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PIONEERING THE FUTURE OF CLEAN WATER: INNOVATIONS IN WATER FILTRATION TECHNOLOGY

Dear Readers,

Welcome to the May edition of EverythingAboutWater Magazine, where we delve into the transformative realm of smart water technologies. As urbanization accelerates and climate challenges intensify, the need for intelligent water management solutions becomes increasingly critical.

In this issue, we spotlight the pioneering technologies that are revolutionising how we monitor, manage, and conserve our water resources. From advanced metering infrastructure (AMI) and Internet of Things (IoT) applications to predictive analytics and AI-driven systems, we examine the suite of innovations enabling smarter water management. These technologies are not only enhancing operational efficiency and reducing water loss but also empowering consumers with real-time insights into their water usage.

Through a series of in-depth articles and case studies, we explore the multifaceted applications of smart water technologies across various sectors. Discover how utilities are leveraging these advancements to optimize distribution networks, mitigate leakages, and improve service delivery. Learn about groundbreaking projects where smart irrigation systems are transforming agricultural practices, ensuring sustainability and resilience against climatic variations.

This issue serves as a valuable resource for industry professionals, urban planners, policymakers, and all stakeholders committed to fostering a sustainable water future. As you engage with the innovative stories and expert analyses presented, envision a world where smart water technologies facilitate sustainable development, enhance water security, and promote environmental stewardship.

In closing, I extend my heartfelt thanks for joining us on this insightful exploration of "Smart Water Technologies: Revolutionizing Water Management." May the knowledge and experiences shared in these pages inspire concerted efforts towards harnessing technology for a water-secure future.

Thank you for your unwavering commitment to advancing water sustainability.

Thanks & Regards,

Simran Arora

Associate Editor

EverythingAboutWater Magazine

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DROPLETS

Dana India Empowers Communities With Environmental Sustainability Initiatives in Sanand, Gujarat

Initiatives aimed at revitalizing local ecosystems and enhancing community wellbeing.

Sanand: In a bid to revitalize local ecosystems and support community wellbeing, Dana India has accomplished two Corporate Social Responsibility (CSR) initiatives at Charal and Gokulpura in the Sanand region of Gujarat. These projects, focused on critical water resources, exemplify DANA's commitment to environmental stewardship and improving the quality of life for residents.

The first project involved the cleaning and rejuvenation of a pond in Charal Village, aimed at enhancing water quality and ecosystem restoration for the 3,500 villagers. Funded by Graziano Trasmissioni India Pvt Ltd (Affiliated company of Dana Incorporated), the project was completed in December 2023.

The second project focused on increasing the water storage capacity in Gokulpura Village, home to a larger population of 5,500 residents. Also sponsored by Graziano Trasmissioni India Pvt Ltd, this project was completed in March 2024. Through these efforts, Dana India aims to make a significant difference in the lives of residents and contribute to a healthier, more sustainable environment.

"Water is a precious resource and access to clean water and sustainable resources is fundamental to the health of a community. We, at Dana, are committed to supporting community development," said Gajanan Gandhe, Country Head and VP, Dana India. "Our focus on water resource management in Charal and Gokulpura is part of Dana's broader mission to support environmental sustainability and make a tangible difference."



Shri C.R. Patil Takes Charge as Union Minister for Jal Shakti

Shri Chandrakant Raghunath Patil took over as the Union Minister for Jal Shakti, in New Delhi today. After taking charge, the Minister expressed gratitude towards Prime Minister Shri Narendra Modi for trusting him with the responsibility of the Ministry. Shri Patil is a three-time Member of Parliament from the Navsari Lok Sabha Constituency of Gujarat.

Shri Patil said, "I am determined that the Ministry of Jal Shakti will set new benchmarks in water conservation, sanitation and management. In this direction we will promote collective efforts and conserve water assets using the latest technology."

Shri Patil, along with the Union Ministers of State for Jal Shakti, Shri V. Somanna and Shri Raj Bhushan Choudhary were briefed by senior officials of the Ministry regarding the water position in the country and functions of various departments of the Ministry. Dignitaries present on the occasion included Ms. Vini Mahajan, Secretary, Drinking Water and Sanitation, Ms. Debashree Mukherjee, Secretary, Department of Water Resources, River Development & Ganga Rejuvenation, along with and other senior officials of the Ministry.

Ghaziabad: Treated Water Supply Project to Become Operational in September

The project is being executed at a cost of about Rs. 320 crores to supply treated STP water through pipelines to industrial units. The project to supply treated water from sewage treatment plant (STP) in Indirapuram to industrial units in Sahibabad Site IV industrial area has been delayed by about four months and officials of the Ghaziabad municipal corporation said the project is likely to become operational by September.

The project is being executed at a cost of about Rs. 320 crores to supply treated STP water through pipelines to industrial units. The municipal corporation in April, 2021 also floated bonds for the project at Bombay Stock Exchange to raise Rs. 150 crores, said officials.

"The project was to get operational in May but has been delayed and is likely to get operational in September. The delays have been due to restrictions under the graded response action plan (GRAP) and also due to a delay in handing over 56MLD (Million Litres

ATER NEWS

per Day) capacity STP to the civic body. The project is intended to save groundwater in Sahibabad,” said Vikramaditya Malik, municipal commissioner. The records of the UP Groundwater Department indicate that water level in Sahibabad has gone down from 25.19 metres below ground level (MBGL) in the post monsoon of 2017 to 33.34 MBGL in the post-monsoon period of 2023. The officials said they have signed about 400 water purchase agreements with units in Sahibabad Site IV Industrial area.

“The corporation will supply treated water to industrial units at the rate of Rs. 45 per kilo litre. The project will supply about 40MLD of treated water to units. We are also exploring the possibility to supply treated water to other industrial areas in Rajendra Nagar and Mohan Nagar, among others,” Malik said.

The officials said the entire treated water supply will be made through water pipeline network from Indirapuram to Sahibabad Site IV industrial area. The length of the main supply pipeline will be 11km. Earlier in May, environmentalist Sushil Raghav had moved the National Green Tribunal contending that laying of pipelines for distribution of treated water was in violation of environmental norms. The tribunal during the first hearing on May 30 disposed of the petition while giving liberty to the applicant to approach pollution control board in case of any violation.



Dana India Empowers Communities With Environmental Sustainability Initiatives

In a bid to revitalize local ecosystems and support community wellbeing, Dana India has accomplished two Corporate Social Responsibility (CSR) initiatives at Charal and Gokulpra in the Sanand region of Gujarat. These projects, focused on critical water resources, exemplify DANA's commitment to environmental stewardship and improving the quality of life for residents.

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GreenPro is a Type-1 Ecolabel accredited by the Global Ecolabelling Network (GEN) through the GENICES system, ensuring adherence to rigorous global sustainability standards. This certification is significant as it assures that products bearing the GreenPro Ecolabel have a lower environmental impact, contributing to reduced energy consumption and waste during construction, operation and maintenance. Receiving the GreenPro Ecolabel certification highlights our environmental stewardship initiatives and reinforces our commitment to leading the industry towards a more sustainable future.

Mr. Sanjay Kirloskar, Chairman and Managing Director of Kirloskar Brothers Limited, expressed his pride in this accomplishment, stating, "Receiving GreenPro Ecolabel certifications for our products LLC Series, DBxe, Cast Iron and Alloy Cast Steel foundry castings is a testament to our ongoing commitment to environmental sustainability. We are honoured to be recognised by such a prestigious organisation for our efforts in promoting green practices and reducing our environmental footprint. This recognition reflects our proactive stance towards fostering a culture of responsibility and accountability across our organisation."

This accomplishment establishes a new benchmark for the industry, showcasing KBL's pivotal role in fostering a more sustainable future through its commitment to excellence. KBL constantly strives to implement policies to protect the environment by optimising the usage of natural resources and reducing carbon emissions through initiatives such as recycling waste, rainwater harvesting, energy conservation and promoting renewable energy. As an industry leader, KBL remains dedicated to driving positive change and fostering a culture of following green practices and eco-conscious manufacturing.

The second project focused on increasing the water storage capacity in Gokulpura Village, home to a larger population of 5,500 residents. Also sponsored by Graziano Trasmissioni India Pvt Ltd, this project was completed in March 2024. Through these efforts, Dana India aims to make a significant difference in the lives of residents and contribute to a healthier, more sustainable environment.

“Water is a precious resource and access to clean water and sustainable resources is fundamental to the health of a community. We, at Dana, are committed to supporting community development.”, said Gajanan Gandhe, Country Head and VP, Dana India. “Our focus on water resource management in Charal and Gokulpura is part of Dana's broader mission to support environmental sustainability and make a tangible difference.”

Shri V. Somanna Assumes Charge as Union Minister of State for Jal Shakti



Shri V. Somanna took over as the Union Minister of State for Jal Shakti, in New Delhi today. After taking charge, the Minister expressed gratitude towards the Prime Minister for trusting him with the responsibility of the Ministry and stated, “The last 10 years have witnessed remarkable growth under the dynamic leadership of Prime Minister Shri Narendra Modi”. The Minister expressed firm determination to continue the momentum of development in the third term of the government.

Addressing the media on the occasion, Shri Somanna informed that under the Jal Jeevan Mission, over 11 crore rural households have been added to piped water supply in the last 5 years and now over 76% rural households are receiving 55 litres of quality water per person daily. The Minister further added that under the Swachh Bharat Mission (Gramin), over 93% of India's villages have been made Open Defecation Free (ODF) plus, while around 33% have achieved the ODF Plus Model village category. “Building upon this achievement, we shall strive to bring all the villages in ODF Plus Model category by March, 2025”, he said.

Kozhikode Corporation to Reconsider Site for STP at Kothi

The Kozhikode Corporation may change the location of its proposed 6-MLD sewage treatment plant (STP) at Kothi. Deputy Mayor C.P. MusafarAhamed said at the Corporation council meeting on June 12 that the civic body was open to rethinking the project details.

His response came after Opposition leader K.C. Shobhita pointed out that Seamak Group, which had withdrawn from the contract for the construction of the STP, had made some suggestions, of which a possible change in the site location was one. “We need STPs but cannot ignore public protest. The project has a better chance of taking off with a more suitable location,” she said.

The Corporation's project for STPs at Kothi as well as AvikkalThodu under AMRUT-1 had met with stiff opposition as local residents alleged that thickly populated areas were not ideal for STPs. The issue resulted in stand-offs between residents and Corporation officials in 2022, as a result of which the civic body could not begin the work. Seamak Group had withdrawn from the contract after it failed to commence the work.

Earlier at the council meeting, the Corporation was lauded for winning an award for the best environmental practices among local bodies from the Kerala State Pollution Control Board (PCB). However, it could not ignore issues raised by the PCB during its inspection at Njeliyanparamba.

Ms. Shobhita, in a submission, came down on the PCB report, which pointed out that waste had piled up in the plot. The report had also said that biomining was incomplete, capping was unscientific, and that the polythene covering over legacy waste had mostly deteriorated resulting in leaching from heaps. Ms. Shobhitha pointed out that the Corporation had recently received a notice from the National Green Tribunal and demanded immediate steps to resolve the issues.

Responding to the submission, M.S. Dileep, superintending engineer in the Corporation, said tenders had been floated for the construction of a leachate treatment plant (LTP) and an effluent treatment plant at the site, and that efforts were being made for the upgradation of the existing LTP. The covering over the legacy waste would soon be changed, he added.

Later, RJD councillor N.C. Moyinkutty pointed out that the quality of public works in the city was deteriorating. “Even though public works are being allotted through e-tender, contractors have found a way to bypass that. They have formed a lobby.

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NATIONAL WATER NEWS

MAY 2024

They acquire several tenders from one local body and do not complete most works in time or in proper manner," he said.

Other councillors also complained about the lack of response from contractors for months. Mayor Beena Philip said she would convene a meeting of contractors to resolve the issue. The council also discussed the names of members, apart from the Mayor, who would be included in the delegation to the Bagra Annual Conference in Portugal, as part of the UNESCO Creative Cities Network. Opposition councillors suggested the Corporation should be more inclusive in selecting members of the delegation.

SC Directs the Yamuna River Board to Hold an Urgent Meeting on June 5 to Address Delhi's Water Crisis



The Supreme Court on June 3 directed the Centre to hold an emergency meeting of its Upper Yamuna River Board with the States of Delhi, Haryana and Himachal Pradesh to address water scarcity in the national capital amidst soaring temperatures crossing the 50-degree Celsius mark.

A Vacation Bench of Justices P.K. Mishra and K.V. Viswanathan ordered the meeting to be held on June 5 "Tomorrow there will be too much heat," Justice Mishra said, referring to the declaration of the Lok Sabha election results on June 4. Justice Viswanathan said, "People would be glued to the TV".

The Bench scheduled the case for June 6 and said the minutes of the meeting and the suggested steps to be taken by the stakeholders States should also be placed on record. It said the States, the Board and the Centre should address the issues raised by the Delhi government about water scarcity in the capital in "right earnest" during the June 5 meeting. Solicitor General Tushar Mehta, appearing for both the Centre and Haryana, alleged that over 50% of the water reaching Delhi was diverted into the hands of the tanker mafia or "lost". "If 100 litres come to Delhi, 48.65 litres reach the residents. The total water loss is 52.35%. Where does it go?

Into the hands of the tanker mafia... You (Delhi government) have to tighten up," Mr. Mehta alleged. Appearing for Delhi, senior advocate A.M. Singhvi countered the figures were wrong and the allegations baseless. "We just wanted the water level at the barrage of Wazirabad to be maintained. We are the capital. The heat is at an all-time high. There is migration into the capital," Mr. Singhvi said, trying to bring perspective to the problem at hand.

The Delhi government, in its petition before the apex court, said access to water was one of the basic human rights of an individual. "Access to water is an essential component of dignity and quality of life guaranteed under the Constitution... The current water crisis may only get worse due to the peak summer and ongoing water shortage. People of Delhi are unable to access even adequate clean drinking water," the Delhi government argued in the apex court.

Gurugram: MCG Plans to Reduce Water Supply to Once Daily in Several Areas, Panic-struck Residents Object

Gurugram: Residents are struck with panic after the Municipal Corporation of Gurugram (MCG) revealed its plan to implement water rationing in the intense summer. Due to the extreme heat, the city has also seen a significant rise in water demand. While residents have objected to the MCG's decision, the civic body said the move is essential to ensure water supply to the people living in end-tail areas. The Resident Welfare Association (RWA) has also expressed its dissatisfaction with the decision. It said the move will further put pressure on water resources, which are already available in a limited quantity.



Who will be affected?

According to the proposed plan, several areas that are receiving water twice daily will face their supply reduced to once a day. These areas include Sector 9A and 9. The water supply will be diverted to areas that are severely affected by shortages, such as Dayanand Colony, Subhash Nagar, and Jacobpura West, reported.



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The MCG's move also focuses on the surrounding Sector 57 and Sikanderpur, where residents are already facing a water crisis-like situation, with no water to meet their daily demands. Reacting to the news, a resident of Sector 9 highlighted that the water cut in his locality would add to the problems of residents living in the end-tail areas of this sector. He stressed that rather than cutting down the water supply, "MCG should rather focus on strengthening the infrastructure and distribution system". "One boosting station caters to four localities — sector 9 and 9A, Housing Board Colony, and ESI Hospital.

