OFFICER**

Wendy Broley to maintain and build upon Brown and Caldwell's technical reputation

Brown and Caldwell announced Wendy Broley will take over as chief technical officer (CTO) as Cindy Paulson retires after 35 years with the firm. In a planned transition, Broley assumes the role of CTO next month. Paulson will remain at the firm through 2022, serving on its board of directors and continuing to meet clients' needs while transferring responsibilities to Broley.

Concluding an impressive and impactful career, Paulson hands over the reins to Broley, a water industry leader with over 20 years' experience in technically-complex environmental challenges and solutions.

As Brown and Caldwell's One Water leader, and recently as technical practices director, Broley has worked with clients throughout the integrated urban water cycle to implement alternative water supplies and contribute to diverse water portfolios amid climatic changes, evolving regulations, and population growth. She is a licensed professional engineer and holds a bachelor's in chemical engineering from the University of California, San Diego.

Paulson's legacy, and Broley's technical background, was commended by Brown and Caldwell CEO Rich D'Amato:

"We thank Cindy for her years of technical innovation and her impact in culturing the next generation of water leaders, helping shape Brown and Caldwell as the place to work on the most technically-complex projects. Wendy's industry standing and strategic leadership, paired with her planning, engineering, and operations expertise, will ensure the continuation of Brown and Caldwell's rich history of technical excellence."



DR SUJAN PUNYAMURTHALA

STANTEC HIRES DR SUJAN PUNYAMURTHALA AS A NORTH AMERICAN WATER GROWTH LEADER

Dr Sujan Punyamurthala will work with the firm to develop strategies to position Stantec for growth across North America

Dr Sujan Punyamurthula, PhD, MBA, PE, has joined Stantec as a North American Water Growth Leader. A senior vice president in the firm's water practice, Dr Punyamurthula will collaborate with team members across North America to identify and foster growth opportunities that span business lines. While his primary focus is the water sector, he will work with the firm's network of industry leaders to develop and build long-term strategies to position Stantec for growth across the US and Canada in alignment with innovation and sustainability goals.

Based out of Sacramento, Dr Punyamurthula has nearly three decades of experience building, growing, and managing large multidisciplinary programs. He is well known in the civil engineering industry as a thought leader who can integrate global expertise on emerging technologies to optimize the planning and implementation of infrastructure programs.

Dr Punyamurthula has worked on a wide range of complex civil infrastructure projects as project manager, program manager, technical lead, and principal in charge. He previously served in several leadership roles across the Western US at one of the largest infrastructure firms in the world. He focused on water infrastructure projects and developed and implemented annual strategic growth plans that resulted in consistent organic growth of more than 10%. Dr Punyamurthula specializes in integrating digital technologies to drive innovation, improve operational efficiency, and sustain market leadership.



TRI HUYNH

TORAY MEMBRANE USA NAMES TRI HUYNH AS PRESIDENT & CEO

Succeeding Steve Cappos, Tri Huynh brings over 20 years' experience in the water treatment and desalination sectors

Toray Membrane USA (TMUS) has announced Tri Huynh as the new President & CEO effective April 1, 2022. He will succeed Steve Cappos, who has decided to devote more time to his hobbies and enjoy his well-deserved retirement after 44 years in the water industry. Steve was one of the founding members of TMUS in 2006 and will remain with TMUS until August 31, 2022, as an adviser to Tri as he transitions into his new role.

Tri Huynh brings 20+ years of experience in water treatment and desalination. Born in Ben Tre, a small city in southern Vietnam, Tri and his family immigrated to San Diego, CA, in 1988 as political refugees. He graduated from the University of California, San Diego, in 2000 with a Bachelor of Science degree in Chemical Engineering. Soon after, he started working in the water industry with Osmonics Desal, which later became part of GE Water in 2004. Tri started his career with Toray at TMUS in September 2008 as a Senior Applications Engineer focusing on RO designs for large projects. He went on to hold various roles of increased and diverse responsibilities, including his most recent role as Sales Director. As President & CEO of TMUS, Tri will look to expand Toray's business in the Americas region.

Tri Huynh will be located in the head office of TMUS in Poway, CA, USA.

A Message from TMUS President & CEO: "Toray is recognized as one of the market leaders in membrane technology with our deep-rooted expertise in material chemistry and state-of-the-art manufacturing capabilities."

Saxlund – the Europe-wide environmental technology group – has announced the appointment of Lee Mountford, as the new Projects and Business Development Manager to further develop the Group's expansion of the water and wastewater processing sector.

Lee has many years of process knowledge and experience in the UK and international water, waste and industrial sectors, including business development at Alfa Laval, and joins Saxlund to support the continued growth of the wastewater business in the UK and Europe.

“Backed by his strong knowledge of dewatering, conveying, cake handling and storage and tertiary treatment in wastewater, we are excited to have Lee join the company and support the delivery of projects and developing new business,” explained Matt Drew, Managing Director of Saxlund's UK business.

Lee will be based out of the UK office in Winchester, Hampshire, with responsibility for a portfolio of new programme development and customer engagement working with colleagues across Saxlund's group offices in the UK, Germany and Sweden, servicing markets Europe-wide.

Lee added: “Saxlund's aim is to support water companies and help them to meet stringent targets through deploying our proven industry-leading technologies. The business is ideally placed to provide solutions Europe-wide, with centres of excellence in our three group businesses and expertise gained from projects throughout the continent, working directly with water companies or with contractors and consulting engineers.”



LEE MOUNTFORD

SAXLUND APPOINTS LEE MOUNTFORD AS NEW PROJECTS AND BUSINESS DEVELOPMENT MANAGER

He will be responsible for new programme development to expand the Group's water and wastewater sector

DuPont has appointed Alan Chan as global Vice President and General Manager, DuPont Water Solutions. Chan reports directly to Leland Weaver, President, Water & Protection.

“Alan has been instrumental in helping lead the transformation of Water Solutions to the growing and impactful business it is today,” said Weaver. “I look forward to working with him and the Water Solutions team as they work towards meaningfully advancing sustainable water solutions for our customers, our own operations, and the world.”

Chan previously served as Director, Global Products & Profitability in Water Solutions, and has more than 20 years of service at DuPont and previously Dow, in a variety of product, commercial, technical, and regional leadership roles in the Water business.

“I'm proud and humbled to lead DuPont's Water Solutions organization — a team that is energized by our purpose to help our customers solve the world's most pressing challenges around water access and sustainability,” said Chan. “We will continue to collaborate with our customers and wide range of partners to advance sustainable technologies that enable the purification, conservation and reuse of water and other essential materials.”

DuPont Water Solutions' technologies help purify more than 50 million gallons of water every minute around the world, enable water reuse and recycling, desalination, and the safe access of both ground and surface water. They offer solutions to water and sustainability challenges through a broad portfolio of water purification and separation technologies.



ALAN CHAN

DUPONT NAMES ALAN CHAN VICE PRESIDENT & GENERAL MANAGER FOR DUPONT WATER SOLUTIONS

Chan has worked in several roles in the Water business, including product, commercial, technical and regional leadership



SAUR ACQUIRES AQUA-CHEM AND EXPANDS ITS INDUSTRIAL WATER ACTIVITIES IN NORTH AMERICA

Aqua-Chem provides Saur with a marque brand and sizable industrial water treatment solutions platform in North America



Saur Group has entered into a definitive agreement to acquire US-based Aqua-Chem, a leading provider of engineered water purification solutions to blue-chip customers in over 40 countries. Aqua-Chem provides Saur with a marque brand and sizable industrial water treatment solutions platform in North America, which is one of Saur's priority expansion markets, while furthering its strategic ambition to be a provider of innovative, effective and sustainable water and wastewater treatment solutions to industrial customers globally.

Aqua-Chem will become the North American platform and water purification global center of excellence of Nijhuis Saur Industries (NSI), the Industrial Water arm of Saur, formed after the acquisition of Netherlands-based Nijhuis Industries in 2020. With the

addition of Aqua-Chem, NSI obtains a highly complementary portfolio of water purification and process water treatment solutions with leading market positions and a large installed base in growth end-markets such as pharmaceuticals & life sciences, beverage, energy and the U.S. military.

Saur expects significant synergies from cross-selling opportunities among existing customers, development of rental and other service solutions, manufacturing synergies, and joint technical collaboration. Saur expects to grow its revenues in Industrial Water to over €300 m in 2022 pro forma for the acquisition.

Headquartered in the Knoxville, Tennessee (USA), Aqua-Chem is specialized in water purification, with market leading technologies in vapor

compression distillers, reverse osmosis, pure steam generation and pre-treatment solutions. Aqua-Chem focuses primarily on the North American market where it generates about 70% of its revenues. The company employs 165 people worldwide and works with a highly diversified client base of more than 300 customers across its four end markets of pharmaceuticals, beverage, energy and military.

Patrick Blethon, Executive Chairman of Saur: "I am excited to welcome Aqua-Chem and all its talented employees into our Group. The acquisition of Aqua-Chem firmly places Saur among the leading players in North America. Leveraging the strong complementarities between Aqua-Chem and our Group, Saur will be uniquely positioned to offer an unmatched value proposition to its clients with increasingly innovative solutions. This acquisition is a key step in the deployment of our roadmap to establish Saur as champion of the water transition globally."

Shane DeWitt, CEO of Aqua-Chem: "Together with Saur and NSI, we will invest in our long-term growth, accelerate our product development as well as add new service solutions and resources, helping our clients solve their complex water challenges with superior scale, unparalleled capability, and unique and differentiated innovation."

The transaction is expected to close in Q2 2022, subject to receipt of antitrust approvals and satisfaction of customary closing conditions.

VEOLIA COMPLETES THE COMBINATION WITH SUEZ & STRENGTHENS ITS POSITION IN NORTH AMERICA

Veolia North America is now the leading company for cities and municipalities across the U.S. for drinking water and wastewater treatment

Veolia North America announced the integration of its businesses with Suez's assets in the U.S. and Canada, following the completion of the combination of the two companies, which was announced earlier this year. This positions VNA with 10,000 employees as the leading water and wastewater treatment company in the U.S. for cities and municipalities.

In North America, Veolia is already active in water and wastewater treatment, commercial and hazardous waste collection and disposal, energy consulting

through its decarbonization offerings as well as resource recovery.

The combination of the strengths and assets of the two companies will bring innovation and enhanced resources to strongly support the ecological transformation of the U.S. water sector and to contribute to the country's 2030 carbon neutrality goals.

The main areas of transformational innovations will include expanded opportunities to create water reclamation and reuse programs that preserve and recycle water resources. It will also in-



clude investments in hazardous waste management that ensure the safe and reliable disposal of materials that otherwise would pose a threat to natural resources. And finally, expanded opportunities to reduce or avoid carbon emissions and enable energy efficiency for cities and industries working to achieve greater sustainability and resilience goals.

For existing customers of both Veolia North America and Suez North America, the merger will not result in any immediate changes.

SAUDI ARABIA ANNOUNCES 60 WATER PROJECTS WORTH US\$9.33 BILLION

Securing its position as the world's largest water desalination market, Saudi Arabia announced more than 60 new water projects

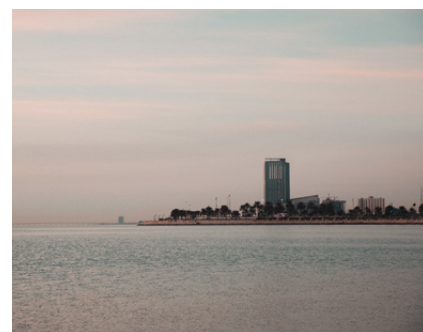
Saudi Arabia announced over 60 water projects, worth US\$9.33 bn, that will secure the country's position as the world's largest water desalination market. The announcement was made at MENA Desalination Projects Forum 2022.

"Saudi Arabia has been increasing its investment in clean energy, power and water. In the water sector, we have integrated the water desalination and wastewater treatment and have been expanding our capacities across the industry," said Engineer Khaled Al Qureshi, Chief

Executive Officer of Saudi Water Partnership Company (SWPC).

"We have been increasing the number of water projects over the last few years. In 2020, our organisation approved 11 Independent Water Projects and 9 Independent Sewage Treatment Projects, while last year we approved 8 IWPPS, 14 Independent Strategic Water Reservoir projects and 7 Small Sewerage Treatment Plant project clusters."

"However, I am happy to announce that this year, we have approved more



than 60 water and sewerage projects that will increase water desalination capacity as well as increase strategic water reserves and the capacity to treat more wastewater in the coming years."

The projects, once completed, will increase the desalination capacity to 7.5 million cubic metres of water per day by 2027, from 2.54 cubic metres per day in 2021 – nearly tripling the capacity in six years. There are over \$5.5 billion of water projects currently under construction.

STEPH ALDOCK

MARKETING DIRECTOR, BLUEFIELD RESEARCH



OPPORTUNITY KNOCKS ON THE WATER SECTOR'S DOOR

The scaling number of deals, increasing transaction values, and profiles of companies making acquisitions in water point to growing confidence in water-related solutions and strategies. In recent months, if not years, a notable shift has been underway — instead of water just representing part of the deal, investors are now targeting water specifically as the opportunity. As a result, a host of new players — energy services firms, technology vendors and private equity investors — are rounding out the competitive landscape.

While the water-related deal flow has been strong over the past five years, recent policy incentives, including the U.S. Infrastructure Investment and Jobs Act, investor focus on ESG, and corporate sustainability strategies are compelling organizations to be more aggressive in their approaches to water.

By the numbers

Water-related M&A surged in 2021, far outpacing the prior year, as measured by the number of water transactions and disclosed deal values. In 2021, Bluefield Research identified 498 announced deals, which represents a 34% increase over the prior year. The combined transaction sum for deals with disclosed values grew to US\$80 billion, up from US\$35 billion in 2020.

While the deal flow has been robust across all segments, the biggest increases have been in the Private Water and Network & Distribution segments, in which year-end transaction totals exceeded the prior year by 58 deals and 36 deals, respectively. These two segments make up 57% of the 2021 total and highlight anticipated growth opportunities to address utility operations and aging infrastructure.

Deal values are up

By year-end 2021, Bluefield identified 13 water-related transactions each topping US\$1 billion, compared to only three in 2020. Three notable, billion-dollar “water pure-play” deals kicked off the year. Autodesk made a long-anticipated acquisition of private equity-backed, digital solutions player Innovyze

for US\$1 billion. Quikrete purchased ductile iron pipes and precast concrete supplier Forterra, Inc. for US\$2.74 billion; and New Mountain Capital acquired Aegion Corporation for US\$963 million in the wake of acquiring a leading contract operations service provider, Inframark.

Utility acquisitions continue to grow

2021 will go down as the most active year for U.S. utility acquisitions in Bluefield's records to date. This activity is largely a result of financial stresses for small system owners, increased investor-owned utility competition for assets, and aggressive strategies by new market entrants. We are also seeing a shift in the competitive landscape through a growing presence of firms such as NextEra Water, NW Natural, Liberty Utilities, and Central States Water Resources.

Industry outsiders carve out, expand digital water positions

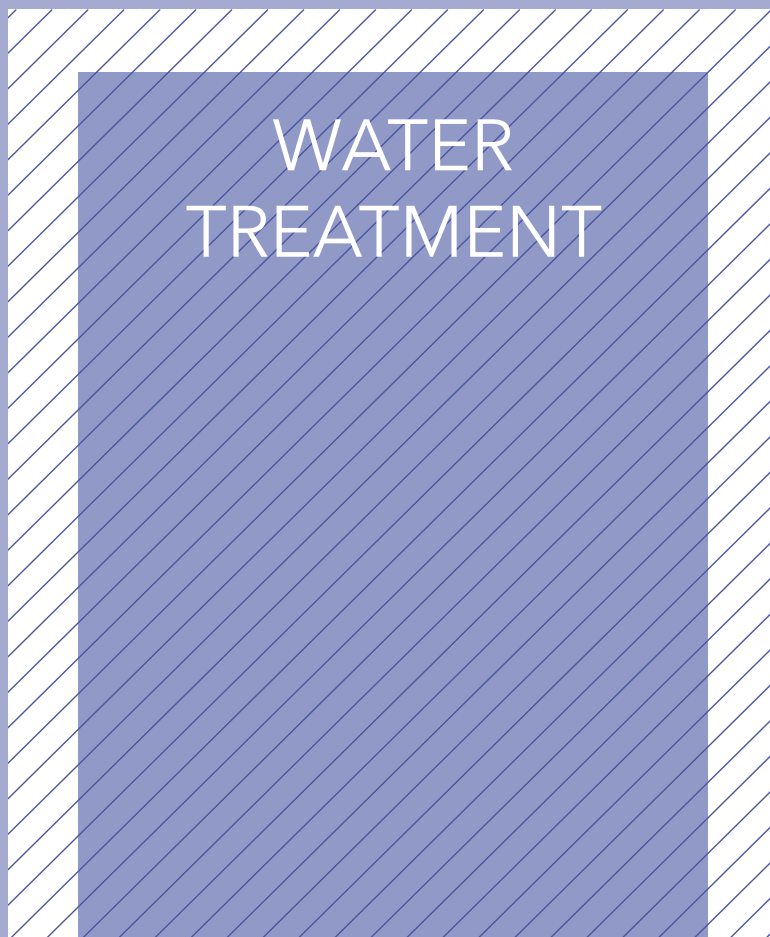
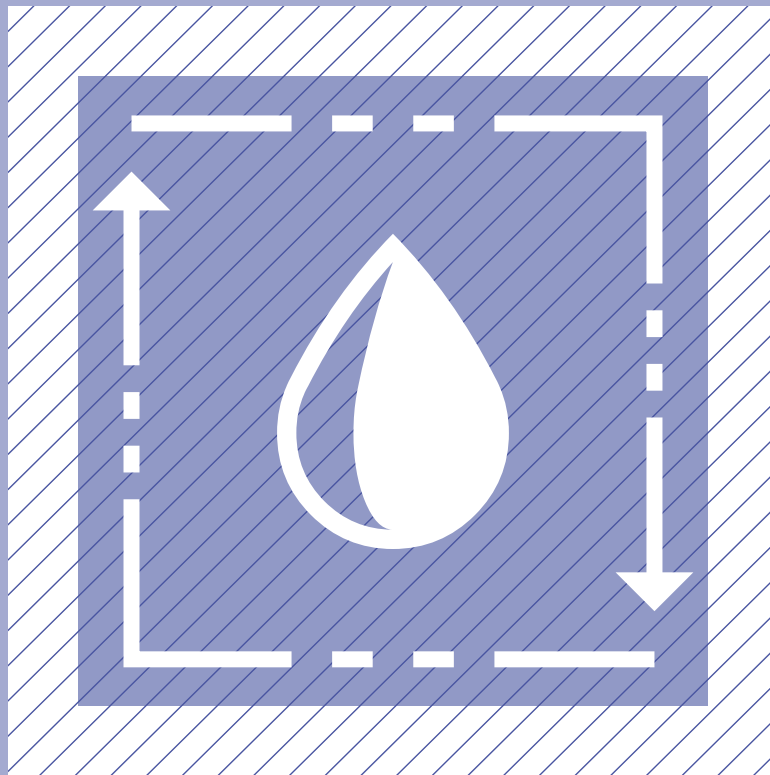
The digital water market continues to attract strong interest from adjacent sectors. A range of outside players — ranging from telecom companies and big tech firms to solid waste management solutions providers and global VC funds — launched new digital water partnerships, products, and investments in 2021. As enterprise software companies, cloud services

providers, and electronics manufacturers build out water-focused strategies, including M&A, solutions for utilities, industrials, and homeowners are expected to become more advanced.

Where do we go from here?

Looking ahead, we anticipate global water M&A activity to remain robust, supported by strong market tailwinds, though high company valuations in key strategic sectors, geopolitical concerns, and inflation loom large enough to pose a potential cooling effect on the market. Until then, market watchers will remain on the lookout for any platform deal opportunities, including collateral divestments from the recent Suez-Veolia acquisition and EQT's sale of French water management firm, Saur. If 2021's activity is a sign, we can expect big things to come for the water industry.

**Water-related M&A surged
in 2021, far outpacing the
prior year, as measured by the
number of water transactions
and disclosed deal values**





LILIANA VELASCO

GLOBAL BUSINESS DEVELOPMENT MANAGER AT MINSAIT

“Oblysis technology seeks to optimize the processes associated with treatment through efficiency improvements”

Oblysis, by Minsait, is a disruptive technology designed to optimise the operational efficiency of wastewater treatment plants, focusing on three main areas: energy consumption, sludge production and reagent consumption.

 CRISTINA NOVO PÉREZ -  GONZÁLEZ-CEBRIÁN

Digitalisation is driving change in water management, becoming increasingly essential in all processes. Wastewater treatment is no exception: multiple physical, chemical and biological processes make even more evident the need for digital solutions to facilitate operational efficiency, while ensuring the continuity of services and achieving effluent water quality objectives. We interview Liliana Velasco, Global Business Development Manager at Minsait – the leading IT and digital transformation consulting firm in Spain and Latin America – on her view on digital transformation trends in the water industry, and the opportunities that their Oblysis solution offers for wastewater treatment facilities.

Can you tell us about your career path and how you ended up working in the water sector?

It is nice to reflect on how I ended up working in the water sector, as it allows me to go back and remember that I have always been passionate about the world of engineering. Since childhood, I had the opportunity to visit large industrial plants in Colombia and see how incredible it was to turn the raw material of a sugar mill into candy, in a factory

that you did not want to leave until your pockets were full of candy samples; or to see how the beautiful books that you took to school were the result of the work of many production lines transforming paper thanks to great engineers and industrial mechanics.

I, therefore, chose to study industrial engineering at the Javeriana University in Cali (Colombia), which I later completed with a Master's degree in Integrated Logistics at the Comillas Pontifical University in Madrid. All this allowed me to start a journey in the world of utilities, starting in the area of hydrocarbon distribution in CLH and Accenture, where I also had the opportunity to start my first water projects for Canal de Isabel II, thus entering the field of technological solutions for the utilities sector. This experience opened the door to work at Indra, now Minsait, where I have been able to execute national and international projects in other sectors such as gas and electricity, expanding my functional knowledge in the areas of production, distribution and commercial cycle. During the last 10 years of my career I had the opportunity to specialise in water, the most valuable resource available to human beings.

Within Minsait, the Phyigital Unit has been created as a pathway to the future: we are strengthening our company's capacity to integrate the physical and digital worlds. And currently, I am responsible for putting the evolution of technology at the service of the water sector, as well as identifying the real needs of the market to contribute to and guide technological development in line with current needs. An exciting challenge!

What trends do you see in the digital transformation processes in the water sector?

Technological evolution trends in the water sector to meet new challenges are very diverse: from intelligent and automated management of sensors deployed in the field, promoting data homogenisation and management, to automation of

"We promote the development of solutions to guarantee the operation of water utilities, with an impact on both the business and society"



processes through a "virtual workforce", a digital transformation trend that is revolutionizing both back office and front office activities.

Digitalisation is a driver of change in the water sector, becoming a fundamental element in all processes, both at the level of control and operation of water infrastructure, as well as commercial management and associated corporate processes: financial, HR, purchasing, among others.

In a context where operational efficiency is a must, demanding the reduction of operating costs while always guaranteeing the continuity of service, water

quality and discharges, at Minsait we promote the development of solutions aimed at guaranteeing the operation of water utilities, generating an impact on both the business and society. All of this in a global scenario where climate change is a fact and fighting water scarcity is a reality, with continuous population growth and increasingly strict environmental regulations. Due to all of these reasons, the sector is inevitably forced to integrate disruptive technologies in its management without delay.

In the last two years, within the Phygital unit, we have focused on consolidating specific solutions for integrated water

cycle management, while promoting the implementation of these technologies with new service models that facilitate water companies' access to these technologies without increasing their investments.

However, implementing disruptive solutions in the sector is also a challenge, since there are factors that do not favour the rapid implementation of new technologies on an industrial scale, such as the human factor – due to a resistance to change the way operations are done or to face new challenges – or other factors such as the contract models imposed by the public sector. New, more dynamic relationship models are required to reduce



In the last two years, within the Phygital unit we have focused on consolidating specific solutions for integrated water cycle management

cycle through improvements in the efficiency of energy consumption, sludge production, reagent consumption and improvements in operating parameters.

The savings in energy consumption are mainly determined by the optimisation of the aeration cycles and the amount of air supply in the biological treatment processes, which results in reduced power consumption by the equipment.