Cutting down the supply is not viable as it already falls short for tail-end residents of our sector. MCG should rather focus on strengthening the infrastructure and distribution system," said Jitender, quoted in the media report. Residents complained that when the water supply is affected even for a day, they have to face repercussions for at least two to three days as the water pipeline gets dry. Meanwhile, others objected that dairies, RO plants, unplanned colonies, and water tankers are extracting water illegally from the main supply line. They are not paying a penny for it, leading to a revenue loss for MCG. Lalit Suraj Bhola, general secretary of Sector 9A said, "If MCG cannot disconnect the illegal water supply, then they should put up valves on these connections to unplanned colonies. It is highly unacceptable that MCG is cutting the water supply of residents who pay bills for every drop".

Environmentalists Urge Political Parties to Focus on Water Harvesting to Conserve Land, Cite Karnataka Model

Katkar of Save Belapur Hills forum. Hills must be strengthened with green cover and "We should not allow encroachments and hill cutting at any cost," he said. "Amidst mega challenges and threats to the environmental protection efforts, we need good officers and firm decision makers", said Indore-based Sanjay Gupta, co-founder of Alliance for Rivers in India (AFR). Also, there is a need to mobilise the youth as responsible citizens and build a strong cadre which comes from the public at large, Gupta said.



AFR works in association with organisations focused on water conservation across various districts. Jyoti Nadkarni of Kharghar Hill and Wetland wondered if we really need these days and themes to remind us of our action and responsibility for the planet. It is time to act on checking land degradation and soil erosion because "our Land is our future."

Singanallur STP to be Commissioned by June



The civic body proposes to complete the works in respect of the Singanallur sewage treatment plant (STP) by June.

It may be recalled that sewage was polluting the Singanallur tank and the corporation's several lakhs worth boating project was shelved because of the pollutants in the water body. Above all, water hyacinth also posed a major problem. The Singanallur tank is fed by the Noyyal and Sanganur canals and both are extremely polluted. From Noyyal, the water flows through the canal and reaches Sular tank.

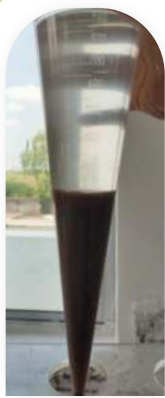
To tide over this, the corporation started constructing a sewage treatment plant along the Tiruchi Road in Singanallur last June and with 95% of the work over, only the machinery that is procured from Bengaluru needs to be fixed. Once that is done, the STP can treat two million litres of water per day.

Corporation sources said that the machinery fitting exercise had commenced and the plant is expected to be commissioned in June.

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BENTLEY SYSTEMS ORGANIZES INNOVATION DAY: TRANSPORTATION, ENERGY, AND WATER INFRASTRUCTURE AT AHMEDABAD, GUJARAT

Ahmedabad, April 23, 2024

Bentley Systems, Incorporated (Nasdaq: BSY), the infrastructure engineering software company, organized an exclusive Innovation Day at ITC Narmada, Ahmedabad, today. The event showcased the power of digital twins and digital delivery in transforming infrastructure projects across various industries.

Bentley hosted the day in the presence of important government bodies, design consultants, construction contractors, and project management consultants, who explored Bentley's industry-leading software solutions for the transportation, construction, energy, and water sectors.

Kamalakkannan Thiruvadi, Regional Executive, South Asia, Bentley Systems, shed light on Bentley's contributions to the Indian infrastructure sector, sharing success stories and showcasing projects from Gujarat. Commenting on the event, Thiruvadi said, "Bentley is committed to reshaping the future of infrastructure through innovative software solutions. Digital delivery and digital twins are revolutionising how infrastructure projects are envisioned, constructed, and operated. We are grateful to all the attendees who joined us for the event. Bentley is spearheading this revolution, encouraging organizations to benefit from open and integrated applications, combined with digital twin technology, to boost efficiency, reliability, and affordability across the asset lifecycle."



"We are thrilled to announce a significant step forward in our commitment to academic excellence and industry relevance through the signing of a Memorandum of Understanding (MoU) between Gati Shakti Vishwavidyalaya and Bentley Systems. This strategic partnership marks a cornerstone in academic-industry collaboration, designed to bridge the gap between theoretical knowledge and practical application in the dynamic field of transportation and logistics infrastructure."

The session on transportation highlighted the potential of digital twins in enhancing operational efficiency and driving innovation. Chirag Joshi, Senior Manager, Design and Engineering, Adani Road Transport Ltd, showcased how using Bentley solutions at Adani enhanced project execution and operational efficiency while improving safety and innovation for transportation business.

The energy session showcased the role in driving innovation and collaboration for large-scale energy production towards a net-zero future.

The event concluded with the water session, elucidating on scalable and flexible water infrastructure digital twin solution. During the session "Women in Engineering," Gunjan Thanki, BIM Expert, Systra India, shared how women in engineering are playing a pivotal role towards building a sustainable tomorrow.

A special recognition awards was hosted to acknowledge the contribution of previous years' Going Digital Awards. Some of the recipients included Aarti Industries, Larsen & Toubro, MaRS Planning & Engineering Services, Tata Consulting Engineers, Zamil Steel Buildings, and Zetwerk Manufacturing Businesses.

This event showcased Bentley's commitment to celebrating excellence and innovation in infrastructure projects. It conveyed Bentley's digital twin vision for India, addressing challenges and opportunities in the ongoing and future infrastructure projects across the country.



HOW TO SLOW DOWN CORROSION WITH MCI® IN HIGH TEMP GCC STATES

Some climates such as those in GCC (Gulf Cooperation Council) countries make it extremely difficult to build structures with long service lives. Hot temperatures and other harsh elements make corrosion a constant threat to the durability of reinforced concrete. Rather than default to expensive options such as epoxy coated rebar and extra thick concrete cover, Cortec's MCI® Technology offers a cost-effective alternative to extend structural service life in high temperature areas.



Why Is Corrosion Such a Problem in GCC States?

The higher the temperature, the faster corrosion can occur. Every time the temperature rises by 10 °C (50 °F), corrosion activity can double. Since temps in the GCC frequently exceed 38 °C (100 °F) in the summer, the processes at work to rust rebar in reinforced concrete structures are in full force. Add to this the proximity of salt-laden air in coastal areas and the presence of chlorides in sabkha soil or high water tables, and the risk for structural deterioration is even higher. At the same time, a strong cultural desire exists to create sustainable structures that will last for the next generation.

How MCI® Can Help

Migrating Corrosion Inhibitors (MCIs) are an excellent antidote to corrosion in reinforced concrete structures. By specifying MCI®, engineers can significantly extend the expected service life of the structure at a small percentage of the construction cost. These amine-carboxylate based inhibitors affect



both the anodic and cathodic portions of a corrosion cell and can be applied in many forms, including concrete admixtures and topical treatments. MCI® can migrate through the concrete matrix as a liquid via capillary action and as a vapor throughout the pore structure. An affinity to metal allows MCI® molecules to adsorb on the surface of metal reinforcement, forming a protective layer that delays time to corrosion and significantly reduces corrosion rates once started. It is the one of the easiest and most cost-effective methods of protecting metal reinforcement from corrosion when compared to epoxy coated rebar, cathodic protection, and calcium nitrite.

New Construction or Facility Maintenance?

Adding MCI® from the start is an excellent way to protect against corrosion in high chloride, high temperature GCC coastal environments. MCI® Technology can be applied to new structures as a concrete admixture such as MCI®-2005, a USDA Certified Biobased Product that does not accelerate set time (unlike calcium nitrite, which can make the concrete mix extremely difficult to work with in hot weather). However, existing structures never enhanced with MCI® can still benefit from an MCI® surface applied corrosion inhibitor (SACI) applied during repair or routine application of a water repellent. MCI®-2020 offers the highest concentration of MCI® SACIs and should be followed by the application of a water repellent or other sealing material (be sure to check compatibility). For the convenience of two-in-one application, MCI®-2018 combines MCI® with a 100% silane water repellent for dual protection against the elements.

Where Has MCI® Been Used in the GCC?

MCI® Technology has been used in countless structures exposed to the GCC climate. Most notable is the Burj Khalifa, the tallest building in the world to date built with a 100-year design life. Due to harsh groundwater conditions, MCI®-2005 was added to the substructure for extra protection. The application was similar for the Princess Tower, where the service life prediction doubled with the addition of MCI®-2005 at less than 1/10 of a percent of total construction costs. MCI®-2005 has also been specified in medical and hospitality facilities in the region.



The Logical Choice to Extend Service Life

The high temperatures and corrosive environments of the GCC are unavoidable. The only answer is to build structures in a way that will slow down the corrosion process and thereby extend service life. MCI® makes the most economical and practical sense for that purpose and has a long track record of use in the GCC.

GLOBAL W

DROPLETS

Energized partnerships: GF Piping Systems contributes to the green hydrogen growth by supplying corrosion-free and safe polymer solutions

As the global demand for green hydrogen rises, so too does the demand for efficient and safe flow solutions for long-lasting hydrogen applications. With 60 years of thermoplastic expertise, GF Piping Systems has begun to apply its extensive experience to this dynamic sector, offering a wide range of products and services.

Hydrogen is far from a novel concept, tracing back to its discovery in the late 18th century. However, the advent of green hydrogen production that bridges the intermittency gap often associated with wind and solar energy is sparking renewed interest. Piping systems are required throughout the entire green hydrogen value chain, from desalination plants, water treatment, electrolyzers, and distribution to embedded storage and fuel cells. To meet the demands of the industry and drive the cost reduction of green hydrogen, GF Piping Systems aims to increase performance, ensure operational safety, and improve the lifetime of these hydrogen applications.

Within the hydrogen sector, the material selection for piping systems is an underestimated factor. A common challenge in all H₂ applications is the need to prevent impurities, and accelerated degradation due to dissolved ions is a particular concern in metal piping systems. Corrosion and maintenance-free polymer alternatives, on the other hand, can extend the lifespan of systems and components which not only reduces downtimes but also the overall cost of producing hydrogen molecules.

As part of a commitment to support the entire hydrogen value chain, GF Piping Systems is extending its leading polymer expertise beyond desalination and water treatment to collaborate with electrolyser and fuel cell manufacturers. To serve the need for hydrogen storage, the Swiss flow solutions provider offers high-quality injection-moulded and extruded tank liner components, made of PE100 and various grades of PA, needed as gas barriers for Type IV hydrogen high pressure tanks. Rachel Bros De Puechredon, Global Business Development Manager Hydrogen at GF Piping Systems, comments: "We are quickly and successfully transferring our extensive expertise in challenging industries such as microelectronics to the hydrogen sector. Thanks to our corrosion-free and chemical resistant components, comprehensive services, as well as our global presence, we believe that we can energize partnerships that shape the sustainable energy transition."

GF Piping Systems offers a vast portfolio for the safe and reliable transport of gases and fluids and operates 36 production sites as well as 18 prefabrication facilities across 31 countries. This enables the company to provide customers with full project support, from planning and engineering to the installation on-site. Established distribution systems including ELGEF Plus and MULTI/JOINT® 3000 PLUS have already received H₂ certifications by KIWA and DBI and are 100% hydrogen ready. In addition, the company is a member of organizations such as Hydrogen Europe, NWBA in NL, and DVGW in Germany.



Flow Reversal Reverse Osmosis to produce ultra-pure water for second semiconductor plant in the Philippines

A leading Japanese multinational corporation that specializes in the development and manufacturing of electronic components will use ROTEC's Flow Reversal Reverse Osmosis (FR-RO) technology to produce ultra-pure water for its semiconductor plant. The project includes the design, procurement, fabrication, installation, and supply of the FR-RO technology to treat 400 m³/day from the customer's industrial semiconductor plant.

ROTEC will work once again with Acqua Engineering and Technical Services to collaborate on the project. This follows an initial collaboration between the companies on a previous plant in Cebu, the Philippines. The project presented a number of design challenges: any solution would need to achieve the highest possible recovery, more than 93 per cent, while minimizing waste discharge, and meeting ever increasing global sustainability standards.

With these challenges in mind, ROTEC was asked to supply a new ultra-pure water system featuring its FR-RO proprietary technology that could treat 16.7 m³/hour of feed water. A two-pass system will be delivered including the use of Electrodeionization (EDI) to remove ions and ensure lower permeate water conductivity suitable for ultra-pure water quality lower than 1 µS/cm.

Jane Ubalde, owner of Acqua Engineering and Technical Services, said: "Working with ROTEC again, I have complete trust in the technology which has already proved successful in installations across a variety of sectors in APAC and the Philippines. Better still, combining the abilities of Acqua Engineering and Technical Services with ROTEC's innovation and solid track record, this project will create a valuable offering for local customers." Nir Weisman, ROTEC's VP sales and marketing, added: "ROTEC is pleased to partner with Acqua Engineering and Technical Services once again to deliver leading-edge technology for the local semiconductor industry. We look forward to continuing to challenge the flow and expand our footprint in the Philippines, providing clear water value for our customers around the world."

ATER NEWS



New wobble plate pump from Lutz Pumpen

The TR series wobble plate pumps make use of a tried-and-tested principle: a spherical pump housing accommodates a wobble plate that sits at an angle on a shaft. The rotation of the shaft causes the plate to perform a characteristic wobbling movement. It continuously changes the volume of two chambers on both sides of the shaft. This creates alternating positive and negative pressure, which draws liquids into the pump and expels them through an outlet opening. An efficient principle that has proven itself with highly viscous liquids such as oils, lubricants, varnish, sealants and silicones.

“The new TR series wobble plate pumps from Lutz Pumpen offer a high-performance solution for industrial applications in which high flow rates at high viscosity pose a challenge,” says Heinz Lutz, Managing Director at Lutz Holding. “The new industrial pumps pump up to 30,000 litres of thick or viscous liquids and media containing solids with a viscosity of up to 1,000,000 millipascal seconds and a temperature of up to 205 °C.” The new wobble plate pumps, which are made of robust stainless steel, are suitable for application in a range of industries including the paint and coatings industry, the sealants and adhesives industry, the pharmaceuticals industry, the cosmetics industry, the oil industry and the food industry.

Maintaining the quality and integrity of the pumped media at high flow rates

The new TR series wobble plate pumps are characterised by their sensitive handling of sensitive products. “Many companies working in an industrial context have found that even expensive systems have a negative impact on the quality and integrity of high-viscosity media when pumped at a high flow rate,” says xx. To address this problem, the design of new pumps placed a particular focus on sensitive product handling.

“The special design of the wobble plate pumps means that they generate a continuous and almost pulsation-free flow, which is subjected to only minimal shear forces. There is no crushing whatsoever. In addition, their compact design minimises the contact time between the medium and the pump. This ensures that the quality and integrity of the pumped media are maintained.”

DROPLETS

Xylem Unveils 'Reuse Brew' Pioneering Bavarian Beer, Made from Treated Wastewater, Marks Significant Advancement in Water Recycling Technologies

In an innovative move to tackle Europe's escalating water scarcity, global water technology leader Xylem (NYSE: XYL), today announced the launch of Reuse Brew. This unique Bavarian beer, crafted from high-quality treated wastewater, marks a significant advancement in water recycling technologies and offers a sustainable solution to the increasing challenges posed by climate change.

The development of Reuse Brew is the culmination of a partnership between the Chair of Brewery and Beverage Technology at Technical University of Munich (TUM), the Chair of Urban Water Systems Engineering at TUM, the city of Weissenburg in Bavaria, and Xylem. This collaboration showcases the transformative potential of advanced water treatment technologies in producing a palatable beer, promoting sustainable water management practices across Europe.

“Reuse Brew is not merely an exceptional beer; it exemplifies the vast capabilities of water recycling in combating the pressing issue of water scarcity,” said Roxana Marin-Simen de Redaelli, Vice President, Central Europe and Nordics at Xylem. “This project is a beacon of modern, sustainable wastewater recycling technologies and underscores the importance of utilizing local resources to mitigate groundwater pressure and ensure supply security during periods of drought.”

At the heart of Reuse Brew's production lies oxidative processes ozonation and advanced oxidation with UV irradiation and hydrogen peroxide, paired with sophisticated filtration and purification processes, including nanofiltration. These technologies effectively remove chemical and microbial contaminants through oxidation and adsorption, ensuring the beer's quality.

“The source of water should not determine its value, but rather its safety and quality,” said Professor Jörg E. Drewes of TUM. “Our collaboration with Xylem on the Reuse Brew project underscores the practicality of converting wastewater into safe drinking water with existing technologies.”

The Weissenburg wastewater treatment plant, the first treatment plant with advanced treatment to eliminate organic micropollutants in Bavaria with the help of Xylem's ozonation technology, has played a crucial role by supplying treated effluent for their Reuse Brew project.

Xylem invites everyone to taste its Reuse Brew at the upcoming IFAT Munich 2024, the premier trade fair for water, sewage, waste, and raw materials management. The event runs from May 13 to 17 at Messe München, and Xylem's booth is located at hall B1, stand 150. Join us for the daily Reuse Happy Hour at 4pm, when attendees can sample Reuse Brew and take home a bottle of this unique beverage.

This was demonstrated in a range of applications, including the work of a company that produces shampoos with integrated air bubbles. Conventional pump systems that produce high shear forces would have caused the tiny bubbles to combine into larger air bubbles. “With pumps from the new TR series on the other hand, the original product properties are retained.”

“For many companies, fast maintenance is decisive in a time of skills shortages” The TR series impresses not only with its high performance and sensitive product handling, but also enables effortless integration into existing process landscapes. With units ranging in length from just 316 to 440 mm, users have the flexibility to mount them horizontally or vertically. The pump head can be rotated in 90 degree increments to allow easy adaptation to existing pipework. The series provides a range of mounting systems such as flange, milk pipe, TriClamp and Camlock. “We have also worked to ensure that the TR series wobble plate pumps are low maintenance and can be cleaned easily, even after connection of pipework. This is crucial for many companies, especially in times of skills shortages,” says Andreas Rössler, Sales Manager at Lutz Pumpen. “Simply dismantling the pump head means that cleaning and maintenance work, such as replacing the wobble plate or shaft seal, can be completed within ten minutes. This ensures increased availability and greater productivity.”

The TR series wobble plate pumps are available in three versions: The TR015, an entry-level version, operates with a 3 kW motor, 10 bar pumping pressure and achieves a flow rate of 6,000 litres per hour. The TR030 has a 5.5 kW motor and works with a flow rate of up to 12,000 litres per hour at a pressure of 15 bar. The TR080 – the Goliath of the series – achieves an output of up to 30,000 litres per hour with a 7.5 kW motor at a pressure of 15 bar. Lutz Pumpen also offers several wobble plates for specific industry requirements – such as FDA-compliant versions for the food and pharmaceutical industries and aluminium bronze versions for the petrochemical industry.

About the Lutz Group: Pioneering fluid management since 1954

Established in 1954, the internationally active family business Lutz has advanced to become synonymous for professional fluid management. Today, the Lutz group of companies includes a number of top-performing, medium-sized companies located in Germany and abroad, which operate in the broad field of pump technology, water treatment and disinfection. The Lutz Group has 13 branch offices and representatives in over 80 countries.

The high-quality and reliable pumps, systems and accessories are

deployed for dosing, conveying, emptying and mixing a wide variety of media from containers and in systems and processes. The product range includes drum and container pumps, flow rate meters, double diaphragm pumps, centrifugal pumps, solenoid and motor-driven dosing pumps, gas dosing devices, measurement and control systems and disinfection systems for industry and swimming pool water.

Corresponding with the broad range of services provided by the Lutz Group, the products and solutions provided by its companies are deployed in a wide variety of industries and commercial sectors. Leading examples include the chemicals industry, the automotive and vehicle industry, electroplating and surface treatment, the food industry, the paint and varnish industry, agriculture, water and wastewater treatment and the paper and ceramics industry.

Siemens accelerates hydrogen ramp-up with generative artificial intelligence



Green hydrogen is critical to achieving sustainability targets in the industrial sector. To accelerate the hydrogen ramp-up, the technology company Siemens will be supporting companies in the hydrogen industry with software tools based on generative artificial intelligence. Especially in hydrogen production, these new solutions are intended to help significantly simplify the design, engineering and automation of hydrogen production plants, enabling a quicker scale-up of hydrogen production.

Faster design with Hydrogen Plant Configurator

The new Hydrogen Plant Configurator is an intelligent chatbot based on generative artificial intelligence which enables users to create plant designs for hydrogen production. In an iterative process, the configurator is fed with the desired design characteristics of a production plant.

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The AI then creates seamless block flow diagrams up to precise layouts of the system units and connections. In addition, the AI can predict plant-specific key figures such as possible power consumption, heat generation and a comprehensive list of the most important components. The data generated in this way represents the basic concept of a plant. It can then be transferred to engineering and simulation software such as Siemens' Comos and gProms, for example, to automatically create the piping and instrumentation diagrams.

"Green hydrogen is crucial for the decarbonization of industry. It will be a scarce commodity for the foreseeable future. This makes it even more important to accelerate the ramp-up of production capacities", says Axel Lorenz, CEO Process Automation at Siemens. "Generative artificial intelligence can provide support in the crucial phases of hydrogen production to save considerable time and costs. With the Hydrogen Plant Configurator, it is easier than ever to plan and operate a more sustainable hydrogen plant and thus lay the foundation for efficient production."

Faster engineering with Comos AI

Siemens is also launching an AI-based tool for the project planning phase of hydrogen plants. The Comos AI engineering assistant can create equipment specifications and diagrams based on natural language descriptions and automatically completes or corrects models and drawings. The assistant can also provide support during cross-domain phases in engineering or cross-product workflows by converting models, drawings, and information structures, for example for simulation software such as Simit from Siemens.

In addition, users can use Comos AI to retrieve information from engineering-relevant products – via their own prompt or suggested by the assistant. In this way, the assistant provides answers to documentation, specifications, or technical details. By entering images, scans, or PDFs, it can also proactively deliver relevant resources and transform them into precise diagrams and models.

AI upgrade for the distributed control system

To simplify the automation of processes in hydrogen plants, Siemens is launching an innovative module for the Simatic PCS neo distributed control system: SFC Generation. The module is integrated into the process control system and can create so-called sequential function charts (SFCs) using generative artificial intelligence.

These charts provide a visual representation of process logic and allow users to easily manage complex workflows. This is possible based on specific prompts or by copying a prose process description into the module's chat window.

From Fields to Gifts - Kvuno Empowers Farmers with Zwardy Points Redemption Programme



farming practices and improve their livelihoods. The motivational nudges provided by Z'wardy were said to have inspired farmers to adopt sustainable methods, leading to increased yields and profitability.

Reaping Hope

Zitamandani Duli, Kvuno Lead Farmer confirmed the life changing aspects one can get from the rewards that come from adopting climate smart agricultural practices in Malawi. He also got a radio through his Z'wardy points and proudly showcased his great harvest which he attributes to Kvuno's Pewo service whereby he was given 25kg of certified soya seeds – of which he needs to return 75kg.

"Look at the great harvest that I have. From what you can see, it can easily amount to about 750kg. The teaching of Kvuno – as well as their seeds – work. You can see for yourself. From the profits, I managed to buy 12 chickens, two goats, an ox cart and so much more. I am storing the seeds now as we are anticipating better prices in the near future. I have no words to thank you. We use your weather app information, teachings and services. Thank you very much Kvuno. You have changed my life, along with my wife and our four kids," says Duli.

According to Judith Samson, Wife of Kvuno Lead Farmer from the Nsalu-Kwathamu region of Malawi, Kvuno helped to change her life around. Today, she attributes her confidence and community stature to Kvuno's good agricultural trainings. "With the proceeds of the sales, I bought a pig and goats. Even better still, look at the house that we are building. It is almost complete. I am confident that if we stick to the teachings from Kvuno we will reach and surpass our dreams," concludes Samson.



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Nordic Water DynaBeltT provides efficient filtration in a compact footprint

Designed for maximum hydraulic flow and occupying just 10% of the space needed for an equivalent sedimentation tank, the DynaBelt offers municipal water treatment works the ability to reliably improve throughput within existing spaces – ideal for facilities in built up areas. A seamless, auto tensioning belt filter is attached to self-cleaning slave and drive rollers and surrounded by the longest emergency overflow weir on the market. As the filter collects suspended solids and head loss occurs, low consumption internal spray bars activate and water is moved to the integrated backwash system. A highly controlled hot water flush also eliminates fat, oil and grease from the filter without the need for chemicals. The DynaBelt features a unique sludge discharge roller, which rotates at high speed and creates a partial vacuum. This removes the sludge from the belt into a dedicated compartment separate from the backwash reject water to ensure no dilution occurs.

The sludge can then be pumped into storage for further processing. Unlike competitor designs that use energy intensive air knives or blowers, this allows the DynaBelt to consume less than 0.6 kW in operation, providing a large energy cost saving and a sizable reduction in carbon footprint. It also offers the largest effective filtration area compared to its competitors at 2.7 m², delivering a 30%-50% average reduction in total suspended solids.

Furthermore, three sizes are available to suit different requirements, whether that is pilot schemes, low flow applications or larger systems. DynaBelts can be arranged in parallel to optimize capacity, enabling larger throughput. User friendliness is another inherent quality of the DynaBelt. Quick connectors allow for a fast belt change, which only needs to be carried out once every one or two years, depending on the application. Lightweight covers mean easy access to the filter belt unit without cranes or tough lifts. The low and compact design of the DynaBelt tank also reduced headroom requirements.

The smart features of the DynaBelt add further benefits for operators. With an integrated human machine interface (HMI) control panel with two variable frequency drives (VFDs), the belt filter can also provide failure validations and notifications to inform maintenance personnel. Operating torque, water consumption, energy usage and head loss detection displays provide ample information daily checks. By specifying the optional 4G antenna, wireless monitoring is also possible, and compatibility is available for a wide range of industrial control systems.

As a Sulzer brand, Nordic Water also offers single source access to a complete range of screening, sedimentation and filtration systems, including the provision of sludge pumps and pipework, further simplifying procurement and future maintenance.

Egypt's Water Research, Space Agencies Join Forces to Tackle Water Challenges



Egypt's National Authority for Remote Sensing and Space Sciences (NARSS) and the National Water Research Center (NWRC) have signed a joint cooperation protocol to bolster national efforts in water resource management and development. The protocol, announced at a workshop on Tuesday, aims to leverage the expertise of both institutions to address Egypt's water challenges. Islam Abu Al-Majd, Chairperson of NARSS, emphasised the Egyptian state's reliance on scientific research as a driver of sustainable development and its role in achieving Egypt's Vision 2030.

He highlighted NARSS's contributions to presidential initiatives and national projects, underscoring the importance of cooperation with NWRC. Sherif Mohammadi, head of NWRC, stressed the importance of collaboration between research institutions to confront challenges related to natural resources. He expressed a desire to utilise NARSS's expertise in joint projects and integrated work teams to develop innovative solutions for water issues.

The protocol encompasses a wide range of collaborative efforts, including the study and evaluation of surface and groundwater resources, the study of natural resources and earth sciences for water resource management, the evaluation of water resources while considering the interplay between water and society, the study of natural and environmental risks impacting water resources, and the development of smart systems for efficient water management and distribution. Additionally, the protocol aims to advance research in new and renewable energy to rationalise water consumption in power generation. It will also leverage remote sensing techniques, geographic information systems, and advanced technologies like lasers, radar, and thermal sensors to study, analyse, and manage water resources.



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The meeting showcased the capabilities of both institutions, highlighting modern technologies that could revolutionise the study and sustainability of water resources. These technologies include aerial and ground laser technologies, advanced imaging, and Internet of Things technologies.

EU backed fund PureTerra Ventures invests in sustainable chemical company with alternative water treatment applications

Sudoc's products not only eliminate pollutants that are harmful to the environment, they also make water resources more reusable, helping to meet EU regulation targets on increased water reuse. Paul O'Callaghan, founder and CEO of BlueTech Forum, said: "We founded BlueTech Forum to support the efforts of entrepreneurs and investors and to generate innovation in the water space. Sudoc was a new entrant to water just a few short years ago, and has taken great strides, moved fast, learned quick and executed very well. Their leadership team is committed to making a positive impact in water and creating value for clients and investors."



O'Callaghan added: "PureTerra is one of the most active and astute water investors out there. I think this is a great fit and very good opportunity for both Sudoc and PureTerra. I am looking forward to seeing what they can do together."

Martijn van Rheenen, strategic director of Momentum Capital, said: "We are pleased to partner with PureTerra in bringing new capital resources to Sudoc, a company we believe will fundamentally change the way we use chemicals in treatment in water."

UK Water Industry Research (UKWIR) announces : Its Chief Executive, Steve Kaye, will be stepping down in November 2024.

Richard Warneford, UKWIR chairman, will lead the search for Kaye's replacement. Warneford joined the UKWIR board in 2012 and has been chair since 2019. He has worked with Kaye for five years.

A water professional and chartered engineer, Warneford joined the sector in 1985. He has worked in operations, commercial, investment, partnerships, asset management and employee relations, with most of this time providing strategic direction and leadership.



Warneford said, "It has been a pleasure and privilege to work alongside Steve Kaye and witness how he has grown UKWIR's capacity and strategic offerings to the water sector. He has overseen a significant step-change, helping to strengthen and solidify UKWIR's relationships with water companies, research institutions, academia and the wider supply chain."

In his time as chief executive, Kaye has overseen several significant research projects, with the potential to make lasting positive change for the sector, including world-leading studies into leakage, river health and the Chemical Investigations Programme (CIP) – the UK water industry's response to current and emerging legislation on trace chemical substances in the water environment.

Kaye said, "I am proud of everything we have achieved, and grateful for the support of my wonderful team, the UKWIR board and the many friends and colleagues in the water sector and beyond. UKWIR has strong ongoing support from water companies in the UK and Ireland; and is continuing to provide vital services and research outputs that benefit the industry and encourage collaboration – helping us build a better industry together."

Kaye has worked in the water industry since 1990 and has been chief executive of UKWIR for the past six years. He will remain in post for the next six months to ensure a smooth transition as UKWIR recruits a new CEO. Alongside semi-retirement, Kaye plans to continue being involved in the water sector in an advisory capacity. "This is an exciting, and challenging, time for the water sector and UKWIR has the potential to be a major player in finding solutions to some of our most pressing challenges. We are looking for a new CEO who can seize these opportunities and help make a difference to the future of water," added Warneford.