Oblysis technology is based on restructuring conventional activated sludge into granular sludge, which contributes to reducing the amount of dry matter produced and, consequently, the costs associated with its treatment, transport and disposal.

In terms of operability, Oblysis contributes to a more stable process when there is variability in the organic load of the influent, and improves the values of the main parameters in the treatment process.

What resources and timeframes are necessary for the implementation of Oblysis in a wastewater treatment plant? Can it be implemented in any type of plant?

Oblysis implementation projects are carried out in several phases. Initially, a preliminary analysis is carried out to determine the technical and economic feasibility of installing Oblysis in a given plant based on historical operating data

and technical information. This analysis is performed in one or two weeks after the data needed is available.

After validating the feasibility of the business model, we proceed to agree with the client on the relationship model to be established throughout the duration of the project, including the shared savings model based on the reduction of operating costs associated with energy consumption, sludge production and reagent consumption.

In terms of the installation of Oblysis devices, it requires between one and two days with the support of plant operators. This installation is very simple as it does not require any changes to the plant infrastructure. During the following days, the correct operation of the equipment is monitored, so it can be calibrated and put into service according to the objectives set.

From a technical point of view, Oblysis can be implemented in activated

the time needed to launch innovative initiatives, which is why we see a need for "traveling companions" to promote the implementation of non-traditional technologies in real environments. We are currently counting on great allies such as Gestagua in Spain to promote initiatives, where we implement pilots that we then take to a productive environment.

What does the Oblysis solution for wastewater treatment plants provide in terms of process optimisation, performance and reduction of operating costs? Oblysis technology seeks to optimize the processes associated with the treatment

"We see a need for "traveling companions" to promote the implementation of non-traditional technologies in real environments"

sludge plants or oxidation ponds, with no limits in terms of the plant's capacity. From an economic perspective, where the operating costs of each plant must be taken into account, currently the plants that present a viable business model have a capacity of at least 75,000 population equivalent.

In Oblysis implementation projects, in addition to economic savings, it is also possible to establish objectives for improving effluent quality parameters or increasing treatment capacity; in those cases, the population equivalent is not taken into account.

How does Oblysis differ from other digital solutions on the market to optimise wastewater treatment plant operations?

Oblysis is a disruptive technology on the market; its operation is based on the transformation of activated sludge into granular sludge, favouring the removal of organic matter, nitrogen and phosphorus in more compact and efficient systems than conventional activated sludge systems.

Granular sludge technologies developed so far are almost exclusively based on sequential feed plants (Granular Sequencing Batch Reactor - GSBP), requiring huge structural modifications in the existing plant in order to be implemented. However, Oblysis is based on a continuous flow process simpler in terms of construction, easy to adapt to existing systems, and with lower requirements in terms of process control and automation.

"Oblysis is based on restructuring conventional activated sludge into granular sludge, to reduce the amount of dry matter produced"

Based on the principle of granular sludge, Oblysis technology creates the optimal conditions to change the sludge aggregation mode from flocs to granules, thus leading to a more stable and efficient wastewater treatment process.

Oblysis technology is a self-regulating system, which analyses the sludge aggregation code and adapts to it:

- ★ Ensures effluent quality;
- ★ Increases capacity and improves overall plant performance;
- ★ Reduced operating costs: energy, sludge and reagents.

Compared to conventional activated sludge systems, granular sludge-based technology can achieve energy savings of up to 30%, and operating and investment costs can be reduced by up to 85% and 80%, respectively.

The efficiency of Oblysis in the removal processes is very high, providing the following values for the main treatment parameters:

- ★ Removal of dissolved organic carbon (DOC) fraction > 90% -95%;
- ★ Removal of ammonium fraction > 95%;
- ★ Removal of nitrogen fraction > 80% -90%;
- ★ Removal of phosphorus fraction > 90%;
- ★ Increased phosphorus removal to the highest regulatory levels with a significant decrease in precipitation reagents used, if necessary.

Can you comment on the possibilities of integrating Oblysis with other digital tools?

Oblysis is a technology that is already integrated with other digital tools, as it is framed within our Sustainability Solutions developed by Phygital, where three main objectives are pursued:

Improve the efficiency, profitability and flexibility of operations related to all types of assets, products and physical infrastructure.

Transform the interaction of people with the physical world, linking real and virtual information.



Contribute to sustainability objectives concerning the multiple aspects of carbon footprint reduction, circular economy and social impact.

Oblysis projects are operated and managed through our Onesait Platform, a complete suite of solutions focused on responding to new challenges and opportunities, combining multiple technological tools such as Machine Learning



(ML), Artificial Intelligence (AI) and automation solutions, integrated with market-specific technologies to reduce costs in the wastewater treatment process.

What are Minsait's next steps to market Oblysis internationally?

Oblysis technology is currently implemented in three countries in Europe: Spain, Italy and Portugal, with successful

projects that will surely allow us to continue growing in these geographies. But our goal is to take our technology around the world through our subsidiaries, who are already working with our customers, mainly in Latin American countries such as Colombia, Ecuador, Chile, Costa Rica and Argentina, among others.

But it is also true that working with such an innovative technology is opening

doors to markets where a few years ago it seemed impossible to work in the water sector, such as the United States, France, Japan or the Czech Republic.

Internationalisation is an opportunity for us to explore the different issues involved in the implementation of disruptive technology, which in turn allows us to learn and apply the best practices that will lead us to success in a win-win model for all parties.

JEROEN M. TIELMAN

FOUNDER & MANAGING PARTNER OF QSTONE CAPITAL



THE BUSINESS CASE WITH ITS IMMINENT ‘TIPPING POINT’ TOWARDS FULL WATER RE-USE (ZLD) BY THE TEXTILE INDUSTRY IN BANGLADESH

The implementation of water treatment systems enabling full water re-use (Zero Liquid Discharge – ZLD) has been promoted in Bangladesh by the local regulators for almost nearly a decade. Despite this, the vast majority of the estimated 5,000 (export-oriented) textile factories in Bangladesh still treat their water to meet the current discharge requirements only. In this article, we sketch a business case, which would induce an industry-wide migration towards ZLD, where the early adopters will benefit strongly from an imminent tipping point towards ZLD as the next level of unambiguous sustainable textile production as is expected to be demanded by end-consumers.

A ‘total value chain perspective’, the application of innovative technologies as part of the total solution enhancing effectiveness and reducing costs, as well as QStone Capital’s basic requirement that a ZLD water treatment system needs to generate attractive returns for both the textile producers as well as for the fashion brands, are the necessary ingredients for a successful migration towards ZLD. This economic base is in our opinion a powerful and necessary supplement to any regulatory requirement. It is using the “carrot” (perceived to be more appealing), rather than just applying the “stick”.

Water treatment is regarded as a cost item in a linear model when the RMG textile processing water is being treated for discharge only. As economic law says that costs are to be minimized as much as possible within the boundary of its purpose, a regulator is needed to enforce industrial process water being treated according to minimum environmental standards. On the contrary, water treatment for re-use (ZLD) is an investment, as it fits with the next level of true sustainable production.

To determine the associated returns, we took several steps starting with analysing samples of process effluent water provided by a few textile producers in Bangladesh. Next, we determined the innovative technologies to be applied, which en-

abled us to calculate both the capital as well as the operational expenditures per m³ of treated water. We then converted this into a ZLD cost per RMG.

When determining the revenue potential per category of RMG, we found that if the Fashion Brand would pay only about 2-3% to the textile producer as a separate ZLD surcharge on top of what they are used to pay per RMG item, the textile producer would be adequately induced to migrate towards full ZLD. For example, this would mean a ZLD surcharge of about USD 0.05 per knitted T-shirt, USD 0.20 for a hoodie or USD 0.35 for a pair of jeans. At the same time, ZLD will enable the Fashion Brand the choice to offer their retail customers a “next level of unambiguous sustainability” for which they could charge retail clients an additional higher “retail ZLD surcharge” of for example USD 0.25 per knitted T-shirt or USD 3-5 per pair of jeans.

Our next finding is that textile producers and Fashion Brands should implement the migration towards ZLD as soon as they can. We think that retail clients of the Fashion Brands would demand ZLD as a tangible “next level of sustainability” quicker than the ability

of all textile producers in Bangladesh to implement industry-wide ZLD. We estimate that it would take close to a decade for all textile producers to actually have ZLD installed. At the same time, we expect a relatively quick shift of retail clients demanding ZLD within the coming few years. This implies the probability of a shortage of ZLD capacity.

We conclude that a separate “ZLD surcharge” of only 2-3% paid by the Fashion Brands to the textile producers in Bangladesh can already be covered by a retail surcharge of less than 1% to 1.5% (in case of an application by the Fashion Brand of a “cost to retail price” multiplier of only 2). Both Fashion Brands as well as RMG textile producers in Bangladesh therefore should align themselves expediently to prepare for the imminent ZLD tipping point.

Water treatment for re-use (Zero Liquid Discharge) is an investment, as it fits with the next level of true sustainable production



JOAN LEARY MATTHEWS

DIRECTOR, URBAN WATER MANAGEMENT & SENIOR ATTORNEY.
NATURAL RESOURCES DEFENSE COUNCIL

GIVE KIDS LEAD-FREE DRINKING WATER

Why lead needs to be removed from school drinking water

With a lot of attention directed toward the removal of lead service lines that bring water into residences, we must not forget that there is another source of lead in drinking water – schools and childcare centers. Outside of the home, children spend most of their time at school or in child care. Staff spend just as many hours there and are exposed to the same lead hazards. Women make up a majority of staff at schools and child-care facilities, and pregnant staff place their fetuses at risk when they drink water that contains lead.

The CDC, the American Academy of Pediatrics, and the World Health Organization all state that there is no safe level of lead exposure. Lead is a poisonous heavy metal that can affect almost every organ and system in the human body, often irreversibly. Children and fetuses are particularly vulnerable. Even at very low levels once considered safe, lead can cause serious, irreversible damage to developing brains and nervous systems of babies and young children. Lead can decrease a child's cognitive capacity, cause behavior problems, and limit the ability to concentrate—all of which, in turn, affect the ability to learn in school. Lead can cross the placental barrier of a pregnant woman into the womb and harm the fetus.

Lead is present in school drinking water

Older plumbing fixtures, fittings, pipes, and solder contain high amounts of lead, which can leach into drinking water. Troublingly, many schools and day-care facilities are housed in buildings that contain old plumbing.

Even new plumbing is not completely lead free. Prior to 1986, there were no federal restrictions on lead content in plumbing products. In 1986 Congress amended the federal Safe Drinking Water Act, defining “lead free” to mean that solder and flux could contain no more than 0.2 percent lead,

and plumbing pipes, pipe fittings, plumbing fittings, and fixtures could contain no more than 8 percent lead. Congress amended the law again in 2011 (effective in 2014) by lowering the maximum lead content of the latter components from 8 percent to a weighted average of 0.25 percent. Congress kept the 0.2 percent limit on solder and flux.

The solution: “Filter First, Then Test”

The best way for a school to protect children from lead in drinking water is to “Filter First, Then Test.” Testing programs around the country demonstrate that lead is prevalent in drinking water in schools, and that the levels can change significantly from day to day. In other words, we know that lead is present in unfiltered drinking water. We also know that filtration effectively removes lead when the filter is certified by NSF International or the Water Quality Association and is properly installed and maintained.

There is no benefit to waiting for a school to test its drinking water for lead – that's a waste of money. Schools should immediately install filters at school kitchen faucets and designated hydration stations, which is a bottle filling water fountain (1 station per 100 students/staff). Testing would only need to be conducted at these drinking water outlets to ensure that the filters are working properly. This is much smarter than embarking on a lengthy testing process that will only prove what we already know to be true. The District of Columbia has already taken the necessary step to require filtration first and then testing. In fact, NRDC drafted model legislation based on the Filter First approach; Filter First bills have been introduced in Michigan, Missouri, and Colorado. Other cities and states should follow suit with the sequence that best protects our children – Filter First, Then Test. Let's protect children and school staff not only in their homes, but in their schools, too.

Lead is present in unfiltered drinking water; filtration removes lead if the filter is certified and properly installed and maintained

SHUQAIQ 3

APPLYING TECHNOLOGY AND INNOVATION TO DESALINATION

Shuqaiq 3 is one of the "mega plants" developed in Saudi Arabia. We know a lot about its construction and development, but today we will go into more depth on the special and innovative technical aspects that make this project unique.

The Shuqaiq 3 desalination plant, which is in commercial operation since last January, is known as one of the "mega-plants" being developed in Saudi Arabia that are benchmarks worldwide.

With a nominal production capacity of 450,000 cubic meters per day, equivalent to 180 Olympic-size swimming pools, the plant supplies both the population and the agricultural and industrial activities of the provinces of Asir and Jizan. More than 2,000 people participated in its construction, and after its completion, a major milestone has been reached in terms of industrial health and safety, with more than nine million hours without any incidents or work-related casualties.

Awarded to the consortium formed by Almar Water Solutions (through Ab-

dul Latif Jameel Enterprises), ACCIONA, Marubeni Corporation and Rawafid Alhadarah Holding Co, and with an investment of close to 600 million dollars, the project will contribute to the economic and industrial development of the area.

What is not so well known is the qualitative difference with respect to similar plants that were built in the same period of time and with production volumes in the same range. And this difference is the result of the many challenges unique to this project that the Shuqaiq 3 consortium faced.

Surrounding area and aerial view of Shuqaiq 3



Location

Located in southwest Saudi Arabia, the geographic and geopolitical conditions were not the most convenient for the execution of a project like this one. The specific characteristics of the territory, relatively remote in the country, meant that logistics, which are already complicated to start with this type of project, posed enormous difficulties, reaching their most critical point with the COVID-19 pandemic. Mobility constraints posed a challenge, but the search for alternative suppliers and the reduction of delivery lots minimized the impact.

The location also has a determining influence on water quality. Although the water's turbidity and temperature are not extreme, there is high biological growth and recurrent red tides in this area of the Red Sea, which present a huge challenge for desalination plants. In the case of Shuqaiq 3, the technological solutions that have been applied, although they already existed in the industry, had never been implemented in plants of this magnitude. The best example is the pigging system. The pig is a "bullet" of almost

two meters in diameter that weighs more than one tonne. It is inserted into the marine pipelines and is propelled by pressurized water to clear out all of the marine growth that has been consolidating inside the pipelines. This growth is very detrimental to the plant because it gradually reduces the internal diameter, generating a potential risk of decreasing flow below the levels required for production.

Minimizing the volume of the controversial sodium hypochlorite, and the shock addition of sulfuric acid, further improve the performance of the membranes in this environment that is so prolific for marine life.

Reverse osmosis membranes

The Shuqaiq 3 plant has more than 7,000 reverse osmosis pressure tubes, which when placed end to end would measure almost 54 kilometres long, with more than 53,000 membranes working simultaneously to produce more than 18 million litres of pure water per hour.

For the water intake, there are three pipes, 2 metres in diameter and 1.5 km long, buried in the seabed and can take in 1 billion litres of water per day for treatment and purification.

Shuqaiq 3 plant has more than 7,000 reverse osmosis pressure tubes, which when placed end to end would measure almost 54 km long





Treated drinking water in Shuqaiq 3



Energy efficiency

The development of a competitive desalination project is largely determined by its energy consumption. The Shuqaiq 3 consortium was aware that this was the key point to winning the contract for this project. Thousands of hours of engineering development and collaborative work with suppliers enabled the plant to achieve its energy consumption targets of around 3 KWh/m³. Of all the solutions implemented, the following are worth mentioning:

- ★ Pressure set. This solution, already used in previous projects by the Almar Water Solutions team, is a highly efficient configuration, which combines all the high-pressure pumps to work together, instead of dedicating each pump to a specific group of pressure tubes. This reduces losses and, consequently, electricity consumption.

- ★ Development of the membrane configuration. In collaboration with the

membrane supplier and working with the projections regarding the raw water quality, the most adapted solution to the environment has been sought, until the optimum distribution of pressure/number of membranes in each step was achieved.

- ★ Reduction of residual losses. At every stage of the process, solutions have been sought to eliminate inefficiency, no matter how small. Some examples include the work done in collaboration with the product-water distributor to reduce the delivery pressure by more than 1 bar, or the adjustment of the HVAC system to achieve the proper temperature in each electrical building.

Commitment to the environment

One of the client's main concerns, and one of Almar Water Solutions' priority commitments, was to respect the environment where the project would be located within a general framework of

environmental impact reduction sponsored by the Saudi government. Shuqaiq 3 is located on the Red Sea and close to

Aerial view of Shuqaiq 3 desalination plant



a natural park, so all kinds of works were studied and carried out to achieve the objectives set.

Shuqaiq 3 includes a waste treatment system to minimize the pollutants that could be discharged to the sea. In addition, solutions have been implemented to minimize the use of chemicals that can have a large local impact, such as sodium hypochlorite.

These efforts were carried out during the construction phase, as well as after the completion of the plant. The marine construction method included the creation of a pond to collect the excavation material and prevent it from being deposited on the seabed and damaging it, albeit temporarily and in a localized manner. Thus, once construction was completed, both the seabed and the coastline were left in the same condition as before the start of the project.

Today, Shuqaiq 3 is the main water supplier in the region, because the project represented a technological leap forward compared to other desalination plants in the area, based on less efficient thermal desalination technologies.

The project has also stood out for the diversity and integration of the

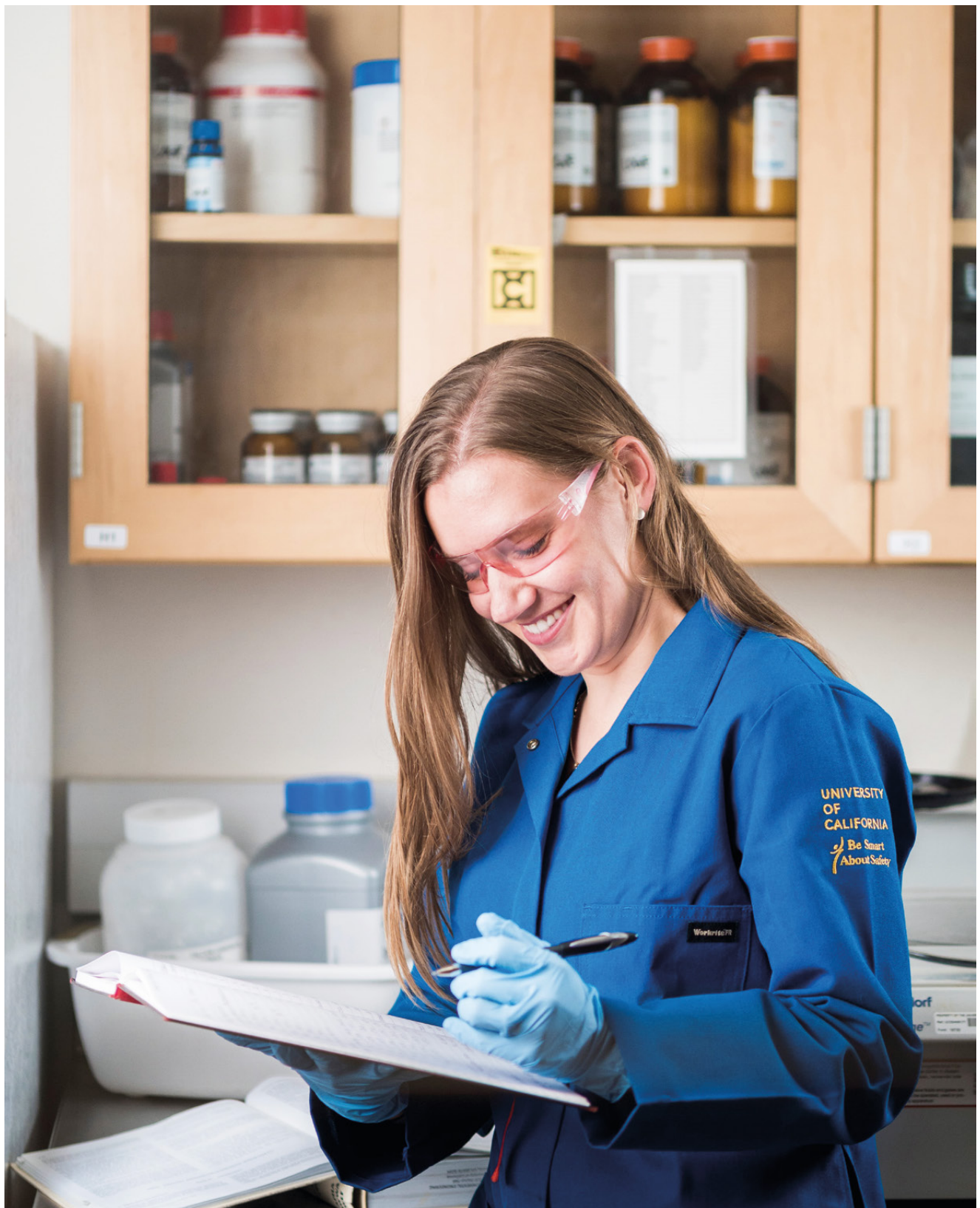
people involved in it, being one of the commitments of Almar Water Solutions. Many professionals from the area have worked together with the corporate team to adapt the resources and gain knowledge and experience in the area, providing enormous synergy at all levels.

Shuqaiq 3 has been a well thought out and developed project, both technically and environmentally. Starting with the bidding phase, all the needs

of the area and the client have been reflected in order to achieve an effective and efficient plant and a high-quality product water, helping the economy and the daily life of the region. The extreme drought suffered by the region and the scarce natural water reserves, means that projects like Shuqaiq 3 make even more sense to improve the quality of life of its millions of people and allow the sustainable development of these regions.

There is high biological growth and recurrent red tides in this area of the Red Sea, which are a challenge for desalination plants





DR AMANDA RUPIPER

CENTER FOR WATER-ENERGY EFFICIENCY, UNIVERSITY OF CALIFORNIA, DAVIS

“The amount of losses a utility should recover depends on the individual utility”

Water loss management can lead to water savings and net economic benefits, but is there an optimal level of water loss? Researchers use engineering and economic principles to take account of the heterogeneity of water losses to arrive at the most economically efficient level of water loss reduction.

 CRISTINA NOVO PÉREZ

As water utilities grapple with scarcity and uncertainty of water supplies, leak management offers an opportunity for water savings. While some leaks will be evident and accessible, others will be costly to find and repair. Dr Amanda Rupiper has been carrying out research related to water use efficiency and sustainability at the Center for Water-Energy Efficiency at UC Davis. We interview her about her research on water loss management and the implications for water suppliers as well as for policy and regulation.

Can you tell us briefly about your career path and your current research focus at the University of California, Davis?

I started my career out as an Environmental Scientist working for the California Department of Public Health as a regulator in the Drinking Water Program and then moved into a Chemist position in the State Drinking Water Laboratory. In these roles, I was able to visit many small water systems throughout Northern California and work with several Environmental Engineers. This work inspired me to increase my involvement in California

water management issues and go back to school to get my Engineering degree – which brought me to the University of California, Davis (UC Davis).

I have been very fortunate while pursuing my Ph.D. to work with the Center for Water-Energy Efficiency at UC Davis and participate in a variety of research from decentralized water reuse to water loss management. Since completing my degree, I have stayed on with the Center for Water-Energy Efficiency as a post-doctoral researcher. I am currently working on a few projects including one related to energy load-shifting in the water sector. This work specifically examines the potential of water distribution systems to use their existing water storage to shut off their distribution pumps when energy costs are high and energy grids are strained and increasing pumping during low cost or low emissions periods to increase the integration of renewable resources with the Californian energy grid. Other projects I am actively working on include quantifying the impact of advanced metering infrastructure on water consumption and end-user water leaks and an equity assessment of various water rate structures in North and South America. In

the fall, I plan to continue working on research related to efficient water management, water loss, and related topics in a new role as faculty at the University of California, Riverside.

Why is it important to assess water loss at the utility level?

Utilities are complex and unique - what is best for one utility may not be best for another and a one-size-fits-all approach can be detrimental for many utilities. The easiest way for me to explain this is with an example of two utilities of identical size, identical costs to produce a volume of water, and identical levels of leakage, 15% of their annual water demand. The only difference between these utilities is the rate at which new leaks develop within their system, a metric commonly referred to as rate of

Concerning water losses, what is best for one utility may not be best for another and a one-size-fits-all approach can be detrimental



For some utilities the cost of achieving a uniform regulation exceeded the benefits of saved water, meaning they lost money

rise. Utility 1 has a newer distribution system where leaks develop somewhat slowly. Utility 2 has an older distribution system where leaks develop five times faster than Utility 1.