The process is already underway to look for Kaye's successor. UKWIR would like to hear from interested candidates.



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GEM INDONESIA

LANXESS DRIVES SUSTAINABLE CHANGE IN JHAGADIA THROUGH ITS CSR INITIATIVES

Jhagadia, May 3, 2024

LANXESS reaffirms its commitment to sustainability and community development through a series of impactful Corporate Social Responsibility (CSR) projects in Jhagadia, Gujarat. The organization has implemented several initiatives aimed at promoting education, renewable energy, vocational training, and water conservation in the region in the last couple of years.

LANXESS has been a driving force in promoting renewable energy solutions in Jhagadia. Focusing on the topic of Climate Protection, the organization has installed solar panels and solar street lights in key locations across the region, including rural areas, government schools and hospitals. These solar lighting projects not only contribute to reducing carbon emissions but also provide a sustainable source of electricity to the community.

In addition to this, the organization has also invested in Rainwater Harvesting projects in the region to meet the water needs of the community in Jhagadia. This involved collecting rain water from the identified villages and recharging the ground water levels.

LANXESS has always been committed in creating a conducive learning environment and empowering young minds. In order to enhance the quality of education in the region, the organization has supported municipal schools in Jhagadia by providing e-learning software's. These e-learning tools provide an interactive audio-visual learning experience to the students and familiarizes them with the modern system of education. Additionally, LANXESS has also distributed school bags in municipal schools thereby providing underprivileged children access to basic educational amenities.

Recognizing the importance of skill development and empowerment, LANXESS has been implementing vocational training program at its manufacturing site

in Jhagadia over the last years. Through this program, the organization provides valuable on-the-job training to graduate apprentices.

LANXESS has also supported the communities in times of need by mobilizing its resources and provided support to the flood affected population of Bharuch & Ankleshwar by providing them with essential relief material. Whether it be floods or other natural disasters, LANXESS has continuously contributed towards the development of the communities where it operates.

During COVID-19 pandemic, LANXESS donated advanced German ventilators to hospitals in Thane & Mumbai (Maharashtra), Ujjain (Madhya Pradesh) and Ankleshwar & Bharuch (Gujarat). To help medical institutions tackle the situation better, the organization also donated 1 tonne of disinfectant, Rely+On™ Virkon™ which was highly effective in containing the spread of the virus and face masks among other relief materials.

Commenting on the development of its CSR projects, Namitesh Roy Choudhury, Vice-Chairman & Managing Director at LANXESS India said, "LANXESS remains dedicated to its mission of creating value for society and fostering sustainable development in the communities it serves. Our CSR initiatives are a testament to our commitment to supporting communities in need and contributing to their long-term well-being. We will continue to work closely with local authorities and like-minded organizations and provide support to the community and nearby areas of Jhagadia region in the future". LANXESS is a leading specialty chemicals company with sales of EUR 6.7 billion in 2023. The company currently has about 12,800 employees in 32 countries. The core business of LANXESS is the development, manufacturing and marketing of chemical intermediates, additives and consumer protection products.

LANXESS is listed in the leading sustainability indices of the Dow Jones Sustainability Index (DJSI World and Europe).

Forward-Looking Statements

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EIB GLOBAL'S WATER SECTOR FUND BACKING €10 MILLION FOR WATER INVESTMENT ACROSS AFRICA AND ASIA

The investment through the Water Access Acceleration Fund, a €70 million private equity fund. Investment to improve safe drinking water access in Africa, Asia and Latin America.

First fund investment by the Water Sector Fund, financed by the Netherlands and managed by the EIB. The Water Sector Fund managed by EIB Global will provide €10 million in the Water Access Acceleration Fund (W2AF), managed by Incofin, a prominent global impact investment manager. W2AF is a "water-focused" blended finance impact fund targeting sustainable and scalable solutions that improve access to safe, affordable drinking water for underserved populations, mainly in Sub-Saharan Africa and South and Southeast Asia. The new initiative will provide 20 billion litres of safe drinking water by 2030.

The €10 million anchor investment by EIB Global will secure other investments, attract more private investors to W2AF. Through the fund, EIB Global will support innovative water businesses.

Among the first partners to benefit from this equity support will be Rite Water Solutions, a company in India providing drinking water solutions and improving water quality in rural and urban areas of the country. More than 540 000 households are expected to benefit.

This support to W2AF represents the first fund investment by the Water Sector Fund, a trust fund established in partnership with the Dutch government and managed by EIB Global. With its donor financial resources, the Water Sector Fund develops drinking water projects in low- and lower-middle income countries and promotes the UN Sustainable Development Goals.

EIB Vice-President Robert de Groot remarked, "This investment showcases our joint commitment to enhancing access to safe, affordable drinking water for all. Innovative financial and technical solutions are needed. The W2AF is an excellent example, funnelling water investments to the regions that need it most and helping build the private water ecosystem in

emerging markets in Africa and Asia. I extend my gratitude to the Dutch government for their vital support, making this impactful endeavour possible."

Incofin Chairman Loïc De Cannière stated, "We thank the EIB and the Dutch Water Sector Fund for joining W2AF, together with our diverse investors from Europe and the United States. W2AF is a pioneering, first-ever equity impact fund for the drinking water sector in the Global South. Incofin aspires to make the impact of this fund a success, and an example for other investors. By doing so, it will pave the way for more water funds, helping millions of people around the world access drinkable water, which is a key Sustainable Development Goal and a fundamental human right."

Cees Bansema, Ambassador of the Kingdom of the Netherlands to Luxembourg, explained, "Access to safe drinking water is a human right and critical for social and economic development. This investment in W2AF shows how cooperation makes water projects more sustainable and inclusive. It is also a great example of how we can mobilise additional funding from other financiers or investors. It is a flagship operation of the Dutch-funded Water Sector Fund — combining the Netherlands' continuous commitment to addressing global water challenges, the EIB's extensive experience investing in water worldwide, and fund manager Incofin's unique track record in impact investments."

Background information

EIB Global is the EIB Group's specialised arm devoted to increasing the impact of international partnerships and development finance outside the European Union. EIB Global is designed to foster strong, focused partnerships within Team Europe and as part of the EU Global Gateway strategy, alongside fellow development finance institutions and civil society. EIB Global brings the Group closer to local people, companies and institutions through our offices around the world.

The Water Sector Fund is an EIB-managed trust fund established in 2017 in partnership with the government of the Netherlands. It focuses on water sector projects in low- and lower-middle income countries, supporting universal access to water supply, sanitation and hygiene. The fund is open to contributions from other donors seeking to achieve UN Sustainable Development Goal 6: clean water and sanitation for all.

Incofin Investment Management is an impact investment fund management company for the Global South. It is headquartered in Belgium and has offices worldwide. It focuses on investments in financial inclusion, agri-food businesses, and safe water companies, with assets under management of €1.3 billion. Its investor base comprises development banks, institutional investors, family offices and private individuals.



STEPPING TOWARDS A WATER-SMART SOCIETY

Dr Mayur J. Kapadia, Educator, Technical Content Creator, Trainer, Writer, Editor & Former AGM, Quality Control Dept, GNFC Ltd

CHALLENGES TO SUSTAINABLE WATER AVAILABILITY

Water, an essential resource for drinking, domestic use, agriculture, and recreation, plays a pivotal role in public health and economic development worldwide. However, water availability is not finite and water scarcity has become a global challenge. As far as India is concerned, it has 18% of the world's population but only 4% of the water resources, making it one of the most water-stressed countries in the world. More than 20 cities, including Mumbai, Delhi, Hyderabad, Bangalore, Madras, are predicted to run out of groundwater by 2030. Water shortage will not only impact India's population but also the national GDP. Optimizing water usage is a rising problem for industries, municipalities and institutions not only within India but across the globe. The other challenges which are faced by various organizations are :

- Maintaining and expanding water infrastructure
- Water distribution system leaks
- Rising energy costs
- Rate affordability for customers
- Emerging water contaminants

To alleviate the problems, thrive economically and bridge inequality gaps in water availability for each sector; it is crucial to enhance the global water supply, sanitation, and resource management. In order to be more efficient in water-use; the government, industries and municipalities need to turn towards smart water management that deploys Internet of Things (IoT), Artificial Intelligence (AI) and Machine Learning (ML) to create the difference in water management.

SMART WATER TECHNOLOGY

Smart water technology encompasses the integration of hardware, software, and analytics to collect and automate data & analyse the information to aid water supply and wastewater facilities address various challenges. Smart water refers to a movement in the water industry involving emerging technology to help water and wastewater utilities target solve problems through automation, data gathering and data analysis. By promoting efficient technology use and informed decision-making, smart water technology offers a framework for enhanced water management.

energy efficiency, water quality improvements and more. Accurate data analytics are also helping to manage hydrological issues like flooding and groundwater depletion. A few examples of smart water technology in practice include:

- Imaging to inspect corroding pipes and predict bursts
- Real-time data analysis to identify leaks in piping network
- Measurement of pressure and flow to evaluate



New and emerging digital technologies, smart water grids, and smart water management solutions are being used to build more efficient water management infrastructure, wastewater treatment plants and irrigation systems. They potentially are solutions to issues including leak detection, water efficiency,

rehabilitation / replacement needs of the pipe infrastructure

- Advanced metering to gather water use data and help customers track their home water usage
- Analysis of water quality parameters and their

charting for improvements in the treatment process.

It is the objective of this paper to highlight some of the areas that could strive the benefit, know beneficiaries and how application of smart technology can bring about transformation in the society.

WASTE WATER TREATMENT & WATER RECYCLING :

Waste water treatment is complex and challenging. The operational cost of these plants is also high. Data-driven intelligent applications can reduce the consumption of energy and chemicals in sewage treatment plants, ultrafiltration, and other treatment processes. Smart technology not only reduces the cost of operation but also improves safety.

Digital frameworks like Deep Neural Network (DNN) models, Random Forest models, and Variable Importance Measure (VIM) analysis study various effluent parameters like suspended solids, sludge, and pollutant chemicals along with operational parameters such as time lags and temperature. Adoption of this technology can help develop control strategies to enhance quality of treated water while reducing operational costs. If we look at 'Aeration' as one of the treatment steps, it is a known fact that it accounts for almost half of the total energy consumed in whole waste water treatment plant. Smart technology analyses the plant's data and suggests the best set points for aerators to reduce energy consumption.



Sensors monitor the health of the plant as well as equipment. AI-based predictive analytics tools and controls detect and give a warning about critically high water levels in sewers or indicate blockages. They can also send signals warning of potential safety hazards like pipeline bursts. Data simulations and smart technology also help plant operators to prepare themselves for specific untoward situations, both for

improving efficient treatment and for public safety. These reduce the cost of running the plant and improve plant availability and security.

RO, CW :

Data collected from RO plants, sewage treatment plants, and cooling towers is transmitted to cloud-based analytics platforms to predict performance, detect faults, and provide troubleshooting insights.

RAINWATER HARVESTING :

Automated systems control rainwater runoff from roofs. Sensors monitor moisture and temperature of ambient air as well as the fill level of reservoirs. If heavy rain is predicted, the roof and reservoir can be drained automatically to make room for further rainwater harvesting.

LEAKAGE DETECTION AND THEFT :

Leakage is a major issue in water distribution systems. Currently, most leak detection systems are based on manual procedures. AI and ML enabled electronic and digital systems like pressure and acoustic sensors, connected to the network through centralized and cloud-based monitoring systems, can detect and pinpoint leaks in real time. Advanced AI and ML, combined with statistical methods, can also predict pipe bursts in distribution networks allowing operator and maintenance department to take proactive actions for correcting the situation, which could avert the out-of-service time of the distribution network.

WATER DISTRIBUTION :

Data acquisition, AI-based digital assistants, operational data, networking, and integration system enable the automation of all the technical and organizational processes and value chains for a water distribution network system. Merging these data into a Smart Technology will help water distribution companies optimize plant design, operation, and maintenance. Detection of pipeline leakages based on flow rates and repair actions facilitated based on prediction of pipeline rupture reduce the amount of non-revenue water. Smart technology also helps in identifying the possible impact during outage events so that disaster management teams could remain proactive to take care of the potential vulnerabilities.

HOUSEHOLD WASTAGE :

For households and buildings, AI-based smart metering can help understand their usage patterns and reduce consumption. These meters allow utility companies to collect data faster and more efficiently. Advanced metering infrastructure (AMI) captures flow data at the point of use and throughout out all areas of a distribution system. That data can be used to identify irregularities in water flow or water use for a resident. Additionally, the data captured at the point of use can be provided to the residents through water bills to show them how efficiently they are using their water compared to neighbours or other efficient users.



FLOOD PREDICTION :

AI-based flood predictions and forecast systems help governments to take necessary actions and reduce calamities and destructions. ML and abundant data modelling can measure real-time river data to forecast floods and send alerts to the people in affected regions.

IRRIGATION :

Approximately 70% of the world's freshwater is used by the agricultural industry. Applying a more intelligent approach to water management by deploying AI-based precision irrigation systems, computer algorithms and modelling is already benefiting farmers in many countries, including India.

GROUND WATER LEVEL :

ML models predict the availability of groundwater and

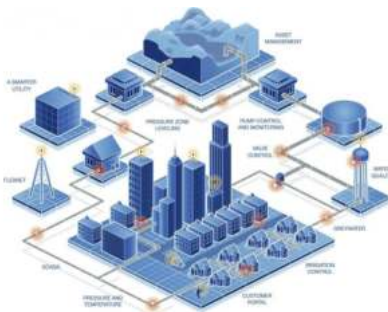
analyse its characteristics. Compared to physical models, data-driven models help determine specific groundwater characteristics accurately, with a lower number of input data and easier model structures.

SOCIETAL TRANSFORMATIONS

Digital technology, including its omnipresent connectivity and its powerful artificial intelligence, has the great power to bring about humanity's socioeconomic evolution. The current age algorithms that automate the conversion of data into actionable knowledge is capable of leading to several social transformations.

SMART CITY :

City administrators need to keep a close eye on water supply, consumption, and equipment. With IoT, the whole water supply chain can become more transparent and easier to control. Residents with smart meters can make more informed decisions leading to a more sustainable city overall. Water waste and disrupted water supply chains are a drain on the city's budget. IoT allows operators to receive alerts and start fixing issues immediately. With AI, city administrators can also watch the watershed and predict which areas are likely to flood. Such information will help local authorities warn residents, manage traffic, and keep the city on its feet.

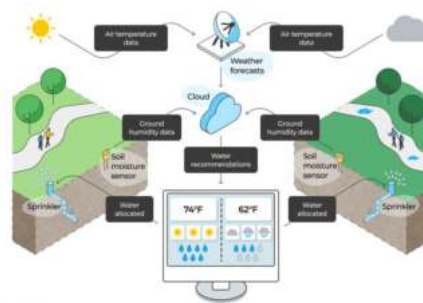


SMART IRRIGATION AND FARM PRACTICES :

Water scarcity as well as oversupply can negatively affect crop yields. Adoption of smart technology brings about the use of a combination of sensors to measure weather data and machine learning algorithms to determine the optimal amount of water required for each crop. These systems take into account factors such as soil moisture, temperature, humidity, and evapotranspiration rates to determine

the precise water requirements of each crop. These sensors are connected to the field and sprinkler in sprinkler irrigation systems, and farmers receive regular updates on their smartphones. Through data compilation and application of algorithms, the effectiveness of the water distribution process is optimized in the farms and parks.

A smart water management system for agriculture can improve crop fields providing farmers with the oversight they need to avoid water waste. Farmers are able to use less water, less fertilizer, save energy, save money and time to grow the same amount of crops.



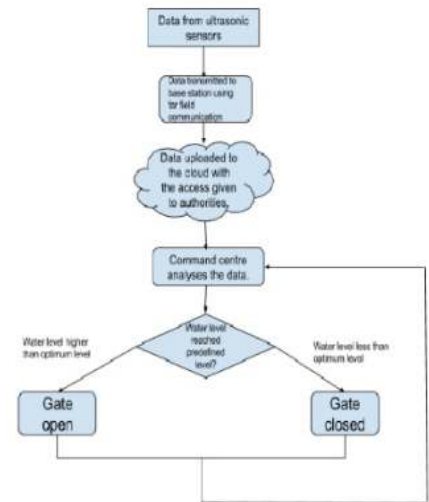
WATER QUALITY MANAGEMENT :

Rivers, lakes, and reservoirs may contain dangerous contaminants. The increasing world population combined with urbanization has also worsened water quality. IoT can help monitor and analyse distributed water and ensure it complies with regulatory standards. Operators receive regular data from multiple samples, enabling them to remotely perform quality control on water reserves. All these actions can improve the management of water quality.

DAM MANAGEMENT & WATER LEVEL MONITORING :

It is highly important to ensure that the dams and reservoirs are functioning properly for maintaining sufficient water levels which are safe. The traditional monitoring methods are time-consuming and complex. Use of ultrasonic, vibration, and pressure sensors can help the monitoring of dam function. Predictive technologies ensure dam operators get early warnings and are able to keep watch over water availability in each reservoir. The technology can also provide remote control over the movement of gates which averts personal visit of staff to operate gates in severe weather conditions like floods or storms.

If the water reaches a certain level, the system can decide of its own to open or close the gate.



BENEFICIARIES OF SMART WATER TECHNOLOGY

While vulnerable communities are benefited more; ideally, everyone stands to gain from smart water technology. Utilities can optimize their resources to focus on expenses on other critical areas and direct funds towards those areas. Manufacturers can innovate their technologies based on data-driven insights to make them tailor-made with respect to clients' needs. Engineers can better serve their clients, while community residents gain insights into their water consumption patterns and save on their water bills.

Smart water technology can enhance water equity, affordability, and access for vulnerable societies. By optimizing consumption patterns, arresting pipeline leaks, and overcoming operational inefficiencies; this technology can help underserved areas access clean and cost-effective water.



Antarctica holds about 60% of the world's fresh water in the form of ice. If all the ice were to melt, global sea levels would rise significantly.

CONCLUSION

Commercial and non-commercial organizations must look forward to conserve water and reduce costs in wake of alarming water scarcity. The traditional methods like analysing water bills, installing water logger of automated meter reader are not able to resolve all water-related issues. Selecting the right smart water technology is crucial for them. The landscape of water management technology is continually evolving. IoT based smart water management brings transparency and optimized control to the whole water supply chain, helping industries and cities use healthy water efficiently, follow regulations, collect and recycle wastewater. With more data analytics, cloud-based AI tools, smart sensors, and ML applications to track and manage the most important natural resource, Smart technology is becoming a reality to help organizations, industries, and governments march toward their goals.



About the Author



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Dr Mayur J. Kapadia, MSc, PhD, is an Educator, Trainer, Editor and Technical Content Creator. He served M/s GNFC Ltd in capacity of Add Gen Mgr & Lab Head for its Bharuch & Dahej (Gujarat) locations. He possesses professional industrial experience of 40 years in the fields of Quality Control of Chemicals / Fertilizers / FMCG products, New Laboratory Set up, Cooling Water Management, ISI certification, and many other areas. He has to his credit technical suggestion awards, nearly 30 publications in journals / magazines and & 20 presentations in conferences. He has been conducting full day training programs on Quality Control, NABL, Instrumental Analysis, ISI certification, Cooling Water Management, etc for industry professionals.

He is an active member in technical committee of Bureau of Indian Standards (BIS), which has conferred upon him a 'Certification of Appreciation' for his immense contribution towards establishing and improvising various Indian Standards. He also has been rendering technical services to various organizations for quality improvement, process trouble-shooting and analytical aspects.

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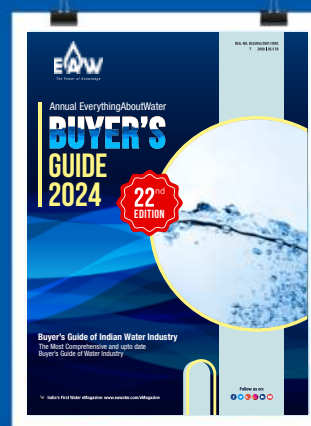


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ASSET MANAGEMENT: KEY TO A BETTER WATER FUTURE

Anil Sethi, Chairman, Pump Academy Private Limited

Water utilities across the globe face immense challenges, including aging infrastructure, deferred maintenance, and resource scarcity, underfunding, and increasing regulatory and environmental pressures. To address these issues effectively, governments are mandating the adoption of asset management practices. Asset management involves the systematic and coordinated activities of an organization to optimally manage its assets and systems, their associated performance, risks, and expenditures over their lifecycles.

Water utilities must manage both plant and network assets efficiently to safely deliver essential services, including drinking water and sewage collection. This requires the implementation of asset management principles, covering:

- **Asset Inventory and Condition Assessment:** Maintaining a detailed inventory of all assets and regularly assessing their condition to identify maintenance needs and prevent failures.
- **Risk Management:** Identifying and mitigating risks associated with asset failure to ensure continuous service delivery.
- **Lifecycle Cost Analysis:** Evaluating the total cost of ownership for each asset, from acquisition through disposal, to optimize investment decisions.
- **Maintenance Planning and Scheduling:** Developing and executing maintenance plans to extend asset life and improve reliability.
- **Performance Monitoring and Data Analytics:** Utilizing data analytics to monitor asset performance, predict failures, and improve decision-making.

- **Regulatory Compliance:** Ensuring all assets comply with relevant regulations and standards to protect public health and the environment.
- **Sustainability and Resilience:** Incorporating sustainability practices to reduce environmental impact and improve resilience against natural and human-made disruptions.

By adhering to these principles, water utilities can enhance the reliability and efficiency of their assets and services, ensuring the safety and well-being of the consumers they serve.

Asset management is not as complex as it may seem. At its core, it's about doing the right things, in the right order, for the right reasons, to achieve the desired results. A successful asset management program aligns the organization's overall mission and strategic

objectives with their daily asset management activities. This requires vertical alignment from top leadership to field engineers and horizontal alignment across all divisions for better and smoother operations.

Water utilities must identify and assess risks to their assets and systems to make informed decisions that balance performance, efficiency, and risk mitigation. Asset management strategies focus on maximizing asset value through optimized maintenance, condition assessments, and lifecycle management. Effective metrics and key performance indicators (KPIs) are essential for measuring and improving asset performance.

CHALLENGES AND OPPORTUNITIES

Water utilities face the critical task of managing



assets to safely deliver their services. Effective water asset management is vital for ensuring reliability, efficiency, and sustainability. However, water utilities face many challenges in their initiatives in managing the assets.

Challenges in Water Asset Management

- **Aging Infrastructure:** Aging infrastructure that requires significant maintenance and replacement is most prominent challenges faced by the water utilities. The deterioration of pipes, pumping systems, treatment plants, and other crucial assets can lead to frequent failures, water loss, and service disruptions. Addressing these issues often requires substantial investment, which can be a significant financial burden for utilities.
- **Funding Constraints:** Securing adequate funding for asset management projects is a persistent challenge. Many utilities face financial constraints, limited access to capital, and other priorities, making it difficult to finance necessary upgrades and maintenance.
- **Regulatory Compliance:** Water utilities must comply with stringent regulations to ensure the safety and quality of water services. Keeping up with evolving regulations and standards can be challenging, especially for smaller utilities with limited resources. Non-compliance can lead to penalties and a loss of public trust.
- **Climate Change and Environmental Concerns:** Climate change poses significant risks to water infrastructure, including increased frequency of extreme weather events, droughts, and flooding. These events can damage assets, disrupt services, and require costly emergency responses. Other environmental concerns such as increasing pollution and resource depletion necessitate sustainable management practices.
- **Technological Integration:** Integrating new technologies into existing systems can be complex and costly. Many utilities struggle with adopting advanced data analytics, IoT devices, and smart infrastructure due to technological compatibility issues and a lack of skilled personnel.
- **Advanced Data Analytics:** The advent of advanced technology and data analytics provides water utilities with powerful tools to monitor asset performance, predict failures, and optimize maintenance schedules. By leveraging big data and machine learning, utilities can make better and informed decisions, reduce downtime, and extend life of the assets.
- **Smart Infrastructure:** Smart infrastructure, including IoT devices and automated control systems, offers significant benefits for water asset management. These technologies enable real-time monitoring, remote management, and rapid response to issues, enhancing the efficiency and reliability of water services.
- **Lifecycle Cost Analysis:** Implementing lifecycle cost analysis allows utilities to evaluate the total cost of ownership for each asset, from acquisition through disposal. This approach helps in making better investment decisions, prioritizing projects based on cost-effectiveness, and optimizing resource allocation.
- **Optimizing Pumping Systems:** Pumping systems play a crucial role in water utilities' infrastructure, responsible for transporting water from sources to treatment facilities and distributing treated water to consumers. It is an essential component of water distribution; require regular maintenance and monitoring to ensure efficient operation and a reliable water supply. Optimizing operations improves energy efficiency and saves costs. Condition monitoring and predictive maintenance help reduce downtime and extend the lifespan of these systems. Effective asset management, using software and analytics, enhances performance, plans for the long term, and considers the challenges of aging infrastructure, new technologies, and sustainable water-energy solutions.
- **Public-Private Partnerships:** Public-private partnerships (PPPs) can provide a viable solution for financing and managing water infrastructure projects. Through PPPs, utilities can leverage private sector expertise, innovation, and funding to address infrastructure challenges and improve service delivery.
- **Sustainable Practices:** Embracing sustainable practices is crucial for addressing environmental concerns and ensuring long-term resilience. Water utilities can adopt green infrastructure, energy-efficient technologies, and water conservation measures to reduce their environmental footprint and enhance resilience and sustainability.
- **Skill Development:** Investing in workforce development is essential for overcoming the challenges associated with technological integration and regulatory compliance. By training and upskilling staff, utilities can build a knowledgeable and capable workforce to manage modern water systems effectively.

For water utilities needing to address aging infrastructure, upgrade technologies to manage emerging contaminants, and increase resilience to extreme weather events or other challenges, effective asset management is the key to ensuring reliable service, optimizing performance, and planning for long-term sustainability. This involves integrating advanced technology and analytics, implementing predictive maintenance strategies, and adopting innovative solutions to enhance infrastructure durability and operational efficiency. By focusing on these areas, utilities can better manage resources, reduce costs, and adapt to evolving environmental and regulatory demands.

In pursuit of enhanced water asset management, Pump Academy Private Limited has launched iPUMPNET, a technology-driven pump optimization solution. It integrates advanced technology with pumping system operations, enhancing energy efficiency, prolonging lifespan, and minimizing downtime to improve overall asset performance. Moreover, it substantially reduces carbon emissions, aligning with environmental stewardship goals.



Opportunities in Water Asset Management

CONCLUSION

Managing water assets is a vital yet intricate responsibility crucial for the safe and efficient delivery of water services. Despite the substantial challenges utilities encounter, there are abundant opportunities to improve asset management practices. Effective water asset management is essential not only for current operations but also for ensuring a resilient and dependable water supply for future generations. By prioritizing this task, water utilities can navigate complexities and proactively address evolving needs, safeguarding water resources for years to come.



About the Author



Anil Sethi, the Founder Chairman of Pump Academy Private Limited, brings a wealth of expertise in the water sector. His vision for the company involves providing innovative solutions to water utilities, envisioning the transformation of pumping stations into technologically advanced, automated, and responsive assets with robust processes. Widely recognized for his outstanding contributions to nation-building initiatives, Anil Sethi has received numerous awards honouring his achievements in the industry.

Anil Sethi
Chairman, Pump Academy Private Limited



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URBAN AND INDUSTRIAL SUSTAINABLE WATER MANAGEMENT

Mandarr Kkamthe, Freelance Expert, Water Management

Water is a vital resource for both urban and industrial sectors. However, urbanization and industrialization have put a strain on water resources, making it increasingly important to adopt sustainable water management practices.

CHALLENGES OF URBAN AND INDUSTRIAL WATER USE

Urban water demand: Cities are growing rapidly, and with them, the demand for water. This increased demand can lead to water scarcity, particularly in arid regions.

Industrial water pollution: Industries generate large amounts of wastewater, which can pollute water sources if not properly treated.

Climate change: Climate change is exacerbating water scarcity and pollution. Droughts and floods are becoming more frequent and intense, and rising sea levels are threatening coastal water supplies.

SUSTAINABLE WATER MANAGEMENT PRACTICES

There are a number of sustainable water management practices that can be implemented to address these challenges. These practices can be broadly categorized into three areas:

Water conservation: Water conservation is the practice of using water efficiently to reduce unnecessary water usage. It is a crucial aspect of environmental sustainability, as it helps to preserve this vital resource for future generations. Water conservation can be implemented in various ways, including;

1. Reducing household water consumption:

- Install water-efficient appliances, such as low-flow showerheads and toilets.
- Fix leaky faucets and pipes promptly.
- Take shorter showers and avoid letting water run unnecessarily.
- Use water-efficient landscaping techniques, such as xeriscaping.
- Collect rainwater for irrigation and other non-potable uses.

2. Promoting industrial water conservation:

- Implement water audits to identify and address water inefficiencies in industrial processes.
- Adopt water-efficient technologies and practices.
- Reuse wastewater whenever possible.
- Recycle industrial water for non-potable uses.
- Raise awareness among employees about water conservation.

3. Enacting water conservation policies:

- Implement water pricing policies that encourage conservation.
- Establish water conservation regulations for industries and households.
- Invest in water infrastructure to improve efficiency and reduce losses.
- Promote public education and awareness campaigns about water conservation.

4. Adopting water-sensitive urban design:

- Incorporate green infrastructure, such as rain gardens and permeable pavements, to

manage stormwater runoff and reduce reliance on traditional drainage systems.

- Design buildings to minimize water consumption and maximize water reuse. Create green spaces that conserve water and promote biodiversity.

5. Supporting agricultural water conservation:

- Implement precision irrigation techniques to optimize water use for crops.
- Adopt water-efficient agricultural practices, such as drip irrigation and cover cropping.
- Encourage the cultivation of drought-resistant crops.
- Promote sustainable agricultural practices that conserve water and protect watersheds.

By implementing these water conservation measures, we can collectively reduce our water footprint, ensure a sustainable water supply, and protect this precious resource for future generations.