Assume a regulation did not take into account utility-specific data (e.g., rate of rise) and instead required each utility to bring their water losses down to 10% of their water demand. In order for Utility 1 to accomplish this, they may only have to search for and repair leaks every five years. In order for Utility 2 to accomplish this, they may need to perform

leak detection surveys and repairs each year at a significant cost. This regulation will result in Utility 2 paying five times more than Utility 1 to achieve identical benefits (i.e., the value of water saved).

This example only considers one utility-specific factor, but you can imagine that other factors could have similar impacts. What we found when looking at models that did not assess water losses at an individual utility level, was that for some utilities the cost of achieving a uniform regulation exceeded the benefits of saved water, meaning they lost money. In addition, these approaches disproportionately affected utilities, causing some to pay as much as ten times what other utilities were paying per volume of water saved.

You found cost-effective leak management depends on utility-specific characteristics. Which characteristics do you take into account in your model?

We tried to incorporate as many utility-specific characteristics as possible. In our study, we applied the model to almost 900 utilities, which meant we were somewhat limited in which utility specific values we had available to us. We used five different utility-specific values pulled from annual water audits; length of mains, number of service connections, average pressure, current annual real losses, and variable production costs. Everything else in our study was based on defaults found in literature or estimated using data from several water suppliers that provided us with detailed data. For our analysis, we felt comfortable using defaults because while the actual values for an individual utility are likely more or less than that default, on average we would be representing utilities as a whole. If an individual utility were to use our model to estimate what is the most cost-effective level of water losses for them, they

should replace as many of these defaults as possible with values specific to their system. We built the model to use utility specific data for many parameters including: leak detection survey costs, leak detection method accuracy, infrastructure condition factors, rates of rise, pressures in individual zones of the distribution system, water cost growth rates, and others.

How does the model you developed arrive at an economically efficient level of water losses?

Economic efficiency relates to the level of water loss reduction that maximizes

Economic efficiency relates to the level of water loss reduction that maximizes the difference between benefits and costs to a supplier



es the difference between benefits and costs to a water supplier. In other words, this is the level of losses where the incremental (a.k.a. marginal) cost of an action like leak detection and repair is equal to the incremental benefit, which in this case is water savings. To find the level of water loss reduction where this occurred we used utility specific data to

create a cost curve as a function of leak reduction activities. Assuming that every unit of water saved is equal to the last (i.e., constant marginal benefits), we were able to maximize the net benefits (total benefits – total costs) by minimizing the total cost equation.

In practice, we did this for two water loss management activities, leak detec-

By examining hundreds of utilities, we saw the implications of policy and modeling choices on individual utilities as well as overall



It will be more economically beneficial for a utility to save water if actions or technologies employed are cheaper or more efficient



tion and repair and pressure management. Minimizing the cost curves for each of these activities allowed us to estimate how often a utility should perform leak detection and in what zones of the distribution system to reduce pressure. Once we identified these activities, we could translate them into new water loss levels.

How does your approach to water loss management differ from existing engineering standards of practice?

Much of what went into our approach is not new, we took advantage of principles that are fundamental to engineering and economics and brought them together. I think the most important thing about our work that has not been done in this way before was that it took a big picture approach. By examining hundreds of utilities from several states, we were able to see the implications of policy and modeling choices on individual utilities as well as overall and the benefits of managing water losses efficiently.

Can the model be adapted to the situation in different countries?

Yes, definitely. Since we designed the model to use as much utility specific data as possible, it is very adaptable to

different situations and conditions. The one big assumption that the model does make is that water distribution pipes are constantly pressurized. So long as this is true for a water system using the model, everything else can be tailored using data specific to the water provider.

One important thing to note is that we populated the model with defaults in the place of missing data. We selected defaults to represent the US states whose data we used in our study. If this model is adapted for a different country it may be worthwhile to consider which defaults should be changed.

How can your findings inform water loss policy and the development of regulations?

There are many ways to approach water loss regulations and since creating a unique water loss standard for each utility can be onerous and require significant amounts of data and knowledge, which may or may not be available or reliable, it is tempting to apply a blanket regulation. For example, all utilities should get their water losses down to 10% of their annually distributed water, should reduce their current levels of losses by 25% or should perform leak detection surveys every two years.

However, all three of these 'uniform' approaches will result in some utilities doing too much, some doing too little, all of them paying different normalized costs to achieve the standard, and some utilities losing money.

If nothing else, what our findings have shown us is that while there is a great opportunity to reduce water losses at a benefit to the water supplier, the amount of losses a utility should recover depends on the individual utility.

To what extent may novel technologies to detect leaks and monitor pressure in water systems influence water loss management?

New and emerging technologies are increasing the accuracy of leak detection, continuous leak monitoring is finding leaks earlier, improved data and metering accuracy is helping better understand and characterize real water losses, and improved pressure monitoring can help identify even small or short durations when pressure can be reduced to decrease leak flows. All of these technologies and advancements can help reduce water losses in a system, but they come at a cost. As the cost of installation of these new technologies comes down, the economically efficient level of water losses will also decrease. This means that all else being equal, it will become more economically beneficial for a utility to save more water if the actions or technologies employed to save water are either cheaper or more efficient.

The saying that change is the only constant in life applies here. As technologies change and improve, as utilities grow and update their systems, as the cost of water fluctuates, so too will the economically efficient level of water losses. Leaks that make sense today might not make sense tomorrow and should be regularly reassessed using sound economic and engineering principles.



LONGEST RIVER BARRIER IN REMOVES PLASTIC FROM W

Bolina Ltd, an Ecocoast company, has installed on the Belgian tidal river Scheldt a floating barrier to catch plastic and other floating debris. The barrier funnelled 218 kg a day into the plastic catcher, removing 7 tonnes of debris and human pollutants a month from the river. Over the annual period between October 2020 and October 2021, the Bolina Debris Booms funnelled over 60 tonnes of waste, removing it from the Scheldt River and stopping it from getting in the ocean.

Autonomous plastic collector

Bolina worked with the world leader in the highly specialised fields of dredging, solutions for the offshore energy market, infra marine and environmental works, DEME Environmental Contractors (DEC), the environmental specialists of DEME. DEME installed a litter trap in Temse, with a floating funnel from Bolina that covered part of the river allowing vessels to pass by unhindered. Operational 24/7, it caught and collected drifting debris inside the Bolina floating debris barrier. Once the litter trap was full, everything was transferred into an autonomous CO₂

neutral DEME vessel using VR technology. When the container is full, the work boat takes this autonomously to the docking station, where it is unloaded by a transfer crane on the quay for collection and processing.

AI was used for debris passing that would miss the funnel. Floating waste was detected using artificial intelligence by smart cameras that were installed on the old Temse bridge. An autonomously navigating work boat, the “Marine Litter Hunter” intercepted the waste and pushed it to a collection pontoon. The waste was collected in the collection pontoon, where a crane equipped with a grab transfers the waste into a container.

Bolina pioneering products fit for purpose

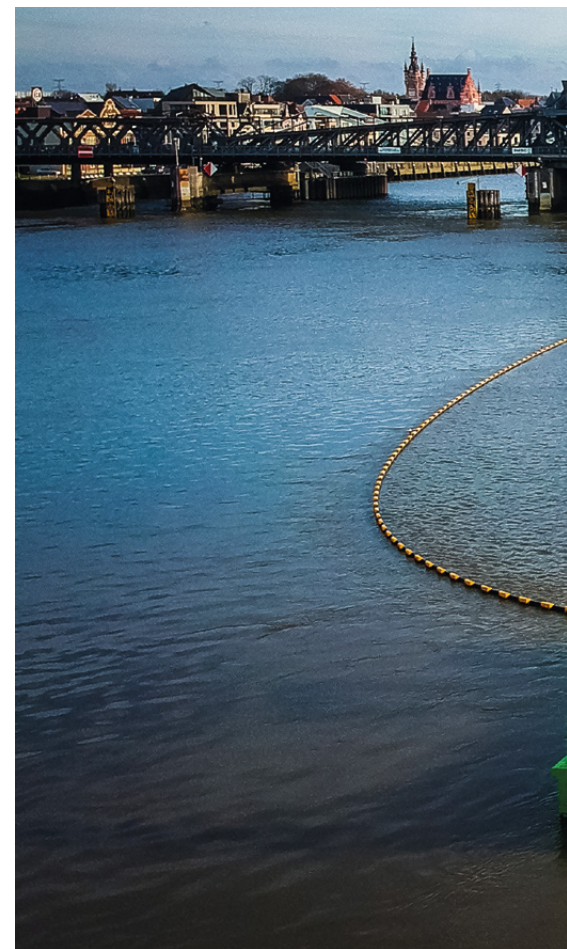
An innovative design was required due to its tricky location on the Scheldt near the Temse Bridge. Various factors came into play including the tidal effect of up to six metres, the alternating current directions and water speeds of up to two metres per second, as well as the river being a busy shipping route - a fitting challenge for both Bolina and DEME.

The design integrated the Bolina floating debris barriers that would rise and fall with the tide. Two giant ‘arms’ would form a funnel and guide the pollution towards the plastic collector to be trapped. Both arms are constructed from one full length, without intermediate pieces or other connections in order to maintain maximum tensile strength. The arms span 103 metres for

the northern side of the funnel and the southern arm is 175 metres.

Due to the extreme tidal effect, Bolina D-500 pile drivers were provided at the beginning of the barriers, which followed the full height difference of six metres, four times a day. At the plastic collector, a special roller system was designed for the connection between the Bolina floating debris barriers and the collector itself. The new roller system allows free movement between the dirt screen and the pontoon in the event of strong waves and tides, without losing any plastic or floating debris.

Waterways worldwide face water pollution challenges, plastic, wet wipes and all kind of debris that pollute the waterways



EUROPE ATERWAYS

In an effort to improve the water quality of Europe's rivers, Bolina Ltd, an Ecocoast company, has engineered the longest floating debris barrier on the Belgian river Scheldt.

Gregory Duquennois who headed up the project from Bolina said:

"In the course of our global activities, we are confronted daily with waste in rivers and oceans. For Bolina, that specialises in products for the protection of waterways and coastlines, it is a logical step to use our expertise to cooperate actively on solutions for the global waste problem. By collecting plastic in rivers we can avoid it ending up in our seas and oceans, where it is more difficult to tackle the problem. As a pioneering company, we continue to commit to technologies and innovations that offer

solutions for global challenges. We are pleased that this installation yielded such positive results and can be seen as a case study for what can be rolled out in rivers across Europe and globally."

Waterways worldwide face water pollution challenges, plastic, wet wipes and all kind of debris that pollute the waterways. Trials and investment from governments, private companies and organisations like DEME and The Flemish Waterway initiative in Temse means these rivers may see a revitalisation with ecosystems returning and beginning to flourish again.

About Bolina

Bolina is the European leader in marine safety, security and environment booms for inland waterways, ports, dams and critical infrastructure. Headquartered in the United Kingdom with strategic partners worldwide, Bolina was acquired by Ecocoast in early 2020, a global leader in engineered products for the protection of coastlines and waterways. The acquisition allows clients to have access to an unmatched range of marine products for coastal and marine protection, demarcation, navigation, safety and security purposes globally.

By collecting plastic in rivers we can avoid it ending up in our seas and oceans, where it is more difficult to tackle the problem





XYLEM'S NEW SMART WASTEWATER TREATMENT SOLUTION CUTS OPERATING COSTS AND REDUCES ENERGY USE BY 25%

Breakthrough digital innovation provides wastewater operators real-time process recommendations



Wastewater utilities can now achieve compliance targets while cutting energy consumption from aeration by up to 25% with Xylem Edge Control. This off-the-shelf suite of digital solutions for conventional activated sludge (CAS) plants marks the latest breakthrough in the digitization of water utilities. With Xylem Edge Control, wastewater operators can now control and monitor their assets, improve nutrient removal, save energy and reduce costs.

“Wastewater utilities are constantly balancing the need to ensure service reliability and compliance alongside the need to manage costs,” said Chris Taylor, Global Product Manager at Xylem. “Xylem Edge Control helps wastewater utilities confidently walk that line, bringing together our digital innovation expertise and insights from our deep bioprocess-

ing experience, in a suite of solutions that maximizes process control while dramatically cutting energy consumption and supporting sustainability goals.”

“Utilities around the world are well on the way to digitizing their networks and reaping major water, energy and cost efficiencies. Xylem Edge Control is a versatile, multi-functional solution that meets wastewater utilities where they are on that journey – and sets them up to unlock more of the benefits of digital transformation.”

The launch of Xylem Edge Control follows rigorous field testing across North America, including Washington and Indiana, including the wastewater treatment operations serving the city of Muncie, Indiana.

The Edge Control solutions apply analytics to real-time data to provide

rapid process recommendations to optimize chemical usage and aeration. As utilities target emissions reductions, Edge Control is the latest high-efficiency technology that can help utilities cut energy-related greenhouse gas (GHG) emissions and make fast progress towards achieving net-zero targets. The platform can operate with any Programmable Logic Controller under various communications protocols and connect to existing hardware, including sensors and probes.

Global water utilities account for approximately 2% of global GHG emissions – the equivalent of the world’s shipping industry. However, innovative solutions like Edge Control can help mitigate a substantial portion of the emissions generated by inefficient wastewater operations, quickly and affordably. Furthermore, by deploying readily available advanced solutions, utilities could cut the water industry’s GHG emissions by 50% across both clean water and wastewater activities.

Xylem Edge Control can be used as a stand-alone process or as a connected, subscription-based enterprise with fees based on efficiency and savings. When connected via the Cloud, Xylem Edge Control provides data visualization, allowing the customer to see the energy savings on a monthly basis; real-time data trending reports, showing details such as ammonia and TIN concentrations and alert and alarm texts/email notifications, displaying instrumentation and software status.

ACCIONA PRESENTS DIFFUSAIR®, AN INNOVATIVE DEVICE FOR THE GENERATION OF MICROBUBBLES

ACCIONA's R&D Department develops an innovative solution to generate a cloud of microbubbles at low pressure in high-speed floats

Dissolved air flotation (DAF) is one of the most widely used technologies in the removal of low-density solids, algae, hydrocarbons, oil, grease etc. from water that sedimentation cannot eliminate.

This is achieved by injecting fine bubbles, usually air bubbles, into the liquid phase through conventional systems to generate microbubbles. Although this description is a very simple one, the process requires a range of equipment, with the presence of a saturator usually a key factor.

However, DIFFUSAIR®, the solution developed and patented by ACCIONA, consists of a nozzle that generates a cloud of microbubbles of constant size (determined by the operator), introducing water at low pressure (1.5-6 bar) without the need for air saturators, compressors or blowers.

The main advantage offered by DIFFUSAIR® is a 30% reduction in aeration equipment costs and up to 20% in energy consumption in comparison with conventional aeration systems, thus guar-

anteeing optimal performance for the longest possible time. It is a robust system that minimizes the risk of obstructions and adapts to a wide range of operating conditions according to each type of water, and thanks to its ability to regulate the inflow of air and the size of the bubbles.

DIFFUSAIR® can replace the nozzles used in water treatment plants, not only in the DAF process but also in other processes that require the generation of bubbles or microbubbles as in degreasers, floats or bioreactors.





SAFF TECHNOLOGY NOW REMOVING SHORT CHAIN PFAS MOLECULES

SAFF® PFAS remediation technology can remove almost all short chain PFAS compounds from contaminated water



EPOC Enviro (a subsidiary of OPEC Systems) announced that its Surface Active Foam Fractionation (SAFF®) PFAS remediation technology can remove almost all short chain PFAS compounds from contaminated water, as well as long chain PFAS compounds.

PFAS is a family of synthetic compounds widely used globally to make products that resist heat, oil, stains, grease and water. PFAS compounds break down very slowly over time and are recognised as an ‘emerging contaminant’ with widespread concerns about their characteristics of persistence, bioaccumulation, toxicity, mobility and impacts on human health.

In announcing the breakthrough, EPOC Enviro Company President, Peter Murphy, said that the recent short chain removal trial results had exceeded all

expectations and appeared to be a game changer for remediators looking to step away from using unsustainable GAC or resin remediation technologies.

“We are now offering a naturally elegant solution which simply uses air bubbles to remove PFAS down to C4, providing remediators with the ultimate sustainable solution for PFAS remediation, without use of adsorbents which require ongoing replacement and additional waste management,” he said.

“Provision of this single, sustainable solution enables broad scale PFAS remediation wherever this contaminant is found. The SAFF® technology is between one to two orders of magnitude cheaper to operate.”

Up until recently, the primary focus for remediators has been to remove long chain PFAS compounds, but as the global

regulatory environment has become more stringent with concerns around their long-term toxicity and mobility, there has been an expanded focus on also removing short chain PFAS contaminants.

“Short chain PFAS compounds have traditionally challenged remediators because they don’t bind well to available sites in typical remediation techniques, and this has forced us to get creative in finding a solution.”

SAFF® represents a sustainably engineered approach to PFAS remediation, where a combination of aeration and vacuum is used to rapidly ‘foam out’ >99 per cent of target long chain PFAS molecules and now a significant majority of short chain PFAS, enabling treated water to be safely returned to the environment.

SAFF® exploits the natural properties of PFAS compounds to preferentially bind to the air/water interface of a swarm of rising air bubbles. Once on the surface, the compounds are harvested as a waste froth/foam for permanent destruction using readily available partner technologies.

Short chain PFAS removal is achieved by a combination of enhancements to the SAFF including manipulation of a PFAS compounds’ position on the adsorptive isotherm, vessel geometry and sequencing adjustments, and, where required, the addition of specific amendments.

While removal rates are markedly improved and continually getting better, the only short chain PFAS molecule continuing to challenge the SAFF technology is PFBA, which is currently showing removal rates of 40 per cent.

**WINDI MUZIYARI**

PHD, FOUNDER AND CEO OF RESISTOMAP OY

WHY MONITOR ANTIBIOTIC RESISTANCE IN WASTEWATER?

Antibiotic resistance is one of the most urgent threats to global health. It is estimated that antibiotic resistance was associated with around 4.95 million deaths in 2019, making it the third leading Global Burden of Disease (GBD) Level 3 cause of death in that year. The number of deaths is expected to increase significantly in the coming years, as antibiotics lose their effectiveness and bacterial infections become more deadly. Moreover, antibiotic resistance is a complex problem and tackling it requires a One Health approach, as resistant bacteria spread in humans, animals, and the environment.

The World Health Organisation proposed an action plan on antibiotic resistance, which emphasizes the importance of monitoring and research. But the monitoring of antibiotic resistance in the environment has received less attention compared to in humans and animals, which has been done for a long time. Environmental monitoring is essential to identify the “hotspots”, which are certain environments where resistance is known to develop and spread. Hospitals, wastewater treatment plants, pharmaceutical factories, and food and animal production facilities are known as the hotspots of environmental antibiotic resistance due to the constant use and/or production of antibiotics. The monitoring can be also used to evaluate how resistance spreads into and from different environments, and how the resistance levels change over time. Studies show that more resistance is observed in regions where the use of antibiotics is higher and where the environment is contaminated with human waste and antibiotics. Monitoring efforts should also focus on low- and middle-income countries, which often have limited resources but a high burden of antibiotic resistance. To understand and prevent the spread of antibiotic resistance, various stakeholders are interested, or required, to monitor antibiotic resistance. With monitoring data, scientists and decision-makers can better understand antibiotic resistance and

so develop effective strategies to mitigate the spread. It can provide early warnings of emerging threats and help identify long-term trends.

The release of wastewater from the mentioned hotspots into the aquatic environments can further spread the resistance to different environmental compartments which will, eventually, spread to humans and animals. This emphasizes the importance of wastewater monitoring to identify the main sources of antibiotic resistance in the environment. Wastewater monitoring will be a potentially valuable addition to current antibiotic resistance monitoring in humans and animals since it can provide comprehensive information on the levels of resistance in the monitored areas. Wastewater monitoring can also cover a wider range of antibiotic resistance profiles which are often carried

by commensal bacteria compared to the partial data from pathogenic bacteria isolated from humans and animals. Currently, the monitoring of antibiotic resistance in wastewater is being performed mainly at in-house laboratories with less comprehensive and more costly technologies in governmental research institutes and/or university

laboratories that lack appropriate quality management systems. This also emphasizes the need for a commercial service that can provide faster, more comprehensive and quality-controlled service to the various stakeholders.

On the other hand, wastewater monitoring has been used as a monitoring tool to assess population health concerning the use of illegal drugs and the success of polio control measures. In recent years, wastewater monitoring has been used also to monitor the COVID-19 epidemic situation. Wastewater monitoring of antibiotic resistance can be used to identify the trend of antibiotic resistance development and help prioritize measures and interventions to control the situation and assess its effectiveness. It is important that different methods are studied to develop both monitoring and better wastewater treatment.

With monitoring data, scientists and policymakers can better understand antibiotic resistance to develop strategies to mitigate the spread

SEBASTIAN ANDREASSEN & MIKE SNODGRASS

CCO & CO-FOUNDER OF CEMBRANE - SiC TECHNOLOGY LEADER, OVIVO MUNICIPAL



TREATING WATER THE WAY IT DESERVES TO BE TREATED WITH SILICON CARBIDE MEMBRANES

The majority of the world's population does not have access to clean water and the majority of wastewater is not discharged safely to nature's water bodies. Existing freshwater supplies are under increasing stress due to population growth, industrial use, and pollution. As part of a viable water supply, wastewater isn't fully utilized as such, due to limitations and high costs of conventional technology. In some instances, wastewater is barely treated at all in the form of storm driven sewer discharges. Silicon Carbide (SiC) membranes eliminate many of the limitations associated with conventional water treatment, creating a global opportunity to safely purify and recover water with a fraction of the installation time, footprint and cost.

The current water treatment landscape is typically composed of long, complicated and custom-made treatment schemes, involving numerous treatment steps before water can be reused, discharged or consumed safely. This approach often has a limited operating window and can struggle if inlet water quality deviates from the original basis of design. Resulting in plant down time, un-scheduled maintenance and reduction in quantity and quality of the treated water. For that reason, additional standby capacity is often required adding to the already excessive cost and footprint of the plant.

The ability of membranes to turn wastewater into safe, clean, reusable water is widely accepted throughout the world but the adaptation rate is slower than it should be. This is because conventional membranes have not always been the most reliable, causing real world costs for advanced reuse to be higher than projected. Many of our water scarcity issues can be resolved if there is a reliable and sustainable technology that makes it easy to turn wastewater into drinking water.

Silicon Carbide (SiC) membranes are providing a new paradigm for water treatment. A truly resilient membrane can only be achieved by completely changing the membrane material it-

self. Conventional membranes are derived from petroleum oil. SiC is derived from sand from the North Sea. No need to be a membrane expert to understand the difference between those materials. With a step change in membrane material, a much wider operational window can be achieved allowing the system to be truly resilient.

SiC membranes allow for complete recovery after cleaning, indefinite dry storage, high solids tolerance, resistance to coarse material, and pressure washing capabilities are some of the many features that make life easier for the user. SiC is also one of the few membrane materials that is naturally and permanently hydrophilic, meaning organic foulants, including oil, are repelled by the membrane while water is naturally drawn in. This allows it to filter water at up to 10x the flow per unit membrane area compared to conventional membranes.

SiC allows for new ways of thinking about water and wastewater treatment. The days of large, complicated treatment trains using truckloads of chemicals to condition the water with standby capacity, can now become a thing of the past. And in many cases, using SiC, conventional treatment schemes

can be reduced to 10% of the footprint, 10% of the chemical use and at least half the energy consumption.

SiC is also the only technology that can instantly purify and disinfect at the onset of a storm. This ensures no matter what time of year or how intense a storm is, SiC can provide a physical barrier to bacteria, pathogens, and solids, ensuring our waterways are clean and safe.

All the water we have is all the water we will have. It is our responsibility to purify, recover, and reuse it wisely. The adoption of SiC Technology has been extremely rapid in all parts of the world due to the vast treatment capabilities it can provide. In just five years, more than 500 million liters of clean and safe water have been delivered throughout the world, but there is a long way to go.