Water reuse: Water reuse, also known as water recycling or water reclamation, is the process of treating wastewater to make it suitable for beneficial purposes other than potable drinking water. This practice plays a crucial role in sustainable water management, as it helps to conserve freshwater resources and reduce the reliance on traditional sources.

BENEFITS OF WATER REUSE

Water reuse offers several significant benefits, including:

- **Conserving freshwater:** By using treated

- wastewater for non-potable purposes, we can significantly reduce the demand for freshwater, which is often a scarce and precious resource.
- **Enhancing water security:** Water reuse can help to ensure a more secure water supply, particularly in regions facing water scarcity or climate change-induced droughts.
- **Protecting water sources:** By diverting wastewater for reuse, we can reduce the load on freshwater sources, allowing them to recover and replenish naturally.
- **Improving environmental sustainability:** Water reuse helps to conserve water resources and reduce the environmental impact of water treatment and waste disposal.
- **Promoting economic development:** Water reuse can contribute to economic growth by reducing reliance on expensive imported water and enabling new water-intensive industries to operate sustainably.

TYPES OF WATER REUSE

Water reuse can be categorized into different types based on the intended use of the treated wastewater:

- **Direct potable reuse (DPR):** This is the highest level of water reuse, where treated wastewater is directly incorporated into the potable water supply. DPR is typically considered safe for certain applications, such as industrial processes, irrigation of edible crops, and non-potable public uses, such as toilet flushing and landscaping.
- **Indirect potable reuse (IPR):** In IPR, treated wastewater is blended with potable water sources before being distributed to the public. This approach allows for greater water conservation while ensuring the safety of the drinking water supply.
- **Non-potable reuse:** This is the most common type of water reuse, where treated wastewater is used for non-drinking purposes, such as irrigation, industrial processes, and environmental restoration.

CHALLENGES AND CONSIDERATIONS

While water reuse offers significant benefits, there are also some challenges and considerations associated with its implementation:

- **Public acceptance:** Public perception and

acceptance of water reuse are crucial for its widespread adoption. Addressing concerns about water quality and safety is essential for gaining public trust.

- **Cost considerations:** The cost of water treatment and infrastructure for reuse can vary depending on the technology and scale of the project. Economic feasibility is a key factor in determining the viability of water reuse projects.
- **Regulatory oversight:** Clear regulations and guidelines are necessary to ensure that water reuse practices meet environmental and public health standards.
- **Water quality monitoring:** Ongoing monitoring of the quality of treated wastewater is essential to ensure its suitability for intended reuse purposes.
- **Public education:** Extensive public education campaigns are crucial to inform the public about the benefits and safety of water reuse practices.

Despite these challenges, water reuse is a vital component of sustainable water management strategies. By overcoming these obstacles and promoting informed public engagement, we can harness the potential of water reuse to conserve freshwater resources, protect the environment, and ensure a sustainable future for water use.

Water protection: Water protection is the practice of safeguarding water resources from pollution and ensuring their long-term availability and quality. It encompasses a wide range of activities and measures aimed at preventing or minimizing the contamination of water sources, both surface and groundwater.

IMPORTANCE OF WATER PROTECTION

Water is an essential resource for life, supporting human health, agriculture, ecosystems, and industrial activities. Protecting water resources is crucial for several reasons:

- **Human health:** Clean water is essential for human health, as it prevents waterborne diseases and promotes overall well-being. Contaminated water can lead to a wide range of health problems, including diarrhea, cholera, and hepatitis.
- **Environmental protection:** Water pollution can have devastating impacts on aquatic

ecosystems, harming aquatic plants and animals and disrupting the natural balance. Protecting water resources helps to safeguard biodiversity and maintain healthy ecosystems.

- **Economic sustainability:** A clean and reliable water supply is essential for economic growth and development. Water pollution can have significant economic costs, affecting agriculture, industries, and tourism.

KEY PRINCIPLES OF WATER PROTECTION

Water protection encompasses a set of principles that guide actions to safeguard water resources:

- **Prevention:** The most effective approach to water protection is to prevent pollution from occurring in the first place. This involves implementing pollution control measures, reducing the use of hazardous substances, and promoting sustainable practices.
- **Source water protection:** Protecting the sources of drinking water is critical. This involves managing land use activities in watersheds, preventing contamination from agricultural practices, and ensuring proper wastewater treatment.
- **Water conservation:** Conserving water reduces the demand for freshwater resources, thereby reducing the potential for pollution. Water conservation measures include reducing household water consumption, using water-efficient appliances, and adopting drought-tolerant landscaping.
- **Water quality monitoring:** Regularly monitoring water quality is essential to identify and address pollution problems promptly. Monitoring data can inform remedial actions and track progress in water protection efforts.
- **Public education and awareness:** Raising public awareness about water protection is crucial for promoting responsible water use and encouraging participation in water conservation efforts. Public education campaigns can help individuals and communities understand the importance of water protection and adopt sustainable practices.

Water protection is essential for safeguarding human health, ensuring environmental sustainability, and supporting economic development.

By implementing effective water protection measures, adopting sustainable practices, and raising public awareness, we can work together to protect this precious resource for future generations.

CONCLUSION

Sustainable water management is essential for ensuring a sustainable future for urban and industrial areas.

By implementing a variety of sustainable water management practices, cities and industries can reduce their water footprints, protect water resources, and adapt to the challenges of climate change.



About the Author



Mandarr Kkamthe,
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Water Management

Mandarr Kkamthe, Freelance Expert, Water Management, I have been working in the water sector for 14 very fruitful years. I was previously associated with organizations like JUSCO, Suez Environnement, Vishvaraj Environment Pvt. Ltd., Siemens, GE etc. During this time, I achieved much in terms of expanding program offerings and enhancing the quality of existing Systems.

Some of my main skills include the following:

- Expert in developing and implementing a strategy for program teams, as well as developing robust mitigation plans.
- Demonstrated ability to liaise with different engineering teams to increase system awareness.
- Able to report on system performance, and identify opportunities for continual improvement.
- In-depth knowledge of developing new programs to support the strategic direction of the organization.



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SMART IRRIGATION SYSTEMS: CULTIVATING THE FUTURE OF AGRICULTURE

Dilip Yewalekar, Senior Vice President

Manisha Kinge, (M.Tech-Agri Engg)

INTRODUCTION

World is facing two big problem. 1. Climate change—global warming. 2. Short fall of food for growing populations. According to FAO projections, by 2050, the world population will reach to @ 9.1 billion. This significant increase in population will drive up the already high global demand of food. To meet this demand, food production needs to increase in two fold. However, depletion of land, available water and biodiversity, combined with climate change, global warming poses challenges to agriculture productivity. Traditional way of doing agriculture & irrigation methods, reliant on manual labour and often inefficient water usage, are no longer sufficient to meet the demands of food. However, advancements in technology offer promising solutions. Smart irrigation systems, leveraging sensors, data analytics, and automation, represent a paradigm shift towards more efficient and sustainable water management practices in agriculture. This article explores the benefits, components, and future prospects of smart irrigation systems in enhancing agricultural efficiency and sustainability.

SMART IRRIGATION SYSTEMS

Smart irrigation systems basically micro irrigation system, integrated with various technologies- IOT sensors and AI to optimize water usage, fertilizers usages to increase increasing agriculture. These systems rely on sensors to collect real-time data on soil moisture levels, weather conditions, and plant health. By analysing this data, smart irrigation systems can precisely determine when and how much water to apply, thereby minimizing wastage and maximizing crop yield.

MICRO (DRIP) IRRIGATION

The frequent application of required and measured quantities of water directly on or below the soil surface, usually as discrete drops, continuous drops, tiny streams, or miniature spray through emitters or applicators placed along a low pressure delivery system consisting of piping network and emitting devices.

Micro Irrigation System encompass a number of methods or concepts, such as Drip; Subsurface, Line Source Tubing, Inline Drip Lines, Micro Jet, Micro Sprinkler, Mini Sprinkler, Mister and Spray Irrigation. Water and nutrients enter the soil and move into the root zone through the combined forces of gravity and capillary action. Thus, the plant's withdrawal of the moisture and nutrients from the soil is replenished almost immediately among a constant and more favorable root zone environment consequently the plant does not suffer stress or shock. This enhances plant growth making it more even, vigorous and optimum.

STANDARD MICRO IRRIGATION CONFIGURATION

A schematic drawing #1, A Standard Micro Irrigation System consists of physical components required to deliver water near to the crops root zone of crop Pumping Station, By Pass Valve, Fertilizer Applicator, Filtration System, Main Pipe Line, Submain Pipe Line, Laterals, Emitting Devices (Drippers, Line Source Tubing, Micro Jets, Micro Sprinklers, Misters, Mini Sprinklers, Sprayers) Control Valves, Flush Valves, and other necessary Accessories.



Sensors

Soil moisture sensors, weather stations, and crop sensors are fundamental components of smart irrigation systems. Soil moisture sensors measure the moisture content at different depths, providing insights into the water needs of crops. Weather stations gather data on temperature, humidity, wind speed, and precipitation, enabling predictive watering based on weather forecasts. Crop sensors assess plant health and growth, helping farmers make informed irrigation decisions.

Controllers

Smart irrigation controllers serve as the brain of the system, processing data from sensors and determining irrigation schedules. These controllers can be programmed to account for factors such as soil type, crop type, and environmental conditions. Some advanced controllers are equipped with wireless connectivity, allowing remote monitoring and control via smartphones or computers.

Actuators

Actuators, such as solenoid valves and pumps, regulate the flow of water in smart irrigation systems. Based on the instructions from the controller, actuators adjust the irrigation output to ensure

precise water application. This dynamic control mechanism minimizes water waste and prevents over-irrigation, thereby conserving water resources.

RTU (RADIO/REMOTE TERMINAL UNIT)

RTU is a wireless device which accept/transmit signals from principal controllers to end users solenoid valves, soil moisture sensors, water meter, electrical motor pump set and associated apparatus. It works on radio frequency / Internet frequency / GSM card as per the program on PC/PLC.

A smart irrigation system driven by data technologies offers significant advantages in optimizing water use in agriculture.

Data Collection

Smart sensors placed in the soil measure moisture levels, weather conditions, and other relevant data points. This real-time data collection helps in understanding the precise water needs of crops and soil conditions.

Data Analysis

Advanced algorithms analyze the collected data to generate insights report into crop water requirements, including evapotranspiration rates, soil moisture levels, and plant growth stages. Machine learning models can predict future water needs based

on historical data and current conditions.

Precision Irrigation

Precision irrigation techniques, such as drip irrigation or sprinkler systems with variable rate technology, enable precise delivery of water to crops based on their individual requirements. By mapping soil moisture levels and crop water needs, farmers can create irrigation schedules tailored to specific areas within their fields, optimizing water use and minimizing runoff. With accurate data analysis, smart irrigation systems can precisely deliver the right amount of water to crops at the right time and in the right place. This avoids overwatering or under watering, leading to improved crop health and higher yields.

Remote Monitoring and Control

Smart irrigation systems are equipped with remote monitoring and control capabilities, allowing farmers to manage their irrigation systems from anywhere with an internet connection. Through mobile apps or web-based interfaces, farmers can monitor soil moisture levels, weather conditions, and irrigation schedules in real-time, and make adjustments as needed to optimize water use and crop health.

Water Conservation

By optimizing water use, smart irrigation systems contribute to water conservation efforts.

They reduce water wastage through efficient irrigation practices, which is especially crucial in regions facing water scarcity or drought conditions. Efficient irrigation practices promoted by smart irrigation systems help conserve water resources by minimizing losses due to evaporation, runoff, and deep percolation. By applying water only when and where it is needed, farmers can reduce overall water consumption while still maintaining crop yields and quality.

Resource Efficiency

Beyond water, smart irrigation systems can also optimize the use of other resources like energy and fertilizers. By integrating data on soil nutrient levels and weather patterns, farmers can adjust fertilizer applications accordingly, leading to more efficient use of inputs.

In addition to water, smart irrigation systems can optimize the use of other resources such as energy and fertilizers. For example, by synchronizing irrigation with periods of lower energy demand or using renewable energy sources to power irrigation pumps, farmers can reduce energy costs and environmental impact. Similarly, by integrating soil nutrient data with irrigation schedules, farmers can apply fertilizers more efficiently, minimizing waste and environmental pollution.

Cost Savings

By reducing water and input wastage and improving crop yields, smart irrigation systems can result in significant cost savings for farmers in the long run. The initial investment in setting up such systems is often offset by the savings and increased productivity over time.

While the initial investment in smart irrigation technology may be significant, the long-term cost savings can outweigh the upfront costs. By reducing water and input costs, increasing crop yields, and minimizing labor requirements, smart irrigation systems can improve the overall profitability of farming operations.

Environmental Benefits

Efficient water use and reduced chemical runoff from precision irrigation systems contribute to environmental sustainability by minimizing the impact on water bodies and ecosystems. By promoting sustainable water management practices and

			
RTU	Digital Water Meter	Hydraulic Valve-Pilot	Hydraulic Valve-PR Pilot
			
Micro Processor	Pressure Sensor	Flow Sensor	EC/pH Controller
			
Fertilizer Injector	Weather Station	Laptop/PC	Mobile

reducing the use of agrochemicals, smart irrigation systems contribute to environmental conservation efforts. By minimizing soil erosion, nutrient runoff, and pollution of water bodies, these systems help protect ecosystems and biodiversity, ensuring the long-term viability of agricultural landscapes.

In summary, smart irrigation systems driven by data technologies offer a wide range of benefits to farmers, including improved water efficiency, resource optimization, cost savings, and environmental sustainability. By harnessing the power of data analytics and remote monitoring, farmers can make more informed decisions about irrigation management, leading to healthier crops, higher yields, and a more sustainable agricultural future.

CHALLENGES AND FUTURE DIRECTIONS

Despite their numerous benefits, smart irrigation systems face challenges related to cost, complexity, and adoption barriers.

The initial investment required for installing sensors, controllers, and other components can be prohibitive for small-scale farmers. Moreover, the complexity of system integration and data management may pose challenges for farmers lacking technical expertise.

However, ongoing advancements in technology, coupled with increasing awareness of water scarcity and climate change, are driving the adoption of smart irrigation systems worldwide. Future developments may include the use of artificial intelligence (AI) and machine learning algorithms to further enhance system efficiency and predictive capabilities. Additionally, initiatives such as government subsidies and public-private partnerships can help make smart irrigation technology more accessible to smallholder farmers.

CONCLUSION

Smart irrigation systems represent a transformative solution to the water management challenges facing agriculture. By harnessing the power of technology, these systems offer unprecedented precision, efficiency, and sustainability in irrigation practices. As the global population continues to grow and climate variability intensifies, the adoption of smart irrigation systems will be crucial in ensuring food security, preserving natural resources, and building resilient agricultural systems for the future.



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The EEF Global Water Leadership Award – Global Water foundations.

Strategic Leader in Micro Irrigation – ABSA Award.
Professional Excellence Individual Award – Aqua foundations.
Great Manager 250 Award, Economics Times, honored by Hon Kumar Mangalam, Birla Group.