The adoption of SiC Technology has been extremely rapid in all parts of the world due to the vast treatment capabilities it can provide

**DR SOFIA BABANOVA**

CTO AND CO-FOUNDER OF AQUACYCL

CHALLENGES AND APPLICATIONS OF MICROBIAL FUEL CELLS IN WASTEWATER TREATMENT

Recent developments of microbial fuel cells (MFC) have broadened application and provide an opportunity to improve wastewater treatment. They do not provide a silver bullet, but MFCs do supply a sustainable way of treating wastewater that conventional treatment has not been able to treat effectively.

Basics of MFC system

A microbial fuel cell uses bacteria to transform chemical energy into electricity. The fuel source can be any form of biodegradable organic matter. Since the bacteria are simultaneously consuming organic material and cleaning the water, MFC is ideal for wastewater treatment. The naturally occurring bacteria perform extracellular electron transfer, releasing electrons as part of the respiration process, which is captured to generate electricity, constantly pulling energy away from the bacteria and accelerating the bacterial metabolism. By controlling the rate at which electrons are removed, the system controls the treatment rate, speeding up the treatment process relative to conventional systems.

Challenges and limitations of MFC

MFCs were originally researched as a source of clean energy, but as inherent limitations of power generation were recognized, the focus shifted from electricity production to wastewater treatment. For MFC to be a viable option for wastewater treatment, they need to be scaled up to accommodate large volumes of incoming wastewater, which has proven challenging for several reasons, including minimizing the distance between anode and cathode to reduce electrical losses and being cost-competitive with other treatment technologies. The materials used are expensive, including membranes to separate the electrodes, which are prone to fouling, and a catalyst to produce enough power.

New Approaches

Aquacycl developed the first-commercially viable MFC for wastewater treatment by addressing the design limitations above. The

system was optimized for wastewater treatment efficiency instead of energy recovery. Rather than scaling the system within a single unit, Aquacycl created a modular approach, where each reactor is the size of a standard car battery, and they are stacked together to increase treatment quality and volume capacity. The small size means they don't face the mass transfer losses inherent in larger system designs, and it doesn't use a membrane, which eliminates biofouling and makes the system more cost-effective and efficient.

Since one reactor cannot remove all the organics from the wastewater, the reactors are connected in hydraulic series. To increase the volume of wastewater treated, the system has multiple treatment trains operating in parallel, which provides an added benefit of easy serviceability. This allows the system to remain operational while one treatment train is being maintained.

The electricity production from the MFC enables real-time remote monitoring, troubleshooting and control and the earliest detection of any problems in the system.

Applications and future of MFC

Microbial fuel cells will likely never replace a centralized treatment facility. The best applications today are

industrial pretreatment of challenging to treat, low-volume wastewater such as high-concentration streams from food processing, or toxic compounds from hydrocarbon processing. Today, these streams are costly and managed unsustainably, by trucking, incineration or land application.

As costs of the technology come down further, future applications include manure management and distributed sanitation for rural communities or disaster areas. By overcoming some of the key challenges to scaling, MFCs can be a viable alternative for some waste streams. As mentioned earlier, they are not a silver bullet, and likely will only address a small portion of the total wastewater treatment market, but the small, modular nature and energy-neutral operation offer more flexibility and potential for treatment without a sewer or electricity grid.

The small, modular nature and energy-neutral operation offer flexibility and potential for treatment without a sewer or electricity grid



PURE WATER OCEANSIDE

ADVANCED WATER PURIFICATION FACILITY, CALIFORNIA



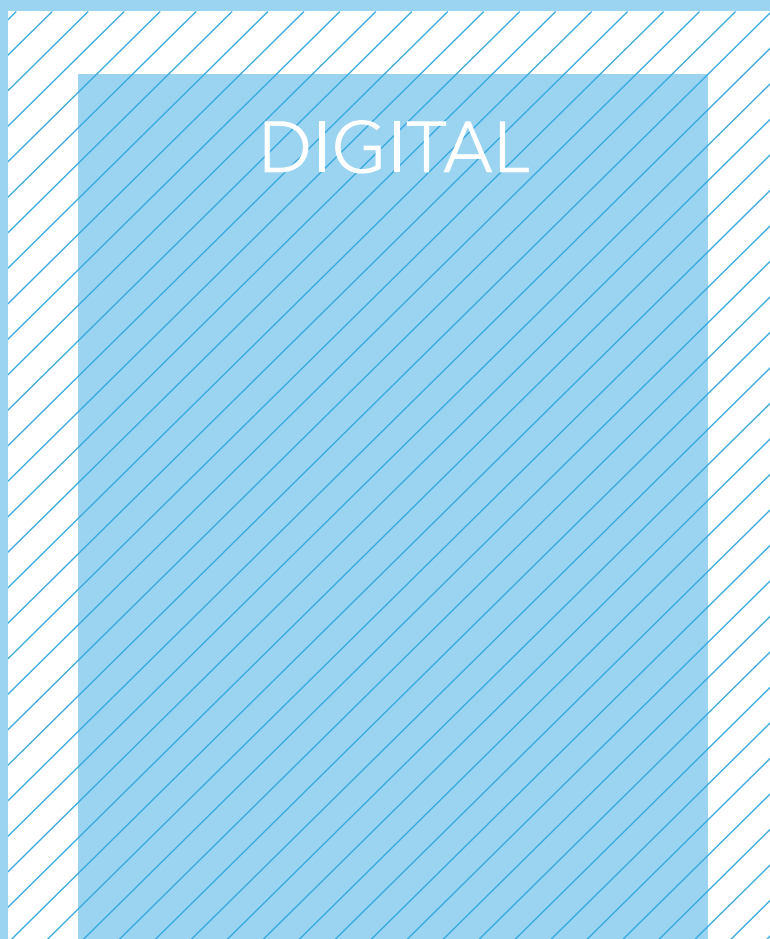
Pure Water Oceanside, an advanced water purification facility in northern San Diego County, California, has been officially dedicated. It will be the first operating potable water reuse project in the county, providing 32% of the water supply of the City of Oceanside – population 170,000 – or 3-5 million gallons per day.

The city imports about 85% of its water from the Sacramento Bay Delta and the Colorado River, with huge energy costs, a source that is vulnerable to drought and earthquake risks. The remaining 15% is sourced from a local aquifer called Mission Basin, currently in decline due to years of use.

The source of the recycled water to create the purified water is the city's own San Luis Rey Water Reclamation Facility. The advanced purification process uses three

steps: filtration, reverse osmosis, and ultraviolet light advanced oxidation. Water will then be injected into the local aquifer, remaining underground for several months. Finally, it will be extracted and treated again at the Mission Basin Groundwater Purification Facility and distributed to Oceanside customers.

Purifying wastewater is not only environmentally sound and drought-proof, it is also cost-effective, with about one-third of the cost of ocean desalination because there are fewer salts to remove. The launch of Pure Water Oceanside coincides with a movement in the region to diversify water supplies, with two other projects planned: the East County Advanced Water Purification Program and Pure Water San Diego.







MATT STUYVENBERG

VICE PRESIDENT OF WATER QUALITY, BADGER METER

Moving Beyond AMI to Smart Water Solutions

 CRISTINA NOVO

Badger Meter has been an innovator in flow measurement for more than 115 years serving water utilities, municipalities and commercial industrial customers with an emphasis on residential metering, measurement, AMI and NaaS (Network as a Service) solutions. Recently Badger Meter has made several acquisitions in the water quality space, expanding the range of solutions offered to move beyond AMI to Smart Water Solutions.

Matt Stuyvenberg is leading the water quality business at Badger Meter as the company expands beyond smart metering and further into smart water solutions. As Vice President of Water Quality at Badger Meter, solving water problems through distributed smart sensors and the synthesis of often segregated data continues to be an area of interest for Matt. In this interview, we hear from him about the strategic fit for s::can and ATi solutions within the Badger Meter portfolio, and the nexus between smart water, IoT and distributed sensors.

Badger Meter has been a leading water solutions company focusing on flow measurement for more than a century; how did it decide to get involved in water quality monitoring? Why now?

While measuring the quantity of water consumed continues to be a significant need for both the utilities that rely on accurate and reliable data to keep their operations running and for consumer insights and conservation efforts, the quality of that water being delivered is increasingly in the headlines. Whether it is the quality of our waterways that we draw from to feed our treatment plants

and where we look to enjoy recreational activities, the treated water being delivered to our faucets, or the quality of water being returned to the collection systems and environment, there's no shortage of water quality issues throughout the water cycle.

Badger Meter has led the way in converting meter reading from something that was done manually at the meter on a quarterly basis, to smart metering and AMI/NaaS/SaaS solutions that collect and transmit 15-minute interval data all without the need for any additional utility installed infrastructure. With that amount of data being collected, the visibility of operations for a utility and homeowner is greatly expanded. Thinking about water quality, we look to make a similar transition in the way water quality data is col-

lected from a manual and infrequent basis to real time, inline, online measurement. This will in turn inform operations, driving confidence in the quality of water delivered and ultimately making water more visible to all stakeholders. While water quality may appear to be a new direction for Badger Meter, it's been part of internal discussions for over 10 years, evaluating how a disaggregated network of water quality sensors could greatly augment the data collected through AMI. While 10 years ago that effort was technologically out of reach, innovation has progressed making it a reality.

How do s::can and ATi contribute to Badger Meter's vision?

ATi and s::can have been a fantastic cultural and technical complement to the Badger Meter vision. While all three companies have different origin stories, all have at their core a desire to preserve and protect the world's most precious resource by making water more visible. For more than a combined 50 years, ATi and s::can have been innovating in the analytical arena, creating products and insights that help water professionals better manage their work.

"Both ATi and s::can have moved water quality monitoring into the field with low-powered, inline, online, reagent-free solutions"



"Only when we have water quality data at our fingertips can we start to educate and reassure the public about tap water safety"

s::can is the leader in inline, online and intelligent spectrometry-based water quality measurement systems. While s::can has independently built out a full suite of monitoring solutions beyond the flagship spectro::lyser product, innovative optical measurement methods and event detection continue to be the focus. Complementing this are the class-leading electrochemical sensor solutions for water quality and gas monitoring applications by ATi. Low-powered, digital and distributed sensor innovations have led to mass deployments of sensors in difficult and distributed locations.

Both ATi and s::can have moved water quality monitoring out of the lab and into the field. In order to do that, sensors and monitoring stations need to be low-powered, inline, online, reagent-free systems whenever possible. That's what makes them such a great fit within Badger Meter. Innovative solutions like MetriNet, by ATi, and pipe::scan, by s::can, enable water quality to be deployed in distribution networks and help fulfill the vision of distributed water quality monitoring living alongside metering and AMI systems.

How can AMI systems function as a backbone for sensor data collection in water systems?

The residential meter has typically been deployed as the "cash register" for the utility. While that is still its core purpose, it's collecting far more information than just a monthly read. Recent advances in ultrasonic metering technologies now



MetriNet, by ATi, is an ultra-low-powered, smart water quality monitoring solution for distribution networks.



Pipe::scan, by s::can, is a sensor system for monitoring drinking water quality at any point in the network.

include sensors and data that previously weren't considered. For example, 15-minute interval data on flow rate, total volume, temperature and even pressure can now be presented by the utility meter through the AMI/NaaS system utilizing an infrastructure-free cellular communications network.

That amount of operational data should not live in a silo within a billing department, but instead leveraged for much greater operational insights. Combine the data collected through the meters with additional sensors throughout the network (e.g. pressure and water quality) and the insights expand to provide greater pressure management, leak detection and alerts, network condition assessment and enhanced operational insights.

To what extent can additional sensors, including for water quality monitoring, improve confidence in water systems?

Water professionals are doing great work every day to ensure they are delivering clean, safe drinking water, yet too frequently people are turning to bottled water due to either a preference for the taste or a lack of confidence in tap water. While utilities are required to do water sampling and publish water confidence reports, these often do little to change consumer perception. Implementing a distributed network of real time water quality monitors effectively shows the utility's commitment to water quality. Furthermore, that data can be surfaced to consumers through outreach apps, like EyeOnWater®, by Badger Meter, or through the utility's own portal.

Forward-thinking water utilities are building futureproof water quality strategies utilizing smart technologies, enabling a shift from reactive practices, to proactive solutions based on real-time data. With continuous measurement, we can demonstrate tap water quality and increase confidence. Only when we have water quality data at our fingertips



BEACON AMA, EyeOnWater, 3" E-Series Ultrasonic Meter with pressure, temperature & Orion Cellular endpoint.

15-minute interval data of flow rate, total volume, temperature and even pressure can now be presented through the AMI/NaaS system

can we start to educate and reassure the public about tap water safety, supported by real-time evidence, along with the health, financial and environmental benefits over its bottled counterpart.

Water quality monitoring used to be based on lab or infrequent data. Do

current smart water solutions make it possible to shift to real time data?

Absolutely. While monitoring stations won't completely replace the lab, a network of low-powered, inline, online, reagent-free solutions from Badger Meter can be deployed in the field at critical locations, shifting to more informed re-



Why wait for days to collect, transport, analyse and receive your results when you could see that data in real time?



al-time decision making, providing evidence-based proof of the water safety. Why wait for days to collect, transport, analyse and receive your results when you can see the data in real-time without missing events that spot checks may have missed?

Can you explain the role of cellular/LPWAN technologies in massive data collection?

Data backhaul has always been a key enabler of remote technologies. Without low power and secure mechanisms to get the data back from the field, massive data collection is impaired. With advances in cellular protocols like LTE-M and NB-IoT, power consumption is low enough to enable frequent communications while still being battery powered.

Badger Meter has been a leader in cellular offerings for meter reading communications since launching the first

ORION® Cellular endpoints in 2013. Now on our 6th generation of product and with millions of devices installed, we are confident that cellular is the best solution for data backhaul for water applications. Combining a secure connection that is available everywhere without the need for utilities to maintain their own networks or vertical infrastructure, cellular data backhaul enables them to deploy sensor networks starting with just a handful of sensors and can scale reliably without concerns of oversaturating collectors like with other LPWAN technologies.

Utilities can find themselves drowned in a wealth of data; how can it be turned into insights?

This really is the key as we look to move beyond AMI into a world of intelligent measurement, reliable communications, secure and integrated data and actionable analytics. Data for the sake of data collection can feel like a noble cause but turning that data into insights is where the real value is realized.

The usefulness of the data is a function of the following aspects:

The right data - accurate, at the right place(s); the correct parameter, resolution and appropriate sample intervals to accomplish the goals of the utility.

The right communications - the latency of the data and separate paths for



EyeOnWater consumer application providing near real-time insights into household water consumption, alerts & enabling online bill pay.

normal data versus alarms will help the utilization of importance events.

The right integration - coupling measurement with other data within the utility such as asset management, GIS systems as well as metadata and other measurement parameters.

The right presentation - synthesizing data and presenting understandable dashboards, heat maps, data arrays, customizable reports and notifications can trim away the laborious data mining and wishful findings of observations. Transforming mass data into easy

"Badger Meter is working closer than ever before to deliver the real value of smart water, to offer a true Return on Intelligence"



to understand presentations is useful for revenue capture, cost reductions, risk mitigations, asset optimization, customer satisfaction and enhanced sustainability.

Digital innovation will be the key to success and survival, enabling organizations to build a connected workforce, modernize operational processes and deliver enhanced customer service. Badger Meter is working closer than ever before with customers and strategic partners to deliver the real value of smart water, to offer a true Return on Intelligence.



Matt Stuyvenberg (right) visits with a major metropolitan customer about their usage of s::can micro::stations which provides 15 water quality parameters, contamination alarms based on UV-VIS spectrum plus percentage of water sources, all in real time.



SWIMMING WITH THE TIDE

SMART IOT SOLUTIONS FOR P

How SEKO is revolutionizing swimming pool chemical dosing with dedicated smartphone apps that connect people to their equipment like never before.

SEKO

In the age of the Internet of Things (IoT) and 5G networks, remote communication with devices as diverse as home appliances, security equipment and wearable technology is commonplace.

Whether it's via smartphone, tablet or even watch, the expectation is now to be able to programme, monitor and manage devices on the go, allowing them to fit seamlessly into our lifestyle.

And with the advent of the Internet of Things (IoT), remote connectivity is becoming increasingly valuable to operators in the commercial and industrial sectors, revolutionizing processes in manufacturing, warehousing, transport and countless other applications by allowing operators to:

- ★ Monitor their overall business processes
- ★ Analyze and improve customer experience
- ★ Save time and money
- ★ Enhance employee productivity
- ★ Integrate and adapt business models
- ★ Make well-informed business decisions
- ★ Generate more revenue

Within the leisure industry, remote connectivity solutions for engineers and end users are increasingly coming to the fore

Within the leisure industry, where stringent health and safety legislation, intense competition and tight margins make the latest innovations even more valuable, remote connectivity solutions for engineers and end users are increasingly coming to the fore.

The commercial and domestic swimming pool sector is no exception and has seen a number of innovations enter the market in recent years designed to improve chemical performance, reduce direct user interaction and save time.

Among the pioneers of IoT for swimming pools is water-treatment expert SEKO, which has introduced dedicated online platforms to enable remote communication with its range of chemical dosing pump systems.

Founded in Rieti, Italy in 1976, SEKO has spent decades refining its peristaltic, solenoid and motor-driven pumps solutions for water-treatment applications as varied as wastewater, drinking water and swimming pool water treatment.

Following this period of continued growth, in 2022 SEKO is a truly global company with regional offices in 24 countries and more than 1,500 employees worldwide.

With its vast experience in the field of water treatment, SEKO has developed a leading range of swimming pool chemical dosing systems for indoor and outdoor installations, suited to both international demands and unique local requirements.



POOL USERS AND ENGINEERS



The SekoLink app allows swimming pool users to start or pause their chemical dosing system at any time



SEKO has developed a leading range of swimming pool chemical dosing systems for indoor and outdoor installations



SEKO's swimming pool range also includes Side Channel Blowers for discharging air into Jacuzzis and spa pools



These established pump solutions include chemical dosing systems for single or multiple pools and spas which automatically inject chlorine flocculant and other solutions into the water in order to control pH levels and maintain safe, healthy conditions for bathers.

Featuring intuitive built-in controllers, SEKO's range of systems include dedicated solutions for installations of every size, from small domestic pools to water parks. In addition, SEKO manufactures systems specifically designed to dose essence in therapeutic applications such as spa pools and saunas.

SEKO has also developed panel-mounted systems such as Kontrol Guard Fort, an all-in-one solution that features a multi-parameter controller that activates solenoid-driven pumps using a proportional dosing method.

SekoLink enables users to start or pause their pool's chemical dosing system and view live pool temperature and health updates

Other combined devices include the Pool Photometer, which includes a built-in sampler dedicated to chlorine measurement and is specifically designed for professional pools such as competition-grade installations.

As part of its comprehensive range of solutions, SEKO also manufactures a line of quiet-running Side Channel Blowers that are widely used in swimming pools and spas to discharge air into hydrotherapy applications such as Jacuzzis and whirlpools.

Now, with more than four decades' experience in the field and a design philosophy of continuous improvement, SEKO has introduced IoT capability to its range to redefine the limits of what was previously possible in swimming pool chemical dosing.

SEKO has achieved this by including integrated Wi-Fi hubs in many of its systems, which allow users to connect to their equipment via dedicated smartphone apps and a unique online portal.

Known as SekoLink and SekoWeb, these apps are designed specifically for end users and technicians respectively and enhance SEKO's range of disinfection systems by enabling immediate access to user-appropriate data and settings.

SekoLink

For those benefitting from the luxury of a residential swimming pool, having to manage chemical dosing and water quality can be stressful and detract from enjoyment of their facility.

SEKO's automatic dosing systems already allow users to avoid manual chlorine dosing, typically carried out by pouring from a bucket, which leaves them exposed to harsh concentrated chemical.

In addition, manual dosing is extremely inaccurate and inevitably causes chlorine levels to be under dosed – putting swimmers at risk of water-borne disease – or excessive, which puts them at risk of skin irritation or worse.

This has led to the development of the exclusive SekoLink app, which is

SEKO's Pool Photometer is specifically designed for professional pools such as competition-grade installations



available on both Android and iPhone devices and is fully compatible with SEKO swimming pool dosing systems such as PoolDose.

SekoLink enables users to start or pause their pool's chemical dosing system at any time as well as view live pool temperature and health updates, allowing issues to be identified and actioned quickly.

SekoLink also sends a notification when chemical level is running low, giving the user time to order more product and ensure water quality is maintained.

By limiting but not removing the owner's influence on their pool, SekoLink prevents vital parameters and programmes being tampered with by unqualified users while still allowing a

degree of control – the perfect balance for those who want to spend more time swimming and less time maintaining their pool.

SekoWeb

Complementing the SekoLink app is SekoWeb, SEKO's unique online portal for professional pool and spa management designed exclusively for technicians, who access the platform simply by scanning a product's QR code or via their online login.

For technicians used to entering uncomfortable chambers and hot plant rooms on site in order to adjust pool parameters, SekoWeb allows them to maintain safe, healthy water conditions 24/7 from any location.

This enables engineers responsible for multiple sites to monitor and manage dosing systems without the associated travel costs and environmental impact of journeys, some of which may not be necessary should equipment be functioning normally and servicing not required.

This is especially useful for businesses such as hotel chains and leisure centre groups with sites spread nationally or even internationally, where a single technician can have immediate access to data for any installation.

By keeping on top of chemical consumption across their entire operation, managers are able to manage stock control with greater precision and budget accordingly. In addition, by analysing chemical use, engineers can identify potential system faults and schedule maintenance accordingly.

As well as revolutionizing operational efficiency, the password-protected SekoWeb prevents unqualified users from altering programmes and jeopardising water quality, which could lead to a risk of infection, temporary closure and loss of income.

This is particularly important at a time when the leisure industry tries to encourage visitors to return post-COVID, with the public still anxious about the spread of viruses in shared spaces and keen for reassurance over infection control.

In an increasingly-connected world, SEKO's smart swimming pool and spa solutions save time, reduce costs, improve safety and make life easier – for end users and engineers alike.

By keeping on top of chemical consumption, managers can manage stock control with greater precision and budget accordingly



UTILITY INDUSTRY PROFESSIONAL WITH RESPONSIBILITY FOR IBM AMERICAS TECHNICAL INNOVATION TEAM FOR ENERGY, ENVIRONMENT, & UTILITIES

REBEKAH EGGERS

“Inclusive human-technology partnerships will empower the virtual organization of the future”

 CRISTINA NOVO PÉREZ

Rebekah Eggers has extensive experience in energy, environment & utilities, with current responsibility for technical innovation, though her background includes solution development, product and management consulting.

Passionate about technical innovation, she says her clients are her inspiration. Meet Rebekah Eggers, a sought out strategic advisor whose various roles include responsibility for IBM Americas Technical Innovation Team for Energy, Environment, & Utilities, as well as sitting on the Board of Directors at Woodard & Curran, being an executive advisor for Digital Water City and One Water Academy, and more. With a track record of leadership for solutions that leverage data and analytics and improve operational efficiencies, we hear from her on the latest digital innovation trends in the water industry.

Can you tell us briefly about your career path and what it means for you to work on water issues?

I have been in Energy, Environment & Utilities for my entire career, 20+ years now amazingly, with current responsibility at IBM for Technical Innovation, though my journey includes solution development, product and management consulting. I hold a handful of advisory positions and am a connector at

heart. I am inspired by my clients, many of whom are committed to leaving the world a better place, and believe that the combined power of science, innovation, technology, and culture can drive superior outcomes for future generations.

How can digital solutions contribute to addressing water challenges?

Technology has come a long way in recent years. It's estimated in the first months of the pandemic we made 5 years' worth of progress in terms of "digital solutions" and we'll progress 10 more years in the coming 2. However, it's important how you define digital. Simply shifting our processes in the water space from manual/paper/physical to digital is not the answer. How we incorporate design thinking to reimagine water and wastewater processes in light of available technologies will go a long way to improving efficiencies, ensuring reliability, and affecting safety, security, and equity.

What role do you see for AI in water services delivery?

AI and its partner, automation, present huge potential for the water services delivery. This is, AI defined as 'augmented' intelligence that takes on dull, dirty, or dangerous tasks and frees humans up for higher-level work. We have no choice, given current workforce dynamics, but to turn to automation. However, it is not technology alone that will solve our industry's greatest challenges, but rather the human-technology partnership that is required to achieve the desired outcomes.

Digitization introduces challenges for traditional workflows, as tasks once performed by people are reimagined and implemented by machines. Resistance and fear are likely to surface. But, if implemented thoughtfully, technology can improve both efficiency and the workforce experience. Inclusive human-technology partnerships will empower the virtual organization of the future. They support the corroborative potential of an organization's people and its ecosystems. By implementing new systems and tools with empathy and intentionality, leaders can invoke the collective best of machines and humans — optimizing outcomes, talent effectiveness, workforce diversity, and work-life balance. As mentioned, this partnership alleviates the pain of tasks that are dirty, dull, or dangerous and frees up skilled resources for higher-value work.

How can cybersecurity concerns be addressed in the water sector?

This is a very timely question as the geopolitical situation in Ukraine unfolds and the cyber discussion is elevated to a new level. Experts in this field are in-

"It's important how you define digital: shifting our processes in the water space from manual/paper/physical to digital is not the answer"



By implementing new systems and tools with empathy and intentionality, leaders can invoke the collective best of machines and humans



dicating that we are entering a new era of cyber warfare, holding organizations across all industries in heightened vigilance status. The water sector's classification as critical infrastructure combined with the realities of our highly fragmented value chain demands the close monitoring of the escalating Russia-Ukraine war, including the evolving attacks and malware observed in the cyber domain as table stakes. The water sector must adopt best practices to help prevent, detect and respond to cybersecurity threats aligned to zero-trust frameworks. As world leaders and subject matter experts are anticipating threats of the likes that we have not seen before commercially, it is prudent to prepare for resiliency. IBM Security provides resources and continuous updates on the latest threat intelligence.

Could you comment on the opportunities blockchain technology can offer in the context of the water industry and new business models?

The three most promising scenarios in the near term around blockchain are supply chain management, asset tokenization, and digital identity.

The supply chain scenario for advanced asset tracking in the domain of supply chain can answer some interesting questions – How might we keep track of the components that make up the devices pro-

vided by our vendor ecosystem? Who owns them? When have updates been made? Are there any cybersecurity vulnerabilities in the devices/assets that are already deployed in the field? If there are vulnerabilities, where do we send alerts and take action?

Asset tokenization has the potential to assign value in the end to end stream. An example would be tracking and reporting groundwater use, where sensors transmit water extraction information and blockchain records the data exchanges or transactions. Blockchain could also be used to create "smart contracts," whereby transactions are automatically executed when the conditions are matched. This would allow water consumers, financiers and regulators to monitor and track, but also exchange "shares" compensating those with surpluses and assigning value for excess capacity, as shown in the example of how the State of California tackled drought with IoT & Blockchain.

Digital identity could allow us to track water quality via an authenticated source. This would allow for mass reporting of trusted water quality data and potentially address concerns around tap water safety. It would also alert stakeholders to issues and improve accountability.

Can you share a success story involving the application of digital technologies in the water industry?

I'd like to highlight the Digital Water City, a European Commission Horizon 2020 project. This is an initiative that I have been working with in an advisor capacity over the past 3 years. The teams are in the final year of effort to deploy 15 digital solutions across 5 cities in Europe with communities of practice (CoPs) established around cybersecurity, interoperability, digital governance and real-time control. The project partners and external stakeholders participate in the CoPs from 3 angles: local (city scale), intra-project (mutual exchange between the project cities' stakeholders), and trans-project level (among other Horizon 2020 projects).

This level of collaboration is a best practice as cities across the globe face considerable challenges to achieve sustainable management of their urban water system. Digital technologies offer a variety of opportunities and solutions to tackle these challenges. Digital-water city works towards three main objectives for sustainable waste and sewage management: health protection, performance and return on investment, and public involvement. These focus on the digital solutions ranging from augmented reality to real-time monitoring and artificial intelligence and were developed in collaboration with diverse stakeholders.

What trends would you highlight in the digital transformation of the water sector?

Stakeholders face unique challenges as they endeavour to meet the increasing demand for affordable, reliable, sustainable, equitable, and secure water services in an increasingly unpredictable world. These challenges come in many forms including aging assets, an aging workforce, the war for talent, and availability due to climate issues. Adding to the complexity, there's an increased number of sensors, IoT devices, drones, and mobile robots creating large volumes of unexploited data, and the growth of assets – 10x more assets than 20 years ago – spread out over a highly frag-

mented value chain. Yet, the sector is still lagging in terms of using the data that is available today. To address these challenges, leading utilities are evolving their asset maintenance and replacement strategy – which differs by asset class – towards a risk-based management model that combines AI and machine learning. There is a clear opportunity in taking advantage of this wealth of data, finding the best balance between costs and risks, without sacrificing performance, and making data-driven decisions to reach affordable asset availability, reduce service interruptions, and improve mean time to recovery.

Additionally, the way we work and interact with others is rapidly evolving, accelerated in recent years with the pandemic and the resulting virtualization of stakeholder (including customer and employee) interactions. New scenarios for work and collaboration, including the ability to do it in a hybrid environment across time zones, implore organizations to re-imagine legacy processes and create modern ones across the ecosystem with partners. Enterprises plan to entrust automation with complex, cross-enterprise work at 7 times the current rate by 2023, according to a recent Institute for

Business Value study. An example of this in the water sector can be found in engineering design automation where the process can be accelerated from 30 days to 4 hours. With software-assisted capital planning, we can evaluate more options faster and free up engineers to evaluate outcomes. Where before we could produce and evaluate 3-4 designs, we can now consider those options but with 8-10 scenarios around each that take into consideration and test rapidly changing uncertainties in the environment, producing huge value creation. While technology is replacing tasks previously performed by humans, it's freeing talent up for higher-level work, creating new levels of efficiencies, and inspiring both experienced and youthful participants with more meaningful work.

A Virtual Enterprise is emerging that embraces the new digital tools and ways of working that have become the norm in recent years. It leverages the accelerated reimagination of human-technology interfaces, including digital channels to stakeholders inclusive of customers and workforces. Further, it highlights the imperative to establish new forms of leadership, inspiration, engagement, and connection in response to the recently elevated challenges of human empathy, creativity, and a sense of belonging that have come with increased hybrid ways of working. Successful Virtual Enterprises will be entities where leaders, employees, and stakeholders have a foundational trust in data and technology as key drivers of insight driven actions and the new rules for how we work. Digital workers and AI bots will make more decisions with greater impact. However, the ability to accomplish this in a way that is acceptable, actionable, and appropriate will be a challenge. Intelligent workflows can accelerate the virtualization of customer and employee interactions, shape enduring ways of working, and evolve into a meaningful competitive advantage that supports business value. New





business models will emerge as virtual enterprises leverage a more inclusive and expansive ecosystem. We have all become more open to interacting with a broader network of people in this hybrid world – those who build on and sustain these new relationships once we "return to normal" will be positioned to thrive.

What do you see in the future of the water industry 20 years from now?

From what I have seen in the past 20 years, any attempt to predict the future has only one certainty – it's bound to be wrong! We should have flying cars by now, right? Absent of a crystal ball or clairvoyant abilities, we can turn to trend analysis to provide 'tea leave like' readings that may point to likely water sector predictions. Let's assume then that we can expect that despite best efforts, the climate crisis will to some degree continue to be a concern or area requiring great focus. If the disappointment expressed by the participating youth at COP 26 is any indication, younger generations will demand it and many of us feel an obligation to comply. In the worst case, continued or worsening drought, wildfires, and extreme water stress will continue to put pressure on aging infrastructure, despite improvements given newly available funding, but struggle to keep up. Absent end-to-end value chain oversight from an engineering perspective, solutions may be put in place that optimize for silos, but not the water sector ecosystem as a whole. Water distribution will continue to be a challenge with the potential that as a society we will be unable to support the nutrition and economic needs of an exponentially growing population. The water security discussion will expand beyond the 60 million Americans who don't drink tap water today due to accessibility and/or fear, whether or not substantiated. In addition, if the past few years are any indication, we may see more/continued pandemics, political unrest, war, crime, and careless pollution that exacerbate this doom, gloom, and uncertainty.

The water sector must adopt best practices to help prevent, detect and respond to cybersecurity threats aligned to zero trust frameworks

That said, I'm rooting for some promising trends that have the potential to deliver on the promise of a brighter future for generations to come! We're experiencing an unprecedented acceleration of technology adoption from AI, to Automation, and the emergence of the Virtual Enterprise that embraces the new digital tools and ways of working that have become the norm during the pandemic. The acceleration of efficiencies gained in technology supported supply chain advances, will not only improve the speed and experience of personal transportation and travel, but also that of critical supplies and goods. We will see a rise of empathy jobs in importance, pay, and interest elevating the roles of teachers and health care workers, as well as, sustainability purpose driven roles. There have been some impressive commitments to carbon neutrality, some even within the next 10 or so years, and fuel shift through the electrification of the industry is already underway with engaged participants capable of making significant impacts. In fact, 70% of global emissions can be addressed at the utility level and this work is in process. We're noticing a blurring of industry where for example concerning the electrification of transportation, we have automotive partnering with the public sector and electric utilities powered by

a rise in focus on diversity and equality. This collaboration across diverse industries and talent will give ways to solutions we've never imagined and change the way that work is done. The open-source community will nurture a culture change driven by open access and the free exchange of information which will be embraced as we unearth all we can discover together.

For the water sector, this means that solutions like desalination, direct air capture, hydro panels for vertical farms, and low cost highly distributed models are within reach. During COP 26, British Prime Minister Boris Johnson pondered, "We have the technology, we can find the finances, but do we have the will?" Change is uncomfortable, transformation is challenging, but I'd like to believe we have the will. And as management consultant Peter Drucker observed, "You cannot predict the future, but you can create it." So, let's create!

"The three most promising scenarios in the near term around blockchain are supply chain management, asset tokenization, and digital identity"



BADGER METER, ATi, s::can & COFTEC ANNOUNCE NEW PARTNERSHIP

Coftec will be the appointed distribution agent for the range of products within Badger Meter's group of companies for Ireland

Badger Meter and Coftec announced the signature of a new partnership, bringing together leading technologies and solutions in smart water quality, flow measurement and control from ATi, s::can GmbH and Badger Meter.

From 17th February 2022, Coftec will be the appointed distribution agent for the range of products within Badger Meter's group of companies for the Republic of Ireland's municipal, industrial and wastewater markets. In addition to the s::can product range already available, the extended range of Badger Meter and ATi products will now form part of this agreement with Coftec, offering a range of pioneering, proactive and sustainable solutions to safeguard, manage and control water quality.

The deployment of smart water is the fastest growing component within the global water sector and the collaboration of industry-leading technology is bringing new possibilities for managing water utilities more efficiently and resiliently. As this emphasis continues to rise, water professionals are becoming more focused on finding the right, tailored solutions to improve water quality management, and this new partnership will enable the water industry to proactively safeguard water quality and create intelligent, optimised, smarter water through the latest, leading technologies.

Garry Tabor, Badger Meter Director of Smart Water Solutions, commented: "Badger Meter, ATi and s::can are passionate about pioneering the



development and deployment of industry-leading, accurate and reliable electrochemical and optical sensing instruments, providing online, inline and reagent-free solutions to enable distributed and real-time water quality monitoring."

"As leading technology providers, establishing the right partnership with shared values for providing customer focused and tailored end-to-end solutions to meet clients' needs and expectations is vital. Badger Meter, ATi, s::can and Coftec all share the same values and strategy for providing customer focused and tailored end-to-end solutions to meet clients' needs and expectations. By working together, sharing the same business ethics, continuously developing technical knowledge and product range, adapting to shifts in

market demands, and working closely with end-users to identify their needs, we believe this partnership will deliver unrivalled class-leading solutions and customer support."

Darragh Hobbs, Innovation Manager at Coftec stated: "We are confident that our partnership with the Badger Meter group of companies will provide our customers with outstanding quality and exceptional customer service, by consistently providing innovative water and wastewater solutions through an extensive product range."

"Badger Meter and Coftec will now co-operate to leverage each other's strengths to supply and support clean and wastewater quantity and quality smart water solutions for the Irish municipal and industrial water and wastewater markets going forward."

DATAKORUM, ALMAR WATER SOLUTIONS INVESTEE, TO DEVELOP PROJECT FOR SMART INFRASTRUCTURE MANAGEMENT

The contract will use a CaaS model to ensure connectivity between end users, distribution meters and AMI

Datakorum, an investee of Almar Water Solutions, which is a leading company in the development of water infrastructures and services for water production, treatment, and sale, has been awarded a contract for a smart-communication project for water and energy infrastructure in Abu Dhabi. The contract, with a term of more than five years, will strengthen the process started by the Abu Dhabi National Energy Company (Taqa) to provide connectivity to its advanced metering infrastructure (AMI).

Datakorum will be responsible for supplying the 5G gateways that provide data connectivity to ensure interaction between end users, distribution meters and the AMI. This will enable Taqa to achieve 100% connectivity between the smart meters in Abu Dhabi.

The scope of the contract initially covers more than 50,000 5G gateways, with NB-IoT and LTE-M connectivity, which will connect dozens of Plug&Play smart water and electricity meters, that support all of the communication protocols cur-



rently used by this type of meter from the main international brands, and five years of associated services. This real-time connectivity will provide customers with access to automatic and detailed readings of their current and past water and energy consumption, so that they can better understand and control consumption. This network will serve as the basis for future demand-side management programs, and the meters will pave the way for smart-grid objectives such as capacity control and outage management.

NETHERLANDS – SINGAPORE PARTNERSHIP FOR REAL-TIME DRINKING WATER MONITORING

Demcon Optiqua and PUB, Singapore's National Water Agency, are making use of sensor technology for safe drinking water in Singapore

Demcon Optiqua and PUB, Singapore's National Water Agency, signed a contract for the further rollout of EventLab in Singapore. EventLab is Optiqua's comprehensive solution for real-time drinking water monitoring. PUB and Demcon Optiqua have worked closely together to develop this solution based on Optiqua's optical sensor technology.

Optiqua has developed an optical technology for the real-time monitoring of drinking water. This makes it possible to quickly respond to changes in the

composition of the drinking water. Technology developer and producer Demcon has been supporting Optiqua for several years. Demcon's support enables Optiqua to further expand the technology and it is now ready for the international rollout of EventLab.

A patented optical lab-on-a-chip sensor with generic sensitivity to changes in water quality forms the core of the EventLab network. In addition to a network of sensors, the EventLab system consists of infrastructure for data transmission and



data analysis and visualization software. Data algorithms constantly analyse the information produced by the sensor network for abnormal water quality changes. In case of an event – contamination or another change in the drinking water's composition – the software issues an alert. This enables the drinking water company to immediately initiate action, for example, further analysing the drinking water. Drinking water companies in Europe, China and the Middle East have also expressed interest in Optiqua's solution.



ECOPETROL, ACCENTURE AND AWS TO HELP COMPANIES ADVANCE JOURNEY TO WATER NEUTRALITY

New water intelligence and management solution will accelerate operational efficiencies across the energy industry

Ecopetrol SA, Accenture and Amazon Web Services, announced a first-of-its-kind solution for water intelligence and management to help advance sustainability and operational efficiencies for energy companies.

The availability of water, one of the world's key sustainable development goals, is a critical business imperative for resource-dependent industries. This new solution, to be housed on an open platform, addresses the entire water lifecycle — from access to treatment, recycle/reuse and disposal — enabling organizations to seek water neutrality alongside net-zero carbon emissions for a sustainable future.

Working closely with Ecopetrol and AWS, Accenture developed the cloud-based water management solution, which will become an industry platform that creates a single source of data, connecting existing ad hoc information to water volume and quality analyses, as well as costs optimization across the value chain to support decision-making. It will apply advanced analytics to optimize water management and enhance integrated water efficiency management and build an ecosystem where participants can share data and promote water reuse within and between industries.

The water intelligence and management solution will leverage Accenture industry insights and leading cloud capabilities from AWS, such as high-performance computing, storage, machine learning and artificial intelligence. The solution will help Ecopetrol reduce its



water footprint by providing a greater understanding of how to decrease the amount of fresh water it captures from local sources to improve water treatment; and increase the reuse of produced water and wastewater in refining, exploration and production assets.

“Our vision is for the energy industry to lead on technological solutions to achieve water neutrality,” said Felipe Bayón, Chief Executive Officer at Ecopetrol. “Collaboration is needed to truly ignite change because companies cannot solve environmental challenges alone. We will use this platform to accelerate our T ESG strategy, including our goals of reducing 66% of freshwater captured and zero discharges to surface water by 2045, improving the environment for the communities where we operate.”

“Ecopetrol is visionary in its aspiration to achieve water neutrality—and in helping the energy industry advance toward this critical sustainability goal,” said Julie Sweet, Chair and Chief Executive Officer at Accenture. “We are honored to be working with Ecopetrol and AWS on this industrial-strength solution.”

The solution will extend beyond the energy sector to help companies across industries meet their water resource challenges.

“The conservation and sustainable management of water is a priority for communities and companies around the world, and through leveraging the breadth and depth of AWS, Ecopetrol and Accenture are tackling this challenge at scale,” said Adam Selipsky, Chief Executive Officer at AWS.

**GEOFF MCGRATH**

MANAGING DIRECTOR AT CKDELTA

HIGH-FREQUENCY DATA IS DRIVING THE WATER SECTOR'S PURSUIT OF NET ZERO

The water sector is at a crossroads. With the threat posed by climate change to freshwater availability and ever-increasing maintenance and operational costs for our aging infrastructure, the challenges facing the sector are seemingly reaching their peak. Regulatory drivers from the upcoming Asset Management Period (AMP8) – due to be enacted in 2025 – promise a new wave of innovation in delivering sustainability that will necessitate a best practice approach to establishing resilience in the sector.

Just as the challenges faced are tough, the opportunities to remediate them already exist. Innovations in the deployment of high-frequency behavioural data can help reduce cost, drive efficiency and deliver a positive ROI for water companies and their investors – all while enabling them to lead the charge in delivering net-zero carbon emissions across the value chain.

Establishing resilience through predictive analytics

Predictive analytics is a key technology in meeting the scale of this challenge and in successfully deploying the right data. As a form of modelling used to determine future outcomes, its forecasting capabilities become more accurate as more high-quality data is fed into it. Leveraging behavioral data against multiple combined data sets through predictive analytics can enable asset managers and planners to meet these challenges more accurately.

Already we have seen considerable industry success in the deployment of these data models with the use of 'digital twins' at the design and planning stage. Using behavioral data, they can enable operators to create a human-in-the-loop simulator to advance early understandings of 'what if' moments in the management and planning of new assets and then provide decision support tools during systems operation.

Being able to forecast new patterns of consumption against variables such as predicting future scarcity of supply and the

need to drive sector efficiency can keep resilience firmly embedded in our strategic thinking for the sector.

Driving collaboration through open data

Utilising predictive analytics-powered data sets on open data platforms can enable developers and operators to build more accurate forecast models that account for complex variables. Whole systems models, i.e. digital platforms that show interrelated systems data, can provide better visibility for competing KPIs (i.e. carbon reductions and systems optimisation). These platforms will be essential as these KPIs risk running into closer conflict in the push to net-zero.

Open data is already being used to great success. Visualisation maps that bring in data from multiple different sectors can enable planners to reduce the impact on existing underground infrastructure during construction. Encouraging open-data sharing frameworks across the industry can help the water sector eliminate planning inefficiencies, reduce outages and deliver considerable cost benefits. All whilst driving the necessary cross-industry collaboration to unlock innovative new methods for delivering net zero.

Encouraging open-data sharing frameworks can help the water sector eliminate planning inefficiencies and deliver considerable cost benefits

Now is the time to act to secure our collective environmental aims and objectives. With new regulatory drivers on the horizon – including the UK water sector's AMP8 cycle – ongoing discussions around keeping consumer costs low in the mission to reach net-zero are beginning to define the long-term strategic vision of the sector.

Now, we need the right tools and platforms to deliver it. We do not have long to get this right.

Predictive analytics with machine learning capabilities has a significant role to play in enabling the sector to decarbonise. The potential to integrate this data across the value chain means we can re-conceptualise how we think about, and deploy, systems with both embedded and adaptive intelligence to optimise system performance without compromising the net-zero goal.

SUNIT MOHINDROO

CHIEF PRODUCT OFFICER OF CITYLITICS



ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING BRING CRITICAL INSIGHT TO PROJECT BIDDING

North America is witnessing a once in a generation infrastructure investment boom. With that comes the opportunity to build smarter, more resilient, and more efficient solutions that will pave the way for future sustainability. This growth has created greater demand for project data and predictive intelligence at all levels, from sales and bidding processes, to design and construction.

Market activity has accelerated significantly as cities and utilities, with access to unprecedented capital, are making major infrastructure investments. As such, vendors and engineering firms serving the water industry find themselves submitting multiple proposals in an overly crowded field. Many times, those efforts come at great expense and effort, with little to show for it in the end.

Rather than relying on anecdotes and estimations to track market direction, prospective bidders need a granular depth of data to gauge market realities and pinpoint the highest value opportunities offering them the greatest odds of success. To have a fighting chance, they now have to “pre-position” themselves. To do so effectively, they must arm themselves with critical sales intelligence.

A bottom-up intelligence approach combining artificial intelligence (AI) and machine learning (ML) to sift through mountains of information is key. AI/ML allows providers to blanket the entire scope of market opportunities and pinpoint water infrastructure projects that are the best fit for their products or services.

With an AI-based sales effort based on contextual data, they can focus on the right opportunities that match their targeting criteria at an early enough stage to influence outcomes, build relationships and customize their strategy for the project in question. With the growing demand for automation, telemetry, and advanced technology capabilities, it is essential that smart water solution providers have the tools to place them at the forefront of the buying process, rather than end up lost in the RFP crowd.

AI/ML techniques offer the precision needed to prioritize opportunities and construct bids based on predetermined filters and conditions. An AI/ML-enabled document aggregation engine can ingest millions of public documents and data generated by tens of thousands of cities, utilities and public agencies, pulling from council meeting minutes, budgets, capital plans, permits, environmental reports, and more.

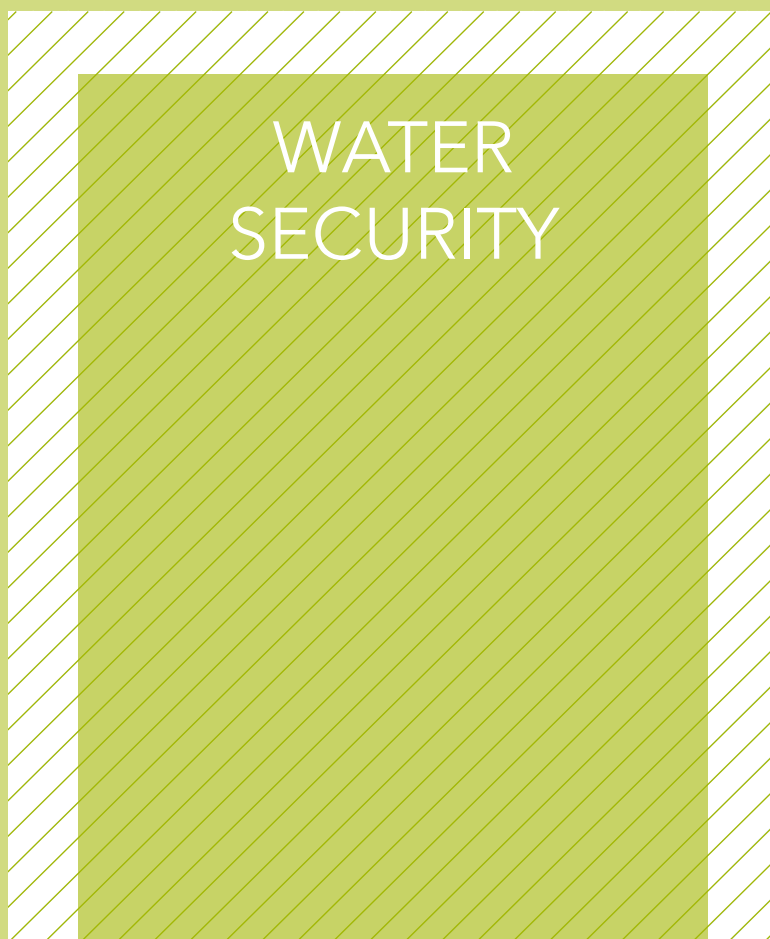
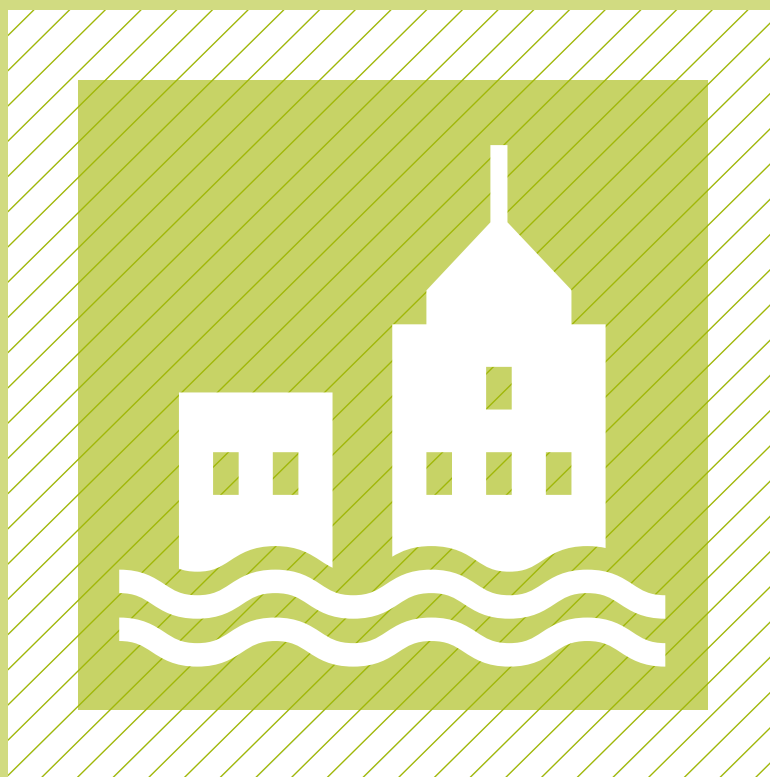
With an AI/ML approach, users are able to layer multiple open-ended criteria to look for relevant smart water and wastewater partnerships and projects. Inputs can include any number of variables, such as geography (national, regional, or local), climate, current leadership’s proclivity for smart technology, funding status, competitors’ involvement, design consultants-of-interest, facility treatment capacity, contract lifecycle, openness to alternative delivery, budget trends, EPA violations, smart water project keywords, and more.