Best Innovative Article in Sabujeema International Magazine
Overall all experience of 36+ years in Water Management –
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Planning, Designing, Execution, Management & marketing
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100+ papers/publications at national/international
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Awards

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Best Innovative Article in Sabujeema International Magazine

Overall experience of 18+ years in Water Management –
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LEADING THE WAY: TRANSFORMING WATER MANAGEMENT WITH SMART WATER METERING TECHNOLOGIES

Jitender Thirwani, Chief Operating Officer, SmarterHomes Technologies Pvt. Ltd.

INTRODUCTION:

In today's world, the effective management of water resources has become a critical priority. The advent of smart water metering technologies has revolutionized traditional approaches to water management, offering innovative solutions to monitor, conserve, and optimize water usage.

In the era of rapid urbanization and escalating water demands, the traditional methods of water management are proving inadequate to sustainably address the challenges faced by Indian cities. However, amidst these challenges lies a beacon of hope in the form of smart water technologies. Leveraging the power of data, connectivity, and automation, smart water technologies offer a transformative solution to optimize water usage, mitigate losses, and ensure the efficient distribution of this precious resource. In this article, we delve into the realm of smart water technologies, with a particular focus on smart water meters, and explore how they can empower Indian cities to achieve intelligent water management.

UNDERSTANDING SMART WATER TECHNOLOGIES:

Smart water technologies encompass a range of

innovative solutions designed to revolutionize the way water is managed, monitored, and distributed. At the heart of these technologies lies the concept of connectivity, enabled through the Internet of Things (IoT) and advanced sensor networks. By collecting real-time data on various aspects of the water supply chain, smart water technologies enable authorities to gain invaluable insights into consumption patterns, leak detection, infrastructure performance, and more.

EMPOWERING INDIAN CITIES:

In the context of India, where water scarcity and inefficient distribution systems are pressing concerns, the adoption of smart water technologies holds immense promise. With rapid urbanization placing unprecedented pressure on existing water resources, the need for intelligent water management has never been more urgent. By embracing smart water solutions, Indian cities can address these challenges head-on and pave the way for a more sustainable future.

THE EVOLUTION OF SMART WATER METERING:

Traditional water metering systems have long been the backbone of water management, providing essential data on water consumption for billing and

operational purposes. However, these systems have inherent limitations, such as manual reading processes, limited data granularity, and difficulties in detecting leaks and inefficiencies. Recognizing these challenges, the emergence of smart water metering technologies has heralded a new era in water management.

Among the various components of smart water technologies, smart water meters emerge as a pivotal tool in the quest for efficient water management. Unlike traditional water meters, which rely on manual readings and offer limited insights, smart water meters are equipped with advanced sensors and communication capabilities that enable remote monitoring and data collection.

Smart water meters leverage advanced sensor technologies, data analytics, and connectivity solutions to provide real-time monitoring, precise measurement, and proactive leak detection. By digitizing water metering processes, these technologies offer a host of benefits that go beyond the capabilities of traditional metering. From improving billing accuracy to reducing water wastage, smart water metering technologies are transforming how we interact with and manage water resources.

KEY FEATURES AND BENEFITS OF SMART WATER METERING:

Smart water metering systems offer a range of features and benefits that set them apart from traditional meters:

Real-time Monitoring: Smart water meters continuously monitor water usage in real-time, providing consumers and utilities with up-to-date insights into consumption patterns.

Precise Measurement: With advanced sensor technologies, smart meters deliver highly accurate measurements of water flow, eliminating the discrepancies associated with manual reading processes.

Proactive Leak Detection: Smart water meters can detect leaks and abnormal usage patterns in real-time, enabling utilities to identify and address issues promptly before they escalate.

Automated & Fair Billing: By automating the billing process, smart meters streamline operations, reduce administrative costs, and improve billing accuracy, leading to greater customer satisfaction.

Data Analytics: Smart water metering systems generate vast amounts of data on water consumption, which can be analyzed to identify trends, optimize water usage, and inform decision-making.

Consumer Empowerment: Smart water meters empower consumers by providing them with access to detailed information about their water usage. This transparency encourages water conservation practices and fosters a culture of responsible consumption.

Predictive Analytics: Leveraging the vast amounts of data collected by smart water meters, predictive analytics algorithms can forecast demand patterns, optimize distribution networks, and enhance overall system efficiency.

IMPACT ON WATER MANAGEMENT:

The adoption of smart water metering technologies has had a transformative impact on water management practices across various sectors:

Residential: Smart water meters empower homeowners to monitor their water usage in real-time, identify inefficiencies, and implement water-saving measures, leading to reduced consumption and lower utility bills.

Commercial: In commercial settings, smart water meters help businesses optimize their water usage, detect leaks, and comply with regulatory requirements, resulting in cost savings and improved sustainability.

Industrial: Industries benefit from smart water metering technologies by accurately measuring water usage, identifying opportunities for efficiency improvements, and minimizing environmental impact.

Municipal: Municipalities leverage smart water meters to optimize water distribution, reduce non-revenue water losses, and enhance overall water infrastructure resilience.

CONCLUSION

As Indian cities grapple with the complex challenges of urbanization and water scarcity, the adoption of smart water technologies emerges as a beacon of hope. Among these technologies, smart water meters stand out as a potent tool for revolutionizing water management practices. By harnessing the power of data and connectivity, smart water meters offer a pathway towards intelligent water management, empowering cities to build a more sustainable and resilient future. As we continue to embrace innovation and collaboration, let us seize the opportunity to transform our cities into models of smart water stewardship, ensuring that future generations inherit a world where clean and abundant water flows freely.



The water industry is increasingly using innovative technologies like desalination to convert seawater into freshwater, addressing water scarcity challenges in coastal regions.



About the Author



Jitender Thirwani has been part of the journey of SmarterHomes over the last decade. Jitender has over 18 years of experience in Business Development, Channel Sales, and Project Management.

About SmarterHomes:

SmarterHomes is a response to a real-world problem of lack of water metering in apartment buildings. Revolutionizing water management with IoT innovation. Empowering communities to measure, conserve, and thrive in the face of water scarcity challenges.

Jitender Thirwani

Chief Operating Officer, SmarterHomes Technologies Pvt. Ltd.

FUJIAN YONGFU POWER ENGINEERING CREATES NEW TYPE OF WIND TURBINE FOUNDATION THAT RESISTS TYPHOONS AND EARTHQUAKES

Brooke Azem, Structural Analysis Product Marketer, Bentley Systems

PLAXIS and SACS Provided a Unified Environment to Simultaneously Create Models and Test Soil Effect

INSTALLING ONE OF THE WORLD'S DEEPEST OFFSHORE WIND FACILITIES

As part of China's push to dramatically increase the country's production of renewable energy and reduce the use of carbon-emitting fuels, power generation companies are installing numerous wind facilities off the country's coast. Fujian Yongfu Power Engineering built one of their latest facilities, the China Changle Offshore Wind Farm Area C, 31 kilometers east of Changle, Fujian. The 58.6 square-kilometer area has an average water depth of between 31 and 45 meters, making it one of the world's deepest locations for a wind farm. After an initial feasibility study, the company decided to install 62 wind turbines, each with a capacity of 8 megawatts, for a total capacity of 496 megawatts.

The feasibility study also revealed an array of challenges. For one, the site is frequently battered by typhoons that produce strong winds, turbulence, and frequent wind direction change, which required Fujian

Yongfu to develop particularly strong and stable foundations for each turbine. However, they had to design the foundations to accommodate complicated geological conditions, including unstable, soft soil, as well as the strong possibility of earthquakes that could have a magnitude as high as seven on the Richter scale. The project's extreme depth also required the design team to adapt permanent and temporary construction structures to changing conditions and keep construction vessels safe. However, as Fujian Yongfu faced budget restraints, they needed to find a way to design the facility safely while keeping costs under control.

DIFFICULTIES DESIGNING WITH TRADITIONAL METHODS

Fujian Yongfu determined that the best way to keep the facility strong and stable was to build the foundations with suction pile frames. Suction piles are long cylinders topped with a cap, with valves to assist with the process of embedding them in the soil. The advantage of these foundations is that they can penetrate up to 60% of their length into the ocean

floor just by using their own weight, depending on soil conditions. Though suction piles have been used for various offshore structures since the 1990s, they had not been deployed as foundations for offshore wind turbines. Therefore, Fujian Yongfu could not rely on previous experience and had to engineer a solution themselves. The design team soon discovered that they also could not rely on traditional methods of offshore wind design. Their initial attempt with these methods could not accurately simulate the interaction between the soil and a pile with such a large diameter, producing an overly conservative design that would have significantly increased the cost of the project.



Fujian Yongfu then tried to use separate digital simulations of the interaction between the pile and the soil and the design of the frame itself, but they learned that the two separate results were difficult to unify.

They needed digital design software that could unify soil analysis and digital foundation design to determine how to effectively use the suction pile method for wind turbines.

DETERMINING THE BEST DESIGN WITH UNIFIED SOFTWARE

Though Fujian Yongfu had previously used Bentley's OpenWindPower Fixed Foundation for offshore modeling, they discovered that pairing it with PLAXIS would give them a unified design environment that could allow them to perform soil analysis and foundation design at the same time. Additionally, recent advancements in the applications included an integrated offshore structural and geotechnical design process for the design of large diameter monopiles and suction tubes, which would enable the design team to fully realize and optimize their design intent.

They first used PLAXIS to perform a full analysis of the soil in the construction area that could also measure the potential effects of design options. Within that environment, they then simultaneously formed and optimized the design of the foundation in OpenWindPower Fixed Foundation while examining how the current state of the design would interact with the soil. The design team used a suction pile module within SACS to automatically import PLAXIS analysis and create a composite model, which shows both the current state of the model and its effects on the soil around it. With this information, they adjusted the model to increase its strength and stability.

KEEPING WIND TURBINES SAFE DURING TYPHOONS

As a result of synchronized soil analysis and digital modeling, Fujian Yongfu determined that the best type of foundation for the project would be a three-pile suction conduit frame. Though this type of frame had only been used in experimental environments within China, Fujian Yongfu used Bentley software to build it on a large scale and demonstrate its utility. Since this type of pile has a larger diameter but a shorter length than other piles typically used for offshore wind facilities, they reduced the amount of steel needed for each foundation. Additionally, the design makes construction faster and easier, as it solves the problem of fatigue damage during pile driving and eliminates the need for some staging platforms and



larger construction equipment such as pile driving vessels. By determining the feasibility of the three-pile suction conduit frame foundations, Fujian Yongfu ensured the wind turbines can withstand typhoons, shifting soil, and earthquakes. Compared to more traditional offshore wind turbine designs, the solution reduces costs by 30%, or more than CNY 400 million. Establishing 496 megawatts of clean energy in Fujian will eliminate the need to burn 535,000 tons of coal annually and cut down on carbon dioxide emissions from various power generation sources by 1,462,600 tons. The design also helped Fujian Yongfu minimize environmental impact by sustaining water quality, minimizing erosion, and protecting marine and avian life.

PROJECT SUMMARY

Organization

Fujian Yongfu Power Engineering Co., Ltd.

Solution

Mining and Offshore Engineering

Location

Changle, Fujian, China

Project Objectives

To develop a wind facility in a geographically complicated area. To unify modeling and soil analysis to deploy a new type of foundation.

Products Used: PLAXIS, OpenWindPower Fixed Foundation.

Fast Facts

Fujian Yongfu Power Engineering needed to build a large wind farm in an area prone to typhoons, earthquakes, and shifting soil. Initial work with traditional methods produced expensive designs,

and other digital solutions could not unify modeling and soil analysis. The design team used PLAXIS and OpenWindPower Fixed Foundation to simultaneously model potential foundation options and analyze its effects on the ocean soil.



ROI

Compared to more traditional offshore wind turbine designs, the solution reduces costs by 30%, or more than CNY 400 million.

The wind farm eliminates the use of 535,000 tons of coal annually and cuts carbon dioxide emissions by 1,462,600 tons.

The design helped minimize environmental impact by sustaining water quality, minimizing erosion, and protecting marine and avian life.

“OpenWindPower Fixed Foundation and PLAXIS allows engineers to take advantage of their seamless interface to optimize the design of wind turbine foundation structures such as single pile and suction pile.” – Fan Xia Ling, Engineering, Fujian Yongfu Power Engineering Co., Ltd.



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Brooke Azem,
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Brooke Azem is a Structural Analysis Product Marketer for Engineering Simulation at Bentley Systems. She currently focuses her expertise in the Structural, Offshore, Geotechnical, and Pipe Stress industries by helping engineers learn how innovative technology can help them achieve their goals by improving their efficiency and their bottom line.

COMPARATIVE ANALYSIS OF WATER LEAK DETECTION SYSTEMS: SENSOR - BASED VS MICROPHONE ARRAY- BASED APPROACHES

Dr. Navin Kumar, Assistant Professor, Department of Electronics, Langat Singh College (NAACA), BRA Bihar University

Water is one of our most precious resources, and any kind of water leak in pipelines can lead to significant damage and waste. Whether the leaks are small or large, they can cause a variety of problems that can impact both the environment and our daily lives.

One of the most immediate concerns with water leaks in pipelines and buildings are the potential for water damage to surrounding structures and infrastructure. Water can seep into walls, floors, and ceilings, leading to mold growth, rotting wood, and structural damage. This can result in costly repairs and renovations to fix the damage caused by the leaks. Therefore, the detection of leaks in pipelines is of utmost importance. Acoustic sensor-based leak detection systems have emerged as a promising solution for the early detection of leaks in pipelines. In this article, we review the research on acoustic sensor-based leak detection systems, focusing on their working principles, sensor technology, signal processing techniques, and applications and its comparison with leak detection systems employing microphone array based sensors.

Acoustic sensors are devices that are capable of detecting the sound waves produced by leaks in pipelines. These sensors can be placed at various points along the pipeline to continuously monitor for

any abnormal sound patterns that may indicate a leak. The signals detected by the sensors are then processed using signal processing techniques to differentiate between normal operating conditions and leak events. These techniques include time-frequency analysis, pattern recognition, machine learning, and neural networks.

Several types of acoustic sensors are used in leak detection systems, including hydrophones, accelerometers, and fibre optic sensors.

Hydrophones are widely used for underwater leak detection, while accelerometers are commonly used for aboveground applications. Fibre optic sensors offer advantages such as high sensitivity, immunity to electromagnetic interference, and the ability to cover long distances. These sensors can be deployed in a wired or wireless network to provide real-time monitoring of pipeline integrity.

Acoustic sensor-based leak detection systems have been successfully applied in various industries,



including oil and gas, water distribution, and chemical processing. These systems have proven to be effective in detecting leaks of various sizes and at different locations along the pipeline. By providing early detection of leaks, these systems help prevent environmental damage, reduce operational costs, and improve safety for workers and the public.

Summarily, acoustic sensor-based leak detection systems are a promising technology for the early detection of leaks in pipelines. By utilizing advanced sensor technology and signal processing techniques, these systems offer a reliable and efficient solution for monitoring pipeline integrity. Further research is needed to optimize the performance of these systems and enhance their scalability and portability for widespread adoption in different industries.



A microphone array-based leak detection system uses multiple microphones placed strategically around a gas or water pipeline to monitor for any sounds related to leaks. The system relies on advanced signal processing algorithms to analyze the sound data collected by the microphones and differentiate between normal background noise and the specific sounds produced by a leak.