Based on these system inputs, the AI/ML engine then surfaces early indicators of infrastructure needs, turning that vast store of raw data into meaningful, predictive market intelligence on infrastructure plans, priorities, projects, and more. These insights help identify the best opportunities to pursue, at the right stage, using the most effective approach and strategy.

AI/ML approaches offer the power to correlate multiple datasets in a way that was simply not available 10 years ago. And today, we are discovering new multi-dimensional insights that AI/ML-powered analysis has generated, well beyond what is capable by human means and traditional analysis models.

While there is a wealth of potential water infrastructure projects to pursue, companies have limited resources to chase down multiple projects that may or may not be a good fit. With artificial intelligence and machine learning, sales and engineering teams have the critical market intelligence to focus their efforts and energies on opportunities they are more likely to win.

AI/ML techniques offer the precision needed to prioritize opportunities and construct bids based on predetermined filters and conditions





RESEARCHER AND CHAIR OF URBAN WATER SECURITY AT INTERNATIONAL WATER RESOURCES ASSOCIATION

DR HASSAN ABOELNGA

“Water security has shaped the MENA region in the past and will shape the future as a vital resource”

Dr Hassan Aboelnga works in academia as a researcher at TH Köln but has also many other roles as a multidisciplinary professional working to advance knowledge and policy on water security and sustainable development, focusing on the MENA region.

 CRISTINA NOVO PÉREZ

Having studied civil engineering and integrated water resources management in universities in both water secure and scarce cities – from Mansoura and Cairo in Egypt, to Amman in Jordan, and Cologne and Kassel in Germany – Dr Hassan Aboelnga recognized that water is an integral part of national security, sustainable growth, and business continuity. Solving water security challenges requires a broad vision, and none better than this multidisciplinary water professional to tell us about the many dimen-

sions of water security in the MENA region, including water and conflict, access to energy, and digital transformation.

You are actively engaged in international fora, focusing on different dimensions of urban water security. Can you tell us briefly about your career path and what it means for you to work on water issues?

I am born and raised in the delta of Egypt in a city called Mansoura. I have first-hand experiences of development challenges related to water and climate change since I was raised in the delta and Arab region, which is widely identified as a climate hotspot where concentrated human and economic development meets the realities of climate change impacts and water-related issues.

I am committed to achieving a water-secure world, especially in the MENA region, the most water-scarce region

in the world. Over the years, I am focusing my career on all four aspects of water and sustainable development-based knowledge: generation, synthesis, application and dissemination. I have been advising many policy-makers and institutions and I am working in academia as a researcher on water security and sustainable development at TH Köln to advance knowledge. I am also vice-chair of the Middle East Water Forum to influence policies, share and co-create pragmatic and innovative solutions. I sit on the Management Committee of specialist groups at the International Water Association and I am Chair of the Urban Water Security working group and member of the Water Security Task Force at the International Water Resources Association, in addition to being an active member of many networks related to water, climate, and sustainable development.

To reach different audiences, I have written many publications, from books and research articles to blog articles, and I have been involved in different events at all levels to advance knowledge and actions toward water security and sustainable development for all.

“Clearly, if the Arab region is to achieve sustainable development, it is paramount to rethink water security with a new paradigm”





There has been progress towards SDG 6, but not nearly enough and some challenges remain which the MENA region must face



What aspects of water security are the most problematic in the Arab region?

Water security in the Arab world confronts the triple threats of climate change, rising food and energy costs, and the economic crisis. All three are under fragile contexts of conflict and political instability in many Arab countries, exacerbating poverty, inequality and underdevelopment. Clearly, if the Arab region is to achieve sustainable development, it is paramount to rethink water security with a new paradigm. Water security is not only about access, we need holistic and integrated solutions to achieve water security that goes across key policy tracks. These must also benefit from existing but untapped synergies and co-benefits, while minimizing adverse cross-impacts through better, more explicit management of trade-offs (drinking water and human beings, ecosystems,

socio-economics, disaster risk reduction, refugee policies, and climate change).

What is your assessment of the progress made so far to address those issues? Could you highlight some lessons learned?

According to UN-Water reports, we are off track to achieving almost all water-related sustainable development goals. There has been indeed progress towards sustainable development goal number 6 on ensuring water for all, but not nearly enough, and some challenges remain which the MENA region in particular – the most water-scarce region in the world – has to face in the near future. Water security has shaped the region in the past and will shape the future as a vital resource.

Over 60% of MENA's population lives under high or very high-water stress, much higher than the global average of some 35% for the rest of the world. Access is especially low for countries affected by conflict (Yemen, Gaza, Syria, Iraq, Libya). The poor suffer the most from lack of access as they need to rely on expensive water of questionable quality from private vendors. Drinking water is still supplied on an intermittent basis

in most Arab countries such as Jordan, Yemen, Lebanon and Palestine. An intermittent water supply creates inequities in clean water availability for people who live furthest from the water source and carries public health risks associated with the ingress of contaminants from the surrounding ground through flaws in the aged piping systems.

Climate-related water scarcity could cause a decrease in regional GDP (6-14%) by 2050. Climate change will also imply greater variability in terms of where and when rains occur. Population growth rates continue to be high (2% compared to the world average of 1.1%). Agricultural productivity has not increased in meaningful proportions. Food loss and waste have reached alarming quantities with huge implications on water, land, energy, and GHG emissions. The region is a global hotspot of groundwater over-exploitation. Demand management opportunities are well articulated but underutilized. Interlinkages across sectors (water, food, energy, environment) and the natural resources base (water, land, soils) are understood but not adequately reflected in policies and practice.

Water is a growing source of global conflict. Being Egyptian and an international water expert, how do you see the current conflict between Ethiopia and Egypt over the Grand Ethiopian Renaissance Dam (GERD) and water security in both countries?

Water security is a key driver for sustainable development and for uniting people and societies.

Actually, I am very concerned about the future of water in Egypt and the whole region. It is the first time in history that Egyptians feel threatened regarding their source of life, the Nile River. Therefore, it is imperative to find win-win solutions that can secure the future of all countries, without further conflicts or tensions. The negotiations of the Grand Ethiopian Renaissance Dam have

"An intermittent supply creates inequities in water availability for people who live furthest from the source and has public health risks"



fully entered the core of the crisis; it can be said that they have put the cart before the horse, with Ethiopia continuing to fill the dam unilaterally and without a legal agreement binding on all parties. What could have been strictly technical negotiations have turned into a political deadlock. The GERD has become a new reality challenging the traditional dynamics in the Nile River Basin.

Both countries are facing similar challenges of population growth, wasteful use, growing pollution, and climate extremes. Further complicating the picture is the reality that Ethiopia faces economic water scarcity despite high water availability, meaning the resource is available in a

sufficient quantity, but finance, management and access are limited, whereas the downstream countries – Egypt and Sudan – face physical water scarcity; that is, the demand exceeds availability.

It is crucial for all countries to consider the costs of inaction, failure and lack of peace for achieving long-standing cooperation over the GERD and water security for all. This lack of cooperation could lead to unforeseen consequences. It could fuel tensions to a point where the environment, economy and people's livelihoods suffer considerably in the three countries. As water knows no boundaries, the spread of tensions does not always take national borders into

consideration, in other words, conflicts do not follow geographical maps.

Egypt, Sudan and Ethiopia must break the political cycle of conflict within a framework of water security for all. This will allow countries at some point to confront the complex issues, including the

"The Grand Ethiopian Renaissance Dam has become a new reality challenging the traditional dynamics in the Nile River Basin"



definition of entitlements to shared freshwater resources and the dynamic operation of the dam in the long run. Thus, it is crucial for the three countries to go back to the negotiation with trusted international institutions and apply the Principles of Effective Joint Bodies (EJB) for long lasting cooperation which include the following: (1) the establishment, structure and

functions of joint bodies; (2) their operation; (3) financial and human resources; and (4) developmental plans.

Do you think the sustainability of the water supply in some countries could be affected by access to energy sources?

Providing safe drinking water is a highly energy-intensive activity. Energy can account for up to 30% of the total operating costs of water and wastewater utilities and, in some developing countries, this can be as high as 40% of the total operating cost. Meanwhile, 15% of the world's total water withdrawals, on average, are used for energy production.

The sustainability of water supply in many countries is not only affected by

water governance and scarcity but also by energy policies and the limited access to energy sources. In most countries, the water and energy systems have been developed, managed, and regulated independently, which causes a significant impact on both water-scarce and abundant countries. For instance, despite the high-water availability in a country like Ethiopia, the water supply systems do not have access to the required energy to pump and distribute water to people. On the other hand, water scarcity in Jordan is coupled with energy shortages where rising electricity tariffs are putting great pressure on the sustainability of water resources. While electricity tariffs have been rising steadily over recent years, water tariffs stayed the same. The dis-

"It is crucial to consider the costs of inaction, failure and lack of peace for achieving cooperation over the GERD and water security"



The sustainability of water supply in many countries is not only affected by water governance and scarcity but also by energy policies



Could you tell us about recent advancements in the digitalisation of the water sector and how it plays a great role to achieve water security?

Digital technologies have the potential to deliver significant impact on and improvements to the water sector. We now have the ability to sense and collect information about everything and the amount of information available is unprecedented (consider this, 90% of the information in the world has been created in the last two years alone). The water sector has already started to benefit from the digital transformation and examples of the operational efficiencies include reduced response times by 20%, increases in work reutilisation by 25%, 15% reductions in energy use across the network and other benefits related to better informed strategic decision making (e.g., asset management and long-term resource planning).

Integrating data and digital transformation in the water sector can help conserve water resources, connect the dots between water users and water-related policies, lead to behavioural change, drive innovation and build community resilience, especially in a fragile context like the COVID-19 Pandemic. However, this integration requires political will,

robust infrastructure, good governance, sustainable financing and long-term investments with commitment from all stakeholders.

Can you tell us about the projects you are currently working on?

I am currently working on all four aspects of water and sustainable development-based knowledge: generation, synthesis, application and dissemination. I am currently working on advancing knowledge in academia toward integrated water resources management and supporting Egypt with a new interdisciplinary master program on water. In practice, I am advancing the implementation of the digital transformation of the water sectors in the Arab region and reinforcing the science-policy interface in the region, in the context of the Sustainable Development Goals.

parity between the revenues from water tariffs and the operating costs (involving energy) threatens not only the financial sustainability of the water utility but also national water security.

A salient feature of the nexus is that saving water saves energy, which in turn reduces greenhouse gas emissions (involved in climate change). Energy efficiency programs offer opportunities for achieving significant water savings to mitigate water scarcity, and similarly, water efficiency programs (e.g., involving a reduction in the high levels of non-revenue water) offer opportunities for providing significant energy savings, especially in energy scarce countries. Furthermore, saving water and energy also contributes to climate change mitigation.

"The disparity between revenues from water tariffs and the operating costs (involving energy) threatens the sustainability of utilities"



WATER AND CLIMATE:

THE ROLE OF DIGITAL TECHNOLOGIES IN SOLVING WICKED CHALLENGES

The world is parched. Climate change is not helping. Nor are things like poor governance and over-allocation. This article looks at how digital technologies and innovation present a tremendous opportunity to help solve many of today's pressing water challenges. It delves into AB InBev - the world's leading brewer - as an example of a company adopting advanced technologies to help address the growing water challenges where they operate.

🍷 WILL SARNI, CEO OF WATER FOUNDRY AND THE FUTURE OF WATER FUND: COLORADO RIVER BASIN

🍷 ANDRE FOURIE, AB InBev

🍷 IVAN LALOVIĆ, CEO, GYBE

Water and climate challenges are wicked problems

Water and climate change are wicked problems. A “wicked problem” is one that has no definitive solution and can be considered a symptom of another problem. Both water and climate change have often been treated as separate wicked problems, but the challenges associated with water and climate change are often inextricably linked, with climate change serving as a threat multiplier.

As the impacts of climate change increase, so do the stressors on water security. A thoughtful evaluation of where these two wicked problems intersect can help guide businesses and society towards enduring, sustainable, and resilient solutions.

Who solves wicked water and climate challenges?

Responsibility for solving wicked challenges is shared and therefore all stakeholders have a role to play. Solving these

wicked problems not only requires stakeholders to understand how their choices impact water and climate, and enact change at the individual level, but also to incorporate that change into their broader associated stakeholder groups. Multinational companies are in a unique position to make a significant contribution in solving wicked water and climate challenges. Wicked problems, by their nature, are not only hard to solve, but a single-point solution can ripple through the system to create another problem. Solutions to wicked problems, which are system-level problems, need to be multifaceted, with multiple vectors. And a multi-vector solution requires coordinating multiple strategies from multiple stakeholders.

Collaboration between multinational companies and entrepreneurs is a powerful tool for addressing wicked climate and water problems, and one that is often overlooked. Combining the scale of the private sector with the speed and focus of

entrepreneurs has the potential to amplify impact – and amplified impact is exactly what is needed as the issues of climate change and water become more acute, negatively impacting economic development, business growth, social well-being and ecosystem health. One only has to look at the impacts of climate change on the Colorado River Basin in the American West to appreciate the urgency in implementing watershed scale solutions.

Corporate strategies to build and maintain watershed health are a growing trend. Several multinational companies are focusing on watershed water quantity, quality, access and resilient ecosystems and communities – here are a few examples:

★ PepsiCo has a stated goal to “achieve sustainable water security for our business, natural ecosystems and local communities that depend on an accessible and reliable supply of clean, safe water.”

★ The Coca-Cola Company states they are “enhancing community water resil-





ience with a focus on women and girls; and improving the health of priority watersheds.”

★ Cargill notes its aims to “restore 600 billion litres of water by 2030 and reduce 5 million kg of pollutants in priority watersheds.”

★ AB InBev’s commitment is that by 2025, 100% of its communities in high stress areas will have measurably improved water availability and quality.

The digital water technology opportunity

The water sector is moving rapidly from an analog world into the digital world. We now use satellite data and analytics to map surface water, measure real-time water quality, and predict flooding. Digital technologies enable the more efficient and effective management of utility infrastructure and industrial assets and have ushered in an age of smart water in urban and rural homes. Likewise, digital technologies such as IoT devices and ar-

tificial intelligence (AI) are increasingly available for the management of utility and industrial assets and support the transition to a digitally enabled human workforce. Digital technologies are already transforming the water sector and our relationship with water in ways that were unimaginable just a few years ago.

The digital transformation of water also presents private sector companies with significant potential value and opportunity. Predictive analytics can support companies in preparing for changes in the quality of the water they intake and support targeted changes in water treatment capabilities. AI- and IoT-powered technologies can provide companies with a much more nuanced, real-time, and predictive understanding of their operational water use, fostering significant improvements in water use efficiency and discharge management. Digital technologies can also empower companies to partner with suppliers to improve water

efficiency and reduce negative water impacts further up their value chain.

Finally, for companies committed to helping improve watershed health outside their factory walls, digital water technologies enable companies – and the partners they work with – to more accurately understand the actual, measurable impact they are having on watersheds through the projects they invest in, and to make smarter, more informed decisions about the types of solutions and interventions that will actually move the needle on water risk.

AB InBev - Digital technologies and watershed health

As the world’s leading brewer, AB InBev aims to be a catalytic force to help solve the growing water challenges where it operates. The growing scarcity and declining quality of freshwater resources is not just a material issue for the company, it is also a significant economic, social and environmental risk for the communities the company is a part of. That’s why as part of its 2025 Sustainability Goals, the company has committed that by 2025, 100% of its communities facing high water stress will have measurably improved water availability and quality.

AB InBev also seeks to help transform the world’s relationship with and management of water resources through cutting-edge digital technology and innovation. The cornerstone of the sustainability innovation effort at AB InBev is the 100+ Accelerator, which began as a platform for open innovation to help the company reach its 2025 Sustaina-

Multinational companies are in a unique position to make a significant contribution in solving wicked water and climate challenges



bility Goals. Since then, it has become one of the company's most transformational programmes, creating efficiencies, driving value creation, and inspiring colleagues to reimagine how they do business to build a company to last. The 100+ Accelerator aims to accelerate the broader adoption of the promising technologies that the start-ups pilot through the programme and the start-ups from the first two cohorts have gone on to raise more than \$200 million from an impressive network of investors.

One of those start-ups is Gybe, a company revolutionizing water quality monitoring through remote sensing and satellite data. As part of the 100+ Accelerator second cohort, AB InBev deployed the GybeMaps™ platform to track water quality changes in a multi-use public reservoir in Idaho. This reservoir is important since it provides water storage for irrigation of several agricultural crops including barley, which is used in beer production.

As AB InBev worked with the US Forest Service to implement bank stabilization projects in this watershed helping to reduce soil erosion and sediment runoff, it was important to determine the effectiveness of these efforts to reduce the sediment deposition and at the same time to also improve water clarity. Gybe installed three automated sensor stations, generating real-time continuous data at key inputs to the reservoir, and a unique time-series data that was never before available for this body of water. Gybe's geospatial analytics immediately put maps of current sediment concentra-



tions into context of historical sediment transport from satellite data over the last decade. Within months from installation, this deployment provided AB InBev with the ability to quantify and track the movement of sediments that accompanies the seasonal run-off in real-time across the key river and creek inflows.

Path forward: the call to action

Today and tomorrow's water challenges require bold action and investments. No longer will analog data solutions meet the needs of the public and private sectors in ensuring water security for economic development, business growth, ecosystem health and social well-being. Actions that the private sector, along with other key stakeholders, can take include the following.

- ★ Accelerate the adoption of digital technologies for real-time water quantity and quality management.
- ★ Create platforms that combine the scale and capabilities of the private sector with the agility and future-focus of entrepreneurs to multiply the impact of technology solutions.
- ★ Increase focus on local watershed water and climate challenges and the application of innovative digital technologies.
- ★ Increase workforce capacity to understand and utilize digital technologies.

Fortunately, there are excellent examples of how digital technologies can address critical water and climate challenges. We now need to learn from these examples and accelerate adoption and integration of them into business models.

AB InBev seeks to help transform the world's relationship with and management of water resources through cutting-edge digital technology



THE LEAD AND COPPER RULE REVISIONS ARE A CATALYST FOR STANDARDIZING DATA MANAGEMENT AND STREAMLINING SRF FUNDING

The Lead and Copper Rule Revisions (LCRR), coupled with the enactment of the Infrastructure Investment and Jobs Act (IIJA)/ Bipartisan Infrastructure Law (BIL), creates an unprecedented opportunity for State Agencies to accelerate investment in drinking water infrastructure.

The vast majority of the IIJA/ BIL funds targeting drinking water infrastructure are being funneled through each State's SRF, particularly through one-time-only special category funding for the replacement of lead service lines.

For Regulators and SRF Administrators, these investments provide a unique opportunity to drive impact in their communities, educate utilities on the availability, accessibility and deployment of funds, and streamline the application process to improve accessibility for the most disadvantaged community water systems (CWS).

Many utilities struggle to dedicate resources to even apply for funding available to solve problems. With many water systems being under-resourced and understaffed, kicking off multi-year projects to comply with LCRR will be a big lift.

Focus on the development and maintenance of inventories

Based on 120Water's experience supporting over 200 CWS' service line inventory development, achieving a verified inventory is a multi-year effort that requires deep analysis of a CWS' relevant and acceptable data sources, strategy for resource prioritization, and deployment of different verification tactics. With inventories due to State primacy agencies by October 16th, 2024, inventory development for every CWS in a state is critical to determine the appropriate deployment of funds for applicable service line replacement and/or remediation projects.

Clearly articulate acceptable service line material verification tactics

Since few CWS will be able to achieve the service line inventory requirement through the records-informed inventory outlined in LCRR, states must clearly articulate different service line

verification tactics that are accessible and relevant for CWS of all sizes and capacities. As noted in the revisions: "Any resource, information, or identification method provided or required by the State to assess service line materials..."

Using predictive modeling will help in prioritizing where to confirm pipe materials but will not be a substitute for an inventory acceptable for compliance. So capturing the additional data points and verification method will be important.

Target the most in-need community water systems

With the vast majority of community water systems (CWS) serving populations of <10,000 people, many systems will struggle to develop competitive applications to fund their projects. Some struggles include: data quality and currency, personnel capacities, time constraints, and adequate education on available funding, among others. Ensuring that funded work will impact the most in-need populations – children under the age of 5 years old, low-income and historically disadvantaged populations – is critical to maximizing the impact of investment dollars.

Many utilities struggle to dedicate resources to even apply for available funding for investment in drinking water infrastructure

Main takeaway

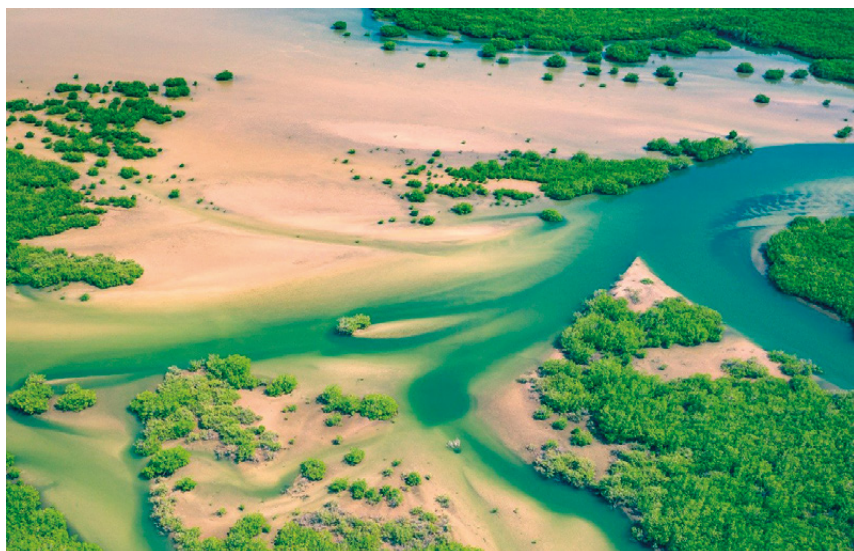
While individual assistance agreements have proven to be both efficient and effective for funding water infrastructure/capital improvement projects, other delivery mechanisms may be more appropriate to realize impact at scale on meeting various LCRR requirements, such as service line inventories.

States should consider the following to support all utilities: (1) primacy agencies and SRF agencies should openly collaborate on data needs to create inventories that become fundable replacement projects; (2) understand how many utilities in a state serve populations of <10,000 people, and what systems and processes can be streamlined and centralized to increase their access to SRF funding; (3) inventory and data standardization needs to start ASAP to have the data needed to distribute funding for replacement after initial inventories are due in October 2024.



WATER SECURITY CHALLENGES FOR DAKAR'S BOOMING POPULATION

Senegal is one of the fastest growing economies in Africa, and water security is key for its socio-economic development goals



Population in the Dakar metropolitan area, estimated as close to 5 million people, is growing and putting increased pressure on already scarce water resources in this area with a hot semi-arid climate.

Senegal is one of the fastest growing economies in the African continent, and water security is key for its development goals. As in many cities in the African continent, infrastructure development in Dakar struggles to keep up with a growing water demand.

Khadija Mahecor Diouf, the mayor of the Golf Sud, a suburb in Dakar that has seen its population increase from 70,000 to 125,000 people in 10 years, says 50% of the households have problems with water access. And things are expected to worsen as the population doubles in the next 10 years.

As part of the Water in Circular Economy and Resilience (WICER) initiative, which supports countries to adopt circular economy and resilience principles, the World Bank Global Water Practice prepared a case study in 2021 focusing on the experience in Dakar. The Greater Dakar area has been dealing with a water deficit since 2011. The WICER case study notes that the Société Nationale des Eaux du Sénégal (SONES) has launched ambitious investment programs to secure and diversify the water supply. Dakar's water is sourced from Lac de Guiers 300 km away, as well as from local groundwater, and more recently, desalination. Concerning sanitation, most of the metropolitan area uses onsite sanitation, primarily latrines, with only 32% of the population covered by the sewerage system.

To address water stress in a holistic manner, the Office National de l'Assainissement du Sénégal (ONAS), responsible for sanitation (onsite and sewerage), as well as stormwater management, has been exploring and implementing circular economy opportunities. Experiences with the recovery of sanitation by-products include wastewater reuse for horticulturalists around Dakar, energy production from methane produced during wastewater treatment, and recovery of treated faecal sludge (biosolids), at the Cambérène WWTP and faecal sludge treatment plant. Senegal is recognized for its success in involving the private sector in service provision and key aspects of the sanitation service chain.

The government is interested in capitalizing on ONAS' reuse experiences to further diversify the water source portfolio of Dakar and increase water supply resilience. To this effect, it requested support from the World Bank to do a study on water security. Challenges and Recommendations for Water Security in Senegal at National Level and in the Dakar-Mbour-Thiès Triangle, recently released, looks at water security challenges country-wide and in the area located between Dakar, Thiès and Mbour, a triangle where more than half of Senegal's population live, and where half of the country's GDP is produced.

It found that deteriorating water resources and an inadequate institutional framework are threatening water security in Senegal and will constrain future economic growth.

DEWA AND TRANSCO TO INCREASE UAE'S WATER SECURITY

The strategic water interconnection projects present an opportunity to maximize the provision of potable water at a national scale

Dubai Electricity and Water Authority (DEWA) and Abu Dhabi Transmission and Despatch Company (TRANSCO), a subsidiary of Abu Dhabi National Energy Company (TAQA Group), will make three interconnections that can transfer a total of 117 MIGD to different areas in Abu Dhabi and Dubai, supporting reliable water supply to customers across the nation. The move reinforces a shared national goal for strategic water interconnections in the UAE.

This partnership increases the reliability and efficiency of the water network to meet the UAE Water Security Strategy 2036 objective to ensure sustainable access to water during both normal and emergency conditions. The strategic water interconnection projects will help avoid crisis and any water shortage. They will also help efforts to raise the efficiency and operational capacity of water networks to promote the sustainable development in the UAE.

HE Saeed Mohammed Al Tayer, MD & CEO of DEWA said: "Water security is



a national security issue for the UAE and is one of the seven strategic sectors of the National Innovation Strategy launched by His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai. Dubai has a comprehensive approach to ensure the sustainability of water resources in line with the Dubai Integrated Water Resource Management Strategy 2030, which focuses on enhancing water resources, rationalising water consumption to reduce water consumption."

1.4 MILLION PEOPLE WITHOUT RUNNING WATER ACROSS WAR-AFFECTED EASTERN UKRAINE

An additional 4.6 million people across Ukraine are at risk of losing access to piped water as a result of conflict-related damage

More than seven weeks of intense hostilities in Ukraine have devastated both water and electricity networks, leaving 1.4 million people without access to safe water in the east of the country and a further 4.6 million people with only limited access. In total, over 6 million people in Ukraine are struggling every day to have drinking water.

Since the start of the war, at least 20 separate incidents of damage to water infrastructure have been recorded in eastern Ukraine alone. The most recent inten-

sification of fighting in the Donbas region and the widespread use of explosive weapons in populated areas threatens to push the water system — already impacted by the previous eight years of conflict — to the edge of a complete collapse.

Osnat Lubrani, the Humanitarian Coordinator for Ukraine, warning about the health risks caused by water stoppages, particularly for children and the elderly, said: "Poor water quality can lead to diseases, including cholera, diarrhoea, skin infections and other deadly infectious diseases."



The situation is particularly critical in Mariupol, where tens of thousands of people are likely to be using dirty sources, as they seek any water they can find. Major cities across Donetsk and Luhansk oblasts are also cut off from water supplies and an additional 340,000 people risk losing access to safe water if a reservoir in Horlivka runs dry. Sumy and Chernihiv cities experienced serious water stoppages in early March and Kharkiv's system was also seriously affected.



STATE OF WATER SECURITY IN CANADA: PREPARING FOR THE FUTURE AFTER SEASONS OF DISASTER

Researchers highlight there is an incredibly important need for a nationally coordinated approach to water sustainability



The climate crisis is becoming a water crisis, and last year was one of the most disastrous years in Canadian history for water-related extreme events. Widespread drought, flooding, wildfires, permafrost thaw, and glacier retreat resulted in damage to communities, lakes, forests, animals, and crops.

As spring 2022 begins, scientists are seeing snowpacks at record-highs in the Yukon and parts of the Rocky Mountains and Manitoba that could lead to more flooding in the West. However, low to non-existent snowpacks have developed across parts of southern Alberta indicating that another drought leading to difficulty growing crops and feeding and watering livestock, could also be on the horizon.

"The cannon is loaded yet again," said Dr John Pomeroy (Ph.D.), Canada Research Chair in Water Resources

and Climate Change at the University of Saskatchewan (USask). He heads up the pan-Canadian Global Water Futures (GWF) program which employs more than 1,100 researchers across the country. Several GWF representatives along with many others from the Water Security for Canadians initiative traveled to Ottawa on March 22, World Water Day, to speak with members of parliament and other water policymakers from across the country to see how to find solutions to the emerging water crisis facing Canada.

"Water is life to Indigenous Peoples across Canada—if the water is not healthy, then people are not healthy. It's entirely related," said Dr Dawn Martin-Hill (Ph.D.), associate professor of Indigenous Studies at McMaster University and a GWF researcher. Mar-

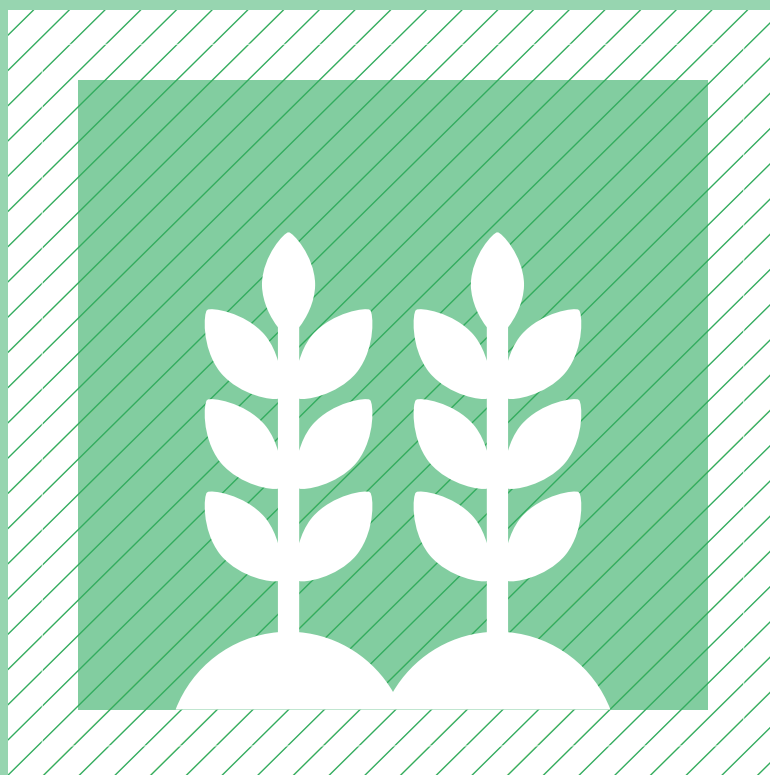
tin-Hill, from the Mohawk Wolf Clan of Six Nations of the Grand River, said the need to engage with First Nations People is paramount to the health of water and the future of Canada.

The role of Indigenous People is vitally important, and so too is the role of women. "Women and girls around the world are often the water keepers or the water fetchers, and the next generation of scientists, policy makers, and politicians need to include more women and greater diversity if we are going to equitably solve the water problems in Canada and around the world," said Dr Corinne Schuster-Wallace (Ph.D.), USask associate professor.

This year the theme for World Water Day is Groundwater: Making the Invisible Visible, "and this certainly speaks to roles of women and other equity-deserving groups who have been invisible in these conversations for too long," she said.

With key stakeholders in Ottawa on World Water Day, and with the continuing strong national dialog on Water Security for Canadians, policy and legal experts are ready to work with government to establish the likes of the Canada Water Agency.

"Water knows no boundaries—it doesn't care if a provincial or national border interrupts the flow, water ties us together," said Merrell-Ann Phare, lawyer, legal counsel, and advisor to Indigenous and non-Indigenous governments on water rights. "These national conversations are so important to a better future on water for all people."





VINCENT CAILLAUD

CEO OF VEOLIA WATER TECHNOLOGIES

“At Veolia Water Technologies we are a major contributor to all SDGs where water is concerned”

Veolia Water Technologies is a subsidiary of the France-based Veolia group. As an end-to-end water solutions company and with a worldwide network of businesses, the firm is a global leader in water and wastewater treatment.

 OLIVIA TEMPEST

French water and wastewater companies Veolia and Suez completed their merger process earlier this year and are on the way of becoming the world champion of ecological transformation. This ambitious metamorphosis would not be possible without the company's firm commitment to achieving the Sustainable Development Goals (SDGs), and, in particular, wherever water is concerned

"We introduced usefulness to our strategic vision and we made it our purpose to contribute to human progress by committing to the SDGs"

in the case of Veolia Water Technologies. Vincent Caillaud, CEO of Veolia Water Technologies, spoke to us about innovation, water sustainability and the future of the water sector in the face of climate change.

Can you tell us briefly about your career path and your current role in Veolia?

I have spent my whole career working for Veolia, having been hired as a project manager for SIDEM, the desalination subsidiary of Veolia Water Technologies, after graduating in 2002. Over the following decade, I progressed within the company and took over operations of SIDEM in 2008. I first joined the Veolia Water Technologies leadership team in 2016 as CEO of the Oil & Gas business

and moved on to COO of the company in 2019. I have been CEO since 2020.

I'm proud to lead Veolia Water Technologies, a team of more than 7,000 people spanning 48 countries. I'm also extremely proud of working for a company that has committed to lead the ecological transformation. As a company, we want to make a difference, to contribute to tackling the effects of

"Many of our customers have ambitious environmental targets and are looking for a partner with the know-how to assist them in reaching their goals"





The podcast series includes nine episodes, each featuring inspiring real-life stories that show the Sustainable Development Goals in action



climate change and coping with scarcity of resources, minimizing pollution and reducing threats to biodiversity. Personally, I want to be part of the solution, I want to take action.

I strongly believe in driving positive environmental change through strategic and innovative technologies and services. I feel that Veolia Water Technologies is well positioned to do just that.

How is Veolia Water Technologies using the SDGs to improve its performance towards sustainability?

In 2020, we introduced usefulness at the heart of our strategic vision and we made it our purpose to contribute to human progress by firmly committing to the SDGs. This translates to a commitment to achieve a multifaceted performance that equally considers financial, commercial, social, societal and environmental performance. This goes well beyond a

typical CSR objective; it is at the heart of what we do.

At Veolia Water Technologies we are a major contributor to all SDGs where water is concerned. Many of our customers already have ambitious environmental targets and are looking for a partner with the technical know-how to assist them in reaching their goals. Others are getting started on this journey and need to be guided along the way. With all, we share our high level of commitment to sustainability and our expertise to find ways to optimize their water cycle and reduce their environmental footprint.

How does Veolia Water Technologies contribute to achieving all SDGs where water is involved?

We have always believed that innovation advances water sustainability and improves resilience. When leveraged with our vast experience and with the quality of our technologies and services, our high capacity for innovation becomes a powerful tool that allows us to design solutions that bring long-term results for our clients.

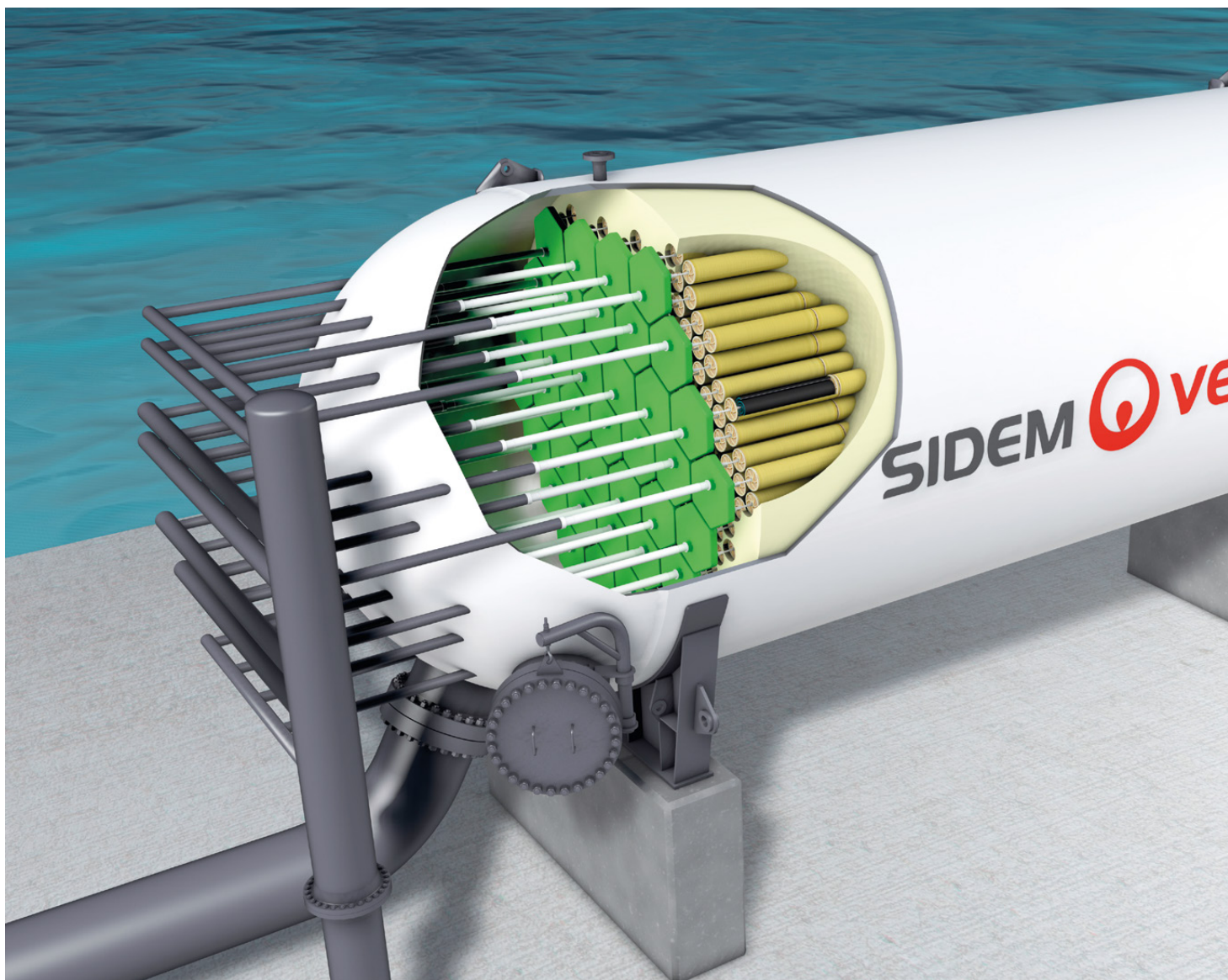
We are very proud to have been involved in creating France's first energy-positive wastewater treatment plant in Cagnes-sur-Mer, contributing to SDG 7: Affordable and clean energy. SDG 14 is about life below water; in Canada, our

"We are very proud to have been involved in creating France's first energy-positive wastewater treatment plant in Cagnes-sur-Mer"



BIOFOS' Lynetten wastewater treatment plant in Copenhagen, Denmark, is committed to resource recovery and being energy positive.





teams are working on cleaning Randle Reef, the largest PAH-contaminated sediment site on the Canadian Great Lakes.

"We are committed to helping our customers meet their environmental, performance and financial objectives"

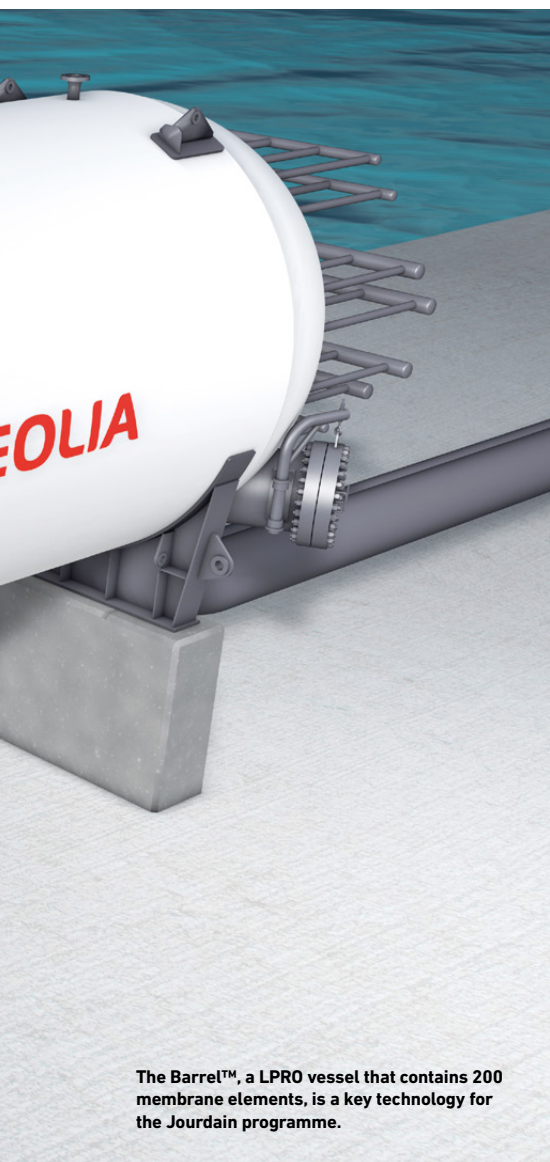
We have been partnering for many years with BlueKolding, a wastewater utility in Denmark that are true pioneers of a circular vision where one's waste is another one's valuable resource. They embody SDG 11: Sustainable cities and communities. In a remote area of Sri Lanka and in densely populated Beirut, we are helping to provide access to water which in turn contributes to reducing inequalities and poverty, in line with SDG 1.

I could go on and on. But the basic fact is that we tackle many different chal-

lenges alongside our customers, and we are committed to helping them meet their environmental, performance and financial objectives.

What role does digitalization play in advancing water sustainability and resilience?

Better managing water demand in the future is key; I believe real-time data and analytics will help us bridge the increasing gap between supply and demand by helping us be more efficient and smarter



The Barrel™, a LPRO vessel that contains 200 membrane elements, is a key technology for the Jourdain programme.

in how we use our water resources. Digital already plays a key role in efficiency which, with scarcity and quality, are the three main water challenges.

But efficiency goes beyond simply being compliant with the regulation in place, or being cost-efficient. We live in a rapidly changing world where our customers have to deal with increasingly complex issues. Recent events like the COVID-19 pandemic or extreme weather events related to the intensification of climate change, have really highlighted how water treat-



Better managing water demand in the future is key; real-time data and analytics will help us bridge the gap between supply and demand



ment plant operators must ensure the sustainability and the resilience of their operations, even under very challenging or unforeseen conditions. A lot of complex decisions have to be made in a very short time, often under a lot of pressure. This is where digital can also help.

For businesses, they need to fully comprehend their data to know how much water their operations really require and put in place processes and technologies that reduce water consumption by facilitating reuse and recycling.

For municipalities, we have already started using both live and forecast weather data to predict the impact of weather events on the surrounding environment and the local water infrastructure. We need more municipalities working in this space and using analytics to help plan for both droughts and flooding as the rate and intensity of these events increase. Digital is also a fantastic tool to better manage energy consumption and maximize the use of renewable energy, with wastewater treatment plants going from being big energy consumers to becoming energy producers.

And for us, the consumers, we have a vital role to play. Data and AI will help us adopt more sustainable behaviours by giving us the insight to make better

choices when it comes to our water usage. In the face of climate change, we will need to better monitor our 'small' everyday necessities to lessen the impact on the environment and to make sure resources are shared.

Veolia and Vendée Eau launched the Jourdain programme, the first experiment in Europe in wastewater treatment for the supply of drinking water. Could you tell us a bit more about Veolia's Re-use of Treated Wastewater solution?

The Jourdain programme being implemented in France by Vendée Eau, a local water public authority, addresses a critical need: the reuse of wastewater in an area under water stress during the summer months. This unique project in Europe aims not only to provide a reliable source of drinking water for the future but also to reduce our client's environmental footprint.

"The already strained relationship between water availability and demand is about to get even more complex and it will impact us all"



"Data and AI will help us adopt more sustainable behaviors by giving us the insight to make better choices when it comes to our water usage"

This programme will tackle water shortages through refill of fresh water storage and indirect potable reuse. The technology at its heart is the Barrel™, a low-pressure reverse osmosis vessel that contains

200 membrane elements. In addition to the usual macro-pollution parameters, this refining process will also make it possible to significantly reduce salinity, microbiological compounds and micro-pollutants such as pesticides, pharmaceutical or industrial compounds. The refined water will then be returned to the Jaunay reservoir in complete safety for the environment and for the users.

The water that will be produced will be of very high quality — we have made strict commitments to meet the specifications set by Vendée Eau regarding the environmental and health objectives of the programme. To reach this level of

commitment, we rely on more than 20 years of expertise and feedback of advanced treatment carried out on projects all over the world.

Veolia announced in 2020 its project to create the world leader in ecological transformation. What role did the merger with Suez play in Veolia's plans to achieve this ambitious goal?

The scale, speed and impact of climate change are undeniable. Increased pollution and pressure on resources and ecosystems mean that we no longer have time for a transition: we need to quickly transform the way we produce and con-



sume. Bringing our two groups together allows us to build the world champion of ecological transformation. It gives us the means to achieve our ambition, to turn the tide together.

Combining our resources, our expertise, our ideas and our know-how will allow us to move faster, to reach wider. We strongly believe that it will benefit our customers, communities and industries, by giving them access to more solutions to achieve their ecological transformation.

Veolia recently launched a podcast series called Blue Gold. Could you tell us a bit more about this initiative?



Nine episodes, each featuring inspiring real-life stories that show the SDGs in action.



As a company made of many engineers with technology at its core, we have been guilty in the past of focusing too much on that aspect of our work without insisting enough on the global picture: what do we ultimately achieve? How do we impact the world we live in? The SDGs are, above all, a human journey. And so came the idea to create a podcast to shine a light on the true stories of our customers, partners and employees who are working together to preserve water, provide sustainable cities and communities for future generations and fight climate change.

The podcast series, called Blue Gold, includes nine episodes, each featuring inspiring real-life stories that show the Sustainable Development Goals in action. Each story is told by people who work every day to protect our global water resources. These are all highly innovative projects led by passionate people, from Veolia, public authorities and businesses all over the world.

What do you see in the future of the water industry twenty years from now?

My vision is that most of the water we consume is reused. Reuse is a proven weapon for combating water shortage and is something that is underutilized.

Regardless of where we are in the world and our current water access, we all need

to treat water as a scarce resource. The already strained relationship between water availability and demand is about to get even more complex and it will impact us all. Individuals, communities, businesses and industries — we must all take immediate action to safeguard our water today, not tomorrow.

The good news is that solutions exist. And even though there is still some hesitation in taking the big leap towards fully embracing wastewater reuse for consumption, we are making progress.

Meeting the growing demand for water is a planet-wide challenge that is only going to get tougher. But I started this interview by saying that I believe in driving positive environmental change through innovative technologies and services. I stand by that statement: the next 20 years will continue to see these innovations come to life, and Veolia Water Technologies will be part of the transformation.

"We introduced usefulness at the heart of our vision and made it our purpose to contribute to human progress by committing to the SDGs"



WASTEWATER PROVIDES A PLANET-WIDE LABORATORY FOR THE STUDY OF HUMAN HEALTH

Using the WBE technique, researchers are mining global wastewater inventories for vital information on community health



Of the many contemporary conveniences often taken for granted in developed countries, modern sanitation may be among the most important. A new study suggests that wastewater infrastructure may provide societal benefits far beyond the dramatic improvements in community hygiene.

The research highlights a technique known as Wastewater-based Epidemiology (WBE), in which samples of municipal wastewater can be used as a diagnostic tool to explore a surprisingly broad range of community-wide health indices.

In research published in the journal *Environment International*, Rolf Halden and Sangeet Adhikari, describe how WBE can be used to help achieve a number of ambitious objectives outlined in the United Nations Sustainable Development Goals.

The study, the largest and most comprehensive assessment of wastewater infrastructure around the world to date, examines wastewater treatment facilities in 129 countries, serving over a third of the world's population. It is also the first study to propose and evaluate the feasibility of using WBE to measure progress toward achieving several UN sustainability objectives.

The WBE technique can be used to assess factors influencing community-wide health, from the consumption of local diets, alcohol, illicit drugs and tobacco to exposure to hazardous chemicals, pharmaceuticals, personal care products, viruses, and antibiotic-resistant microbes.

In addition to infectious disease monitoring, new disease biomarkers detectable in wastewater are being developed,

enabling researchers to mine samples for evidence of afflictions including diabetes, heart disease and cancer. The study emphasizes the dire need for the expansion of wastewater services to large swaths of the globe where such resources are still lacking.

As recently as 2019, the use of wastewater monitoring to assess and optimize global health was a utopian dream, envisioned and pursued by few, as detailed in Halden's 2020 book, *Environment*. The COVID-19 pandemic, however, changed all of this, with the method put to immediate, practical use for tracking the devastating course of SARS CoV-2.

"Whereas most of these efforts today are still focused on containing the pandemic locally, it is time to take stock of what else can be accomplished using WBE to advance the human condition and sustainability globally," Halden says. "The first inventory of global wastewater infrastructure presented in our paper represents an initial and important step toward creating a healthier and more equitable future for human populations around the world."

Professor Halden is the director of the Biodesign Center for Environmental Engineering at Arizona State University, where he works with Sangeet Adhikari, who wrote the study as part of his recently completed doctoral thesis. Halden is also professor in ASU's School of Sustainable Engineering and the Built Environment, a member of the university's Global Futures Laboratory and professor in the School of Life Sciences.

ECUADOR SIGNS \$175 MILLION LOAN WITH CAF FOR WATER PROJECTS

CAF and Ecuador signed credit agreements that will help improve access to irrigation and drainage services in the country's provinces

During the meeting of the board of directors of CAF — development bank of Latin America — held in Asunción, the Minister of Economy and Finance of Ecuador, Simón Cueva, and CAF executive president Sergio Díaz-Granados signed three credit agreements for USD 175 m in favour of Ecuador.

The first agreement, for USD 75 m, will be allocated to the Broad Focus Sectoral Program, to support road planning and development, access to irrigation and drainage services, and promote the

implementation of planning and management tools to optimize the monitoring of interventions.

The second one, for USD 50 m, will contribute to the implementation of the National Water and Sanitation Plan 2021-2025, in particular with regard to improving the governance and management of drinking water and sanitation services.

The third, for USD 50 m, is intended to recognize and reinforce policy actions for the implementation of the National

Development Plan in the Education Sector 2021-2025.

“These loans are proof of our commitment to continue supporting the Government of Ecuador in its development programs,” said Díaz-Granados.

Currently, Ecuador's portfolio at CAF accounts for 13.9% of the bank's total. In the past six years, CAF approved operations for Ecuador for USD 3.9 bn, which translates into an average USD 650 m per year, accounting for 4.97% of the total approved by CAF in that period for member countries.



MULTI-MILLION-DOLLAR ZANZIBAR WATER INVESTMENT PROGRAMME LAUNCHED TO ACCELERATE WATER INVESTMENTS

The Zanzibar Water Investment Programme was launched at the High-Level Water Investment Conference, held in Zanzibar

The President of Zanzibar and Chairman of the Revolutionary Council, H.E. Dr Hussein Ali Mwinyi, formally launched the Zanzibar Water Investment Programme, which will mobilise over USD 665.5 million between 2022-2027 towards securing clean and sustainable water supply for the island's population and fast-growing economy.

The Zanzibar Water Investment Programme is the first country-specific programme designed under the Continental Africa Water Investment Programme

(AIP), which aims to mobilise USD 30 billion per year towards water security in Africa. The AIP was adopted by African Union Heads of State and Government, as part of the Programme for Infrastructure Development in Africa – Priority Action Plan 2 (PIDA-PAP 2) in 2021. The Scorecard was launched at PIDA Week on 2 March 2022.

Delivery on water investments in Africa is lagging behind the continent's economic and social needs and behind other growth sectors. The African Development Bank estimates that USD 64 bn should be invest-

ed each year to meet the Vision of Water security for all by 2030. The actual figure invested is USD 10-19 bn, leaving an annual investment gap of USD 45 bn-59 bn.

“Investment in water, sanitation and hygiene (WASH) is an investment in health and in all our futures. WASH is critical to achieving the sustainable development goals. The World Health Organisation is proud to have helped develop the AIP Water Investment Scorecard,” said Dr Tedros Adhanom Ghebreyesus, Director-General of the World Health Organisation.





HOW NEW GUIDELINES PAVE THE PATH TO BETTER SANITATION IN AFRICA

The African Sanitation Policy Guidelines (ASPG) could help the continent achieve universal access to safe sanitation by 2030



Access to basic sanitation and hygiene services is a primary concern globally, with 3.6 billion people lacking safely managed sanitation and 2.3 billion without basic hygiene in 2020.

AMCOW, Speak Up Africa, UNICEF and Water & Sanitation for the Urban Poor believe that there is hope to turn this situation around: in the form of the African Sanitation Policy Guidelines (ASPG).

The guidelines provide the continent with essential standards for sanitation and hygiene policies improvements, giving national governments a structure that will help them turn the page on the current state of inadequate sanitation and hygiene services for its populations.

Across the continent, guidelines – which outline six key areas of intervention – have already been or are being implemented. The following examples

demonstrate how African nations can put in place the systems to ensure universal access to safe sanitation.

Sanitation systems and services, South Africa. Since the 2000s, the local authorities have been addressing the challenges of sanitation in the Durban area with a decentralised approach, in which non-sewered, onsite systems have been improved and embraced as viable, efficient, and cost-effective solutions.

Hygiene and behaviour change, Rwanda. Frequently, behaviour change – an important part of vital hygiene improvements – is absent from national WASH policies, which are more focused on delivery of services. But in Rwanda, a national handwashing strategy is having positive results.

Institutional arrangements, Senegal. Lack of clarity in institutional mandates

and in accountability bedevils efforts to provide sanitation and hygiene services in Africa and many developing countries worldwide. Senegal has kickstarted a program designed to update sanitation policy and strategy documents and give clarity on stakeholders' roles and responsibilities.

Regulation, Zambia. In Zambia, the creation in 2018 of a regulatory framework for the management of sanitation waste in urban communities has been a key step forward. This framework, combined with improved standards for sanitation technologies, and a new wastewater quality monitoring programme, is driving action not just from the country's publicly owned water and sanitation utilities, but from the private sector, too.

Capacity development, South Africa. In South Africa, the national government has made progress in building skills in the sanitation workforce. Following completion of a skills gap analysis in 2015, a range of training schemes have been introduced across a range of public sector institutions, including the Department of Water and Sanitation, municipalities, catchment management agencies and water boards.

Funding and financing, Chad. Chad, a country which in the early 2000s had almost no sanitation infrastructure, has made significant progress in the way it invests in sanitation and as a result the proportion of the population with access to improved toilets had reached 16.1% in 2019.

**SARAH RANSOM**

GENERAL MANAGER, AUSTRALIAN WATER PARTNERSHIP

WATER FOR SUSTAINABLE DEVELOPMENT: WHAT'S THE ROLE OF THE WATER COMMUNITY?

The 2022 World Water Day theme 'Groundwater, making the invisible visible' shines the light on a critical but sometimes overlooked water resource. Almost half the world's population depends on groundwater, and it plays such an outsize contribution to our daily water needs, global stability and prosperity. Hidden beneath our feet is an important resilience and biodiversity asset, which needs to be valued appropriately to be sustainably managed.

In our events celebrating World Water Day this year, the Australian Water Partnership interpreted the WWD theme to highlight the contributions of women and other marginalised or 'invisible' people to sustainable water resource management. Women, people with disability, Indigenous peoples and social minorities still lack an appropriate voice in many instances, and so water is managed without the benefit of their knowledge and needs. Stockholm World Water Week in 2022 will also include the huge volumes of 'virtual water' hidden in goods and services, in their exploration of this year's theme. There is a lot about water that is curiously unrecognised.

This might be because many human-water interactions literally happen out of sight – either literally, in the case of groundwater and wastewater treatment – or simply aren't generally well-known. It may also be that the incredible technical depth that supports the world's best water science and engineering makes water issues sometimes hard to approach, even for a well-informed and interested non-specialist. The upshot is, as one development issue amongst many, water doesn't have the profile it deserves.

The shortfall in financing to achieve Sustainable Development Goal 6 is a case in point. There is a well recognised gap in financing to achieve SDG 6 globally. The human costs of this gap are heartbreaking and include illness and premature death, reduced school attendance and increased household labour to secure water – a burden mainly on

women and girls. Lack of access to these basic services locks people in poverty.

In Australia's region, this is particularly acute. In the Pacific, the total population with access to basic services is only 57% for water and 35% for sanitation. This is one of the lowest rates in the world and reflects challenges with remote and rural populations, lack of surface water sources and high exposure to natural hazards. Of the Asian Development Bank's 49 developing member countries, 22 are rated water insecure. We are a long way from achieving sustainable water resource management and universal access to the human right to water.

Water is at the heart of sustainable development, through its many interdependencies with other sectors – energy, urban planning, agriculture, transport, manufacturing and climate resilience. Two major events in the next twelve months will shine a light on this connection: the 27th Conference of the Parties for the UNFCCC (COP27) in Egypt in November 2022 is expected to highlight water, following the successful first Water Pavilion at COP26 last year; and a March 2023 conference at UN Headquarters in New York

The incredible technical depth supporting the world's best water science and engineering makes water issues sometimes hard to approach

will mark the midterm review of the UN Water Action Decade. As the climate crisis bears down and poverty increases as a result of the pandemic, the challenge is to make water's centrality to sustainable development more visible.

How can the water community help? The water sector is made up of passionate and committed people who can act as ambassadors, helping to make visible the hidden aspects of water. To do this, we should learn from science communicators such as Make Water Famous, Nextblue and Water Science Policy who effectively use imagery, story and content to help explain the complexities of water to non-specialist audiences. Water needs to be valued appropriately to be sustainably managed. Because water flows through everything, it needs to make sense to everyone.



INTERVIEW

LIZA DEBEVEC

SENIOR GENDER AND SOCIAL INCLUSION SPECIALIST AT GLOBAL WATER PARTNERSHIP (GWP)

"By including people of all genders in an equitable manner, we not only improve their well-being, but improve the well-being of our economy"

 OLIVIA TEMPEST



Global Water Partnership (GWP) is a neutral convener in the heart of the water sector pursuing to advance governance and management of water resources for sustainable and equitable development.

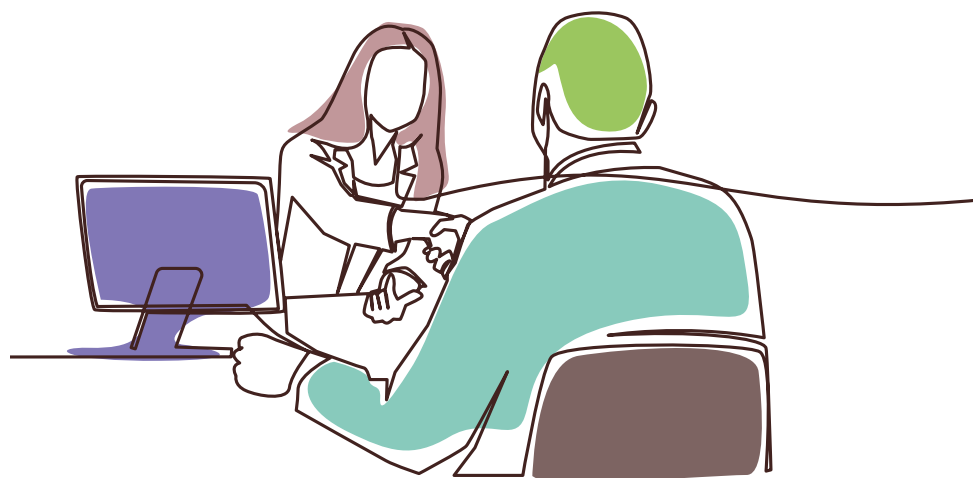
The first person dedicated full-time to gender in GWP, Liza Debevec, Senior Gender and Social Inclusion Specialist, is a social anthropologist with over two decades of experience in Sub Saharan Africa and nearly ten years' experience in the water sector. She has been tasked with the gender dimensions of the global action network's 2020-2025 Strategy. We spoke to Liza to learn a bit more about gender challenges in water resource management.

Can you tell us briefly about your career path and your current role in the Global Water Partnership?

I am a social anthropologist by training with over 20 years of field experience in Sub Saharan Africa. Prior to GWP, I spent seven years as a governance, gender, and poverty researcher at the International Water Management Institute. In my role as Senior Gender and Social Inclusion Specialist at GWP, I lead efforts to integrate gender into all aspects of its work and ensure women and marginalized groups can meaningfully engage in water governance decisions.

How does the Global Water Partnership (GWP) work towards reaching a water secure world?

For GWP, it is about water governance, that is, how we manage the resource. Water is used by all sectors of the economy for their own purposes. Few



people look at how water is managed equitably and sustainably across all sectors. What GWP does is mobilise action through a combination of expertise (knowledge), credibility within the global water community (partnership), and bottom-up orientation: ensuring the 'voices of water' can influence local, national, regional, and global development priorities.

The GWP has been working to improve water governance for twenty years. How has the sector changed in these past two decades?

The water sector has become more cohesive in the last 20 years. One of the milestones that indicate this is the achievement of getting a comprehensive water goal (SDG 6) on the 2030 Agenda. Another indication is that water organisations are working together to monitor the implementation of that goal and to show how many of the other SDG goals are linked to water. Finally, more governments and the private sector are beginning to realize that this resource is under threat and so are wanting the water sector to help them figure out what can be done.

Why is achieving gender equality in water governance important? And how does the GWP work towards achieving this difficult task?

The role of women in water resource management has been – at least on paper – recognized for over three decades. In the context of integrated water resources management (IWRM), which is the guiding approach for GWP, both academics and practitioners have been talking about the importance of the role of women in this process since the early 1990s. The four Dublin principles, on which IWRM is based, include principle 3 on the role of women. This principle states that women play a central part in the provision, management, and safeguarding of water. One of the most generous donors to GESI issues (gender equity and social inclusion) around the globe, Melinda Gates, argues that while gender equality is a human rights issue it is also an undeniable economic issue. By avoiding the equality issue, and continuing business as usual, we would leave a large portion of the population behind and that makes no business sense. By

"Governments and the private sector are realizing water is under threat and want the water sector to help them figure out what can be done"



"More and more institutions and world governments are making sure that their policies and projects address gender equality"

including people of all genders in an equitable manner, we not only improve their well-being, but improve the well-being of our economy and our planet, and all its resources.

At Global Water Partnership, we have committed in our Strategy to achieving gender equality and social inclusion. We use the four action ar-

ea approach as elaborated in our 2017 publication *Gender equality and social inclusion in water resources management*. We believe that there is a need to: (i) make gender a core business goal in any context (ii) conduct gender analysis to ensure we can drive data informed change (iii) ensure meaningful participation of women and other



marginalized groups in decision making processes and (iv) work towards the creation of legal frameworks that give equal access to resources to all members of society.

What success stories can you highlight in terms of improving gender equality in water governance?

The COVID-19 pandemic impacts women in a variety of negative ways, such as exacerbating the effect of water shortages on women

Progress is slow, but there are examples of success. Currently, more and more institutions and governments around the world are making sure that their policies and projects address gender equality. GWP's work on supporting the SDG 6.5.1. reporting is highlighting some of this work but also the challenges that countries face in measuring progress. GWP teams in 5 regions in Africa are working on a large programme that aims to ensure that water resource governance and climate change resilient initiatives are gender transformative. The sheer fact that we are now shifting the conversations from simple inclusion of women to the more important work of addressing and transforming gender norms that prevent the inclusion of women in the first place, is a huge step in the right direction. At GWP we are proud to be at the forefront of gender transformative work in Africa and in the other regions where we work.

Last year, the GWP published a report that found that women are still underrepresented in water resources management. Why do you think this is and what can be done to improve the numbers?

The main reasons here are lack of political will and consequent lack of resources

to advance in this area. But there is hope. Our report highlights seven enabling factors to ensure improvement in this area.

How is the current coronavirus crisis affecting gender issues?

The COVID-19 pandemic impacts women in a variety of negative ways, such as exacerbating the effect of water shortages on women. While not directly related to water, women's workloads in their homes have increased due to COVID-19, not just because of women's role in ensuring hygiene in the home, but as an overall impact of family members staying at home, the need for more home cooked meals, etc. This extra burden impacts women who work at home and those who, due to Covid restrictions, are working from home. In our network, with much of our communication taking place on Zoom, we see the toll this has on women, who are, due to prevailing social norms, responsible for childcare and household duties. Women colleagues are under more stress and may not be able to focus on work as well as their male counterparts. This may result in negative impacts on women's careers in the long run, further reducing the number of women in leadership positions in the water sector and beyond.





"GALVANIZING POLITICAL WILL HAS A LOT TO DO WITH PUBLIC OPINION, MOBILIZATION, AND VISIBILITY"

Alexandra Reis, Head of Communications, Sanitation and Water for All

The Sanitation and Water for All (SWA) partnership supports political action towards a common vision of sanitation, hygiene and water for all, always and everywhere. We hear from Alexandra Reis, Head of Communications for SWA, about communicating water's key role in development and helping raise political will to make it a priority for action.

CRISTINA NOVO PÉREZ

How do you think communication in the water sector has evolved in recent years?

Something that stands out is the way we are getting better at engaging and connecting with other sectors. Access to clean water is increasingly positioned not only as the end goal, but the basis for sustainable development. For example, water is a critical first line of defence against infectious diseases. We also desperately need strategic water management to face climate change. And access to water in schools improves attendance rates for children, particularly girls. When other sectors understand how crucial we are, they can help us 'fly our flag'.

Why do you think it is important to communicate about water?

Well as I mentioned, water is a critical cog for all development. More than that, it is a human right. We need to tell as many people as possible this is something they're entitled

to, so they feel empowered to demand its realization.

We have the technology and the knowledge to realize this human right, but the solution is more than pipes and toilets. It's also (dare I say mostly?) about creating the political will necessary to prioritize it, to fund it, to turn plans into action. And galvanizing political will has a lot to do with public opinion, mobilization, and visibility.

What are the most challenging aspects of communicating about the work of the water sector?

We are essentially a sector of engineers and experts, knowledgeable and passionate about our work, but often perceived as too technical. This can make us appear a bit insular, but there are important steps being taken to change this perception. A great example was COP26's first Water Pavilion, which saw the water sector working together to provide an exciting space to discuss how

water can support ambitious climate action. The same happens with the regular Finance Ministers' Meetings that SWA organizes during the World Bank's Spring Meetings. Both these examples are about entering non-water spaces and making messages about 'how we can help you'.

Could you highlight one of your organisation's communication success stories?

I was particularly proud of SWA's global communication campaign titled 'Water. A Woman's Business' for International Women's Day last year. We moved away from the traditional water and gender communications that tend to focus on women and girls as victims. Instead, we highlighted the role many women are already playing across the water 'value-chain', from ministers to scientists, from economists to plumbers. We produce a communications toolkit to support our partners in crafting messages

and advocacy materials adapted to their own contexts and got the sector to communicate together outside the usual water-related days, such as World Water or World Toilet Day.

Who or what organisation inspires you when it comes to ways of communicating?

I'm in awe of the new wave of young climate activists and the way young women are emerging as bold, inspirational leaders - unapologetically demanding and direct. I admire their capacity to mobilize in virtual spaces as well as 'the real world', and their success at cross-border collaboration - using global visibility to reinforce their national actions. And they instinctively - almost effortlessly - embrace intersectionality: they're right to connect the climate emergency to social justice, to gender equality, to access to water, to protecting natural resources and the fight for human rights. They have much to teach us - and they give me hope.



SOMETHING TO READ...

WATER ALWAYS WINS

Thriving in an age of drought and deluge

Independent journalist Erica Geis believes that working with nature – using indigenous and nature-based solutions – is key to restore our planet and help manage drought and flooding caused by climate change, but also by our development choices. She calls for a mindset shift to approach water with more of an attitude of collaboration and partnership, as opposed to control.

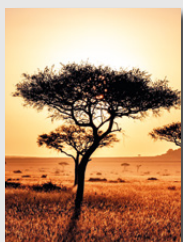


SOMETHING TO WATCH...

EVEN THE RAIN

The lasting impacts of colonialism and its continuation in today's society

Directed by Spanish filmmaker Icíar Bollaín, it is a "film within a film", telling the story of a film crew from Spain that travels to Bolivia to shoot a film about the Spanish conquest of the New World, at the time of Cochabamba Water War in 2000 where the essence of the colonialism is still present through the companies that want to privatise water resources in the region.

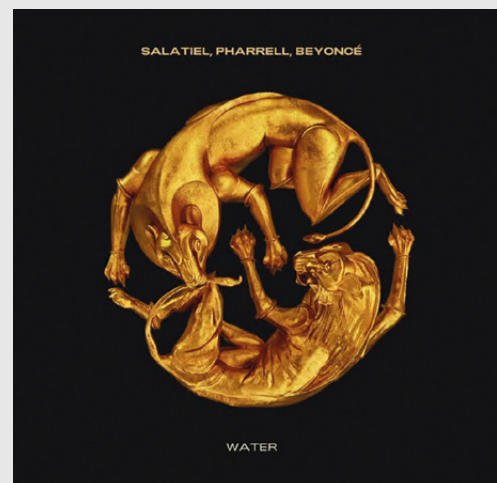


SOMETHING TO ENJOY...

WATER

Beyoncé, Pharrell Williams, Salatiel

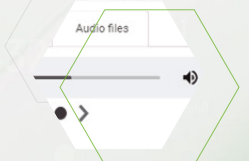
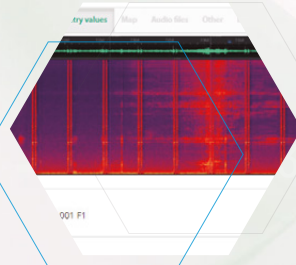
This song, somewhere between hip-hop and rap, performed by Beyoncé, Pharrell Williams and Cameroonian urban music star Salatiel, is part of the album *The Lion King: The Gift* released by Queen B in honour of the photorealistic animated remake of *The Lion King* in 2019, in which the singer gives voice to the lioness Nala.



Planning, Monitoring and Interpretation of Results

Digital transformation of Nautilus System
inspections for large diameter networks

Nemo Platform



Benefits of Nemo

Digital platform

Data analysis

Campaign Monitoring

Facilitates decision-making

Preventive management

Analysis of leak evolution

8 inspections
15.84 kilometers inspected

Total: 10

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