When a potential leak is detected, the system can trigger an alert to notify operators in real-time, allowing them to quickly locate and address the issue before it escalates. This type of technology is especially useful for detecting small leaks that may go unnoticed by conventional monitoring methods, helping to prevent costly damages and potential safety hazards.

Overall, a microphone array-based leak detection system offers a reliable and efficient way to monitor pipelines for leaks and improve the overall safety and integrity of the infrastructure. Leak detection in industrial pipelines is crucial for preventing environmental contamination and ensuring the safety and efficiency of operations. Traditional leak detection methods such as visual inspection or pressure

monitoring can be time-consuming and unreliable. However, recent advancements in sensor technology, specifically microphone arrays, have shown promise in improving leak detection accuracy and efficiency.

In this article, we propose a microphone array-based leak detection system for industrial pipelines. The system consists of multiple microphones strategically placed along the pipeline to capture acoustic signals generated by leaks. The signals are then analyzed using signal processing techniques to detect and locate the source of the leak.

To evaluate the effectiveness of the proposed system, we conducted experiments in a laboratory setting using a simulated leak in a pipeline. The results show that the microphone array-based system can accurately detect and locate leaks with high precision, even in noisy environments.

Furthermore, we compared the performance of the microphone array-based system with traditional leak detection methods such as pressure monitoring. Our results demonstrate that the microphone array-based system outperforms traditional sensor based methods in terms of detection accuracy and speed.

Overall, our research highlights the potential of microphone arrays as a cost-effective and reliable solution for leak detection in water pipelines. Future work will focus on further optimizing the system and conducting field tests to validate its performance in real-world scenarios.

In conclusion, both sensor-based and microphone array-based systems have their own advantages and disadvantages. Sensor-based systems can be more accurate in detecting water leaks, as they can detect changes in moisture, temperature, and pressure. However, they may require more maintenance and calibration to ensure they are working properly. Microphone array-based systems are less intrusive to install and can detect leaks based on sound, but they may not be as accurate as sensor-based systems.

Microphone array-based water leak detection systems, on the other hand, can detect leaks by listening for the sound of running water. This can be beneficial in detecting leaks in hard-to-reach or hidden areas, where traditional sensor-based systems may not be as effective.

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Dr. Navin Kumar is an assistant professor in the Department of Electronics at Langat Singh College in Muzaffarpur. He is renowned for his expertise in microphone array and acoustic signal processing, with a proven track record of published work in this field. Dr. Kumar's research focuses on advancing the understanding and application of microphone array technology in various audio processing applications and solving direction of arrival problems. His work has contributed significantly to the field of acoustic signal processing, making him a known figure in the acoustic signal research fraternity.



REINVENTING MBR: UNBREAKABLE, ALWAYS CLEANABLE, MOVABLE

Julius Gloeckner, Chief Growth Officer, CERAFILTEC Germany GmbH

Membrane bioreactors (MBRs) are a vital and fast-growing part of wastewater treatment in today's world. Operating a wastewater plant means dealing with significant pressure imposed on operators. Fortunately, technologies are evolving to support them in their day-to-day challenges.

Imagine being a plant operator or owner, tasked with the immense responsibility of ensuring that a wastewater treatment facility runs smoothly every single day. The external pressures are immense. You have to operate a plant reliably, and adding to this weight is the need to do so while grappling with the inherent limitations of membranes. Occasional biological upsets can cause significant disruptions, impacting plant performance and overall production. Increasing demands for water reuse and stricter filtered water standards continually raise the bar. Your job is to ensure that every drop of water meets these exacting standards, knowing that any slip-up could mean significant consequences—not just for the plant, but for your team, the environment, and the communities relying on this precious resource.

Internally, the challenges are equally daunting. Staying within budget is a constant struggle, with frequent maintenance and the short lifespan of polymeric membranes stretching resources thin. Balancing these constraints while keeping upper management and plant owners satisfied requires a delicate balancing act—any unplanned downtime or budget overrun can lead to difficult questions and eroded trust. Meanwhile, stakeholders relying on specific filtered water quality and quantity have little patience for technical hiccups, adding another layer of pressure.

Psychologically, the burden can be overwhelming. Achieving operational excellence while being mindful of environmental impact feels like carrying the weight of the world on your shoulders. The worry about potential failures can take a toll. You can't help but wonder: Why isn't there a more reliable, simpler, and longer-lasting solution that can provide peace of mind while delivering superior performance? The good news is that there is a solution to this conundrum, as we shall discuss.

A SHORT DIVE INTO THE ORIGINS OF MBR TECHNOLOGY

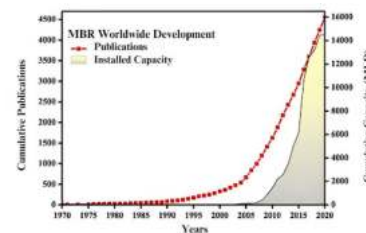
The story of Membrane Bioreactor (MBR) technology began in the 1960s when the first process was introduced by Dorr-Oliver, a Canadian company. This early version, known as the sidestream MBR process, did not gain significant market traction initially. However, the landscape changed dramatically in 1989 with the introduction of the submerged MBR configuration by Prof. Kazuo Yamamoto. This breakthrough involved placing the membrane directly into the bioreactor and utilizing the aeration system for both oxygen transfer and membrane cleaning. This innovative approach effectively controlled cake layer growth on the membranes and allowed operation in high solid concentrations, setting the stage for a revolution in wastewater technology.

By the mid-1990s, companies like Zenon and Kubota had launched their first submerged polymeric MBR products, confirming the technology's efficacy through extensive research and development. The technology's maturity was marked by the early

2000s, with numerous large-scale installations, such as the 45,000 m³/d Nordkanal project 2004 in Germany and the massive 250,000 m³/d facility in Beijing, China 2014. These early projects demonstrated the practicality and effectiveness of MBR technology in treating large volumes of wastewater, paving the way for broader adoption.

PIONEERS AND EARLY ADOPTION

The success of these projects was underpinned by the combination of a biological treatment process with membrane filtration, which together offered superior effluent quality compared to traditional sewage treatment systems. The key advantage of MBRs lies in their ability to operate at higher mixed liquor suspended solids (MLSS) concentrations, resulting in a smaller footprint and higher efficiency. This characteristic made MBRs particularly attractive for urban areas with limited space. Further, the use of membrane filtration as part of the MBR achieves substantially higher treated water quality compared to conventional treatment plants, enabling water reuse and compliance with stricter discharge regulations. These key benefits leapfrogged MBR technology within a decade to thousands of installations around the globe.



Source: Science Direct June 2022

As MBR technology evolved, so did the demand for more resilient and efficient membrane materials. Early polymeric membranes, while effective, faced limitations such as frequent breakage, fouling, and a relatively short lifespan of about 4-7 years. Moreover, most hollow fiber membranes are made from polyvinylidene fluoride (PVDF), a derivative of per- and polyfluoroalkyl (PFAS) substances, known for their persistent and harmful carbon-fluorine bonds, which are toxic to humans. These pollutants have massive ramifications globally, costing billions to clean our water sources and causing significant health damage.

Additionally, polymeric membranes generate a staggering amount of plastic waste each year, contributing significantly to environmental pollution and the accumulation of non-biodegradable materials in landfills and natural ecosystems. The amount of plastic waste from decommissioned polymeric membranes, if converted into plastic bottles, equates to an estimated 3.27 billion bottles each year. If these bottles were stacked up, they would reach the moon and back. This stark visual underscores the urgent need for more sustainable solutions.

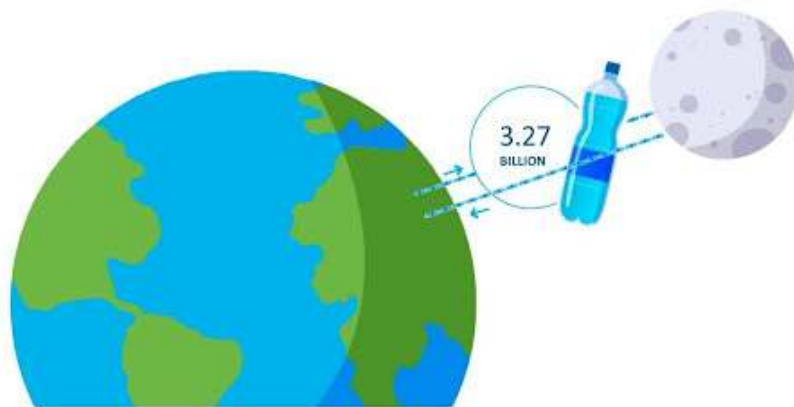


Image: Illustration of annual plastic waste contribution of polymeric UF membranes

THE RISE OF CERAMIC MEMBRANES

While polymeric membranes dominated the early years of MBR technology, the mid-2000s saw the advent of ceramic membranes. In 2005, the first alumina oxide MBR demonstration plant was installed on a golf course in St. Wendel, Germany, marking a new chapter in MBR technology. Over the next decade, alumina membranes were implemented in several milestone projects, such as the Public Utility Board of Singapore (PUB) Jurong plant with a 4,500 m³/d capacity, installed in 2014, and ceramic membranes began to be recognized as a viable

alternative to polymeric membranes.

The shift towards ceramic membranes is being driven by several inherent advantages over their polymeric counterparts. Known for their robustness, long lifespan, and superior chemical and thermal stability, ceramic membranes are widely considered the successor to polymeric membranes going forward. They have a significantly longer operational life, with an expected lifespan of 15-20 years—about three times longer than polymeric membranes—and require less maintenance. Their chemical and thermal stability allows them to endure harsh cleaning regimens to remove fouling after plant upsets or to restore performance, enabling more reliable operation of MBR plants and functioning as a sort of insurance policy. The reduced frequency of replacements and lower maintenance requirements substantially decrease operational costs and complexities.

Additionally, ceramic membranes possess higher mechanical strength, reducing the risk of breakage. In today's world, where water reuse is of vital

importance, ensuring membrane integrity and constant filtered water quality for either compliant discharge, downstream direct water reuse, or feeding reverse osmosis systems is paramount.

By 2021, alumina MBR membranes had been specified in large-scale projects, with the largest being an 97,500 m³/d capacity plant in Singapore. This project, featuring ceramic membranes, was selected after a diligent long-term assessment by the PUB, solidifying the position of ceramic membranes in the market.

In conclusion, the superior properties of ceramic materials make them particularly suitable for all water and wastewater treatment applications, where durability and reliability are critical. Commercially, ceramic membranes are already driving substantial OPEX advantages over polymeric membranes, with continuous development and improvements in ceramic membrane technology increasing untapped savings.

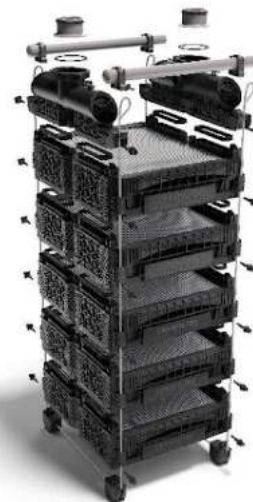


Image: CERAFILTEC MBR Module Tower

THE CURRENT LANDSCAPE AND CHALLENGES

Today, MBR technology is a well-established market with over 10,000 installations worldwide and a market value exceeding \$3 billion of membrane installed base. Ceramic MBRs, though currently comprising about 1% of the market with around 100 installations across 25 countries, are gaining traction due to their superior durability and performance.

Plant operators and owners often face significant challenges with poorly performing polymeric membranes, leading to high maintenance costs, frequent membrane replacements, and inconsistent water quality. These issues can result in substantial operational disruptions, affecting water reuse capabilities and overall plant efficiency. Selecting the right membrane type is important for maintaining smooth operations. Polymeric membranes, for instance, benefit from their ability to move with the water flow and the aeration, which helps solids detach easily. Ceramic membranes, on the other hand, while rigid, are celebrated for their robustness—no breakages—and their cleanability without lifespan reduction when exposed to chemicals. Now,

CERAFILTEC's recent introduction of a new product - FLEXX-CAP® - brings all these benefits under one umbrella: movable, unbreakable, and always cleanable.

CERAFILTEC'S FLEXX-CAP: AN INNOVATIVE GAME-CHANGER IN MBR TECHNOLOGY

CERAFILTEC, headquartered in Germany, has been at the forefront of ceramic membrane technology, driving the technology transformation in the water and wastewater sector. The company's latest innovation, FLEXX-CAP, represents a milestone development for MBRs, with first shipments leaving its facility in Q1 2025. FLEXX-CAP empowers, for the first time, an unbreakable, always cleanable, and now also flexible membrane technology that combines the robustness of ceramic membranes with the beneficial motions of polymeric membranes. The FLEXX-CAP, a flexible end cap, connects the ceramic membranes with the module housing, enabling engineered micro-movements during the continuous air scouring. These movements reduce sludge retention and cake layer formation on the membrane surface while reducing



Image: Ceramic Membrane with FLEXX-CAP - flexible end caps

the laminar boundary layer on the membrane surface as the water flows from bottom to top. This innovation enhances MBR performance by allowing higher flux rates, extending filtration cycles, and reducing backwash requirements. This patented technology leapfrogs ceramic membrane solutions forward and marks a significant advancement in MBR technology.

THE IMPACT OF FLEXX-CAP ON PLANT OWNERS AND OPERATORS

CERAFILTEC has successfully replaced numerous polymeric MBR membranes to upgrade plants and introduce the benefits of ceramic technology. With the introduction of FLEXX-CAP, this trend is expected to proliferate, thanks to the enhanced performance and increased benefits. FLEXX-CAP's ability to deliver

better performance and greater value for MBR operators and plant owners is a testament to CERAFILTEC's commitment to innovation and sustainability in the water sector. The reusable nature of the module and ceramic membranes, combined with their long lifespan, significantly reduces plastic waste and environmental impact. Furthermore, CERAFILTEC's membranes do not contain PFAS or PVDF, making them a safer and more sustainable choice for water treatment applications.

By addressing the challenges plant operators and owners face, CERAFILTEC's innovations help them succeed. FLEXX-CAP reduces the burden of maintenance, ensures consistent water quality, and supports sustainability goals, empowering operators to meet stringent regulations and environmental standards effortlessly.

CONCLUSION

Plant operators and owners are at the forefront of water treatment, ensuring that every drop meets the highest standards and contributes to solving today's water challenges. They are the ones who make water reuse and sustainability a reality. CERAFILTEC is dedicated to supporting these efforts, providing the tools and innovations necessary to achieve their goals with confidence and success.

The evolution of MBR technology from its inception in the 1960s to the present day has been marked by continuous innovation and significant milestones. CERAFILTEC has played a pivotal role in this journey, driving the adoption of ceramic membranes and setting new standards in water and wastewater treatment. Their latest innovation, FLEXX-CAP, is a game-changer that combines the best features of all membrane types, offering unparalleled performance and value.

As global water challenges intensify, the need for sustainable wastewater treatment solutions becomes ever more crucial. By enhancing the reliability and sustainability of MBR technology through advanced ceramic membranes, operators and plant owners can confidently meet stringent regulations, improve operational efficiency, and contribute to a sustainable future. Their dedication and hard work ensure that water resources are managed effectively, making a significant impact on communities and the environment. With the right support and innovative tools, these professionals continue to excel in their mission, leading the way towards a brighter, more sustainable future for all.



About the Author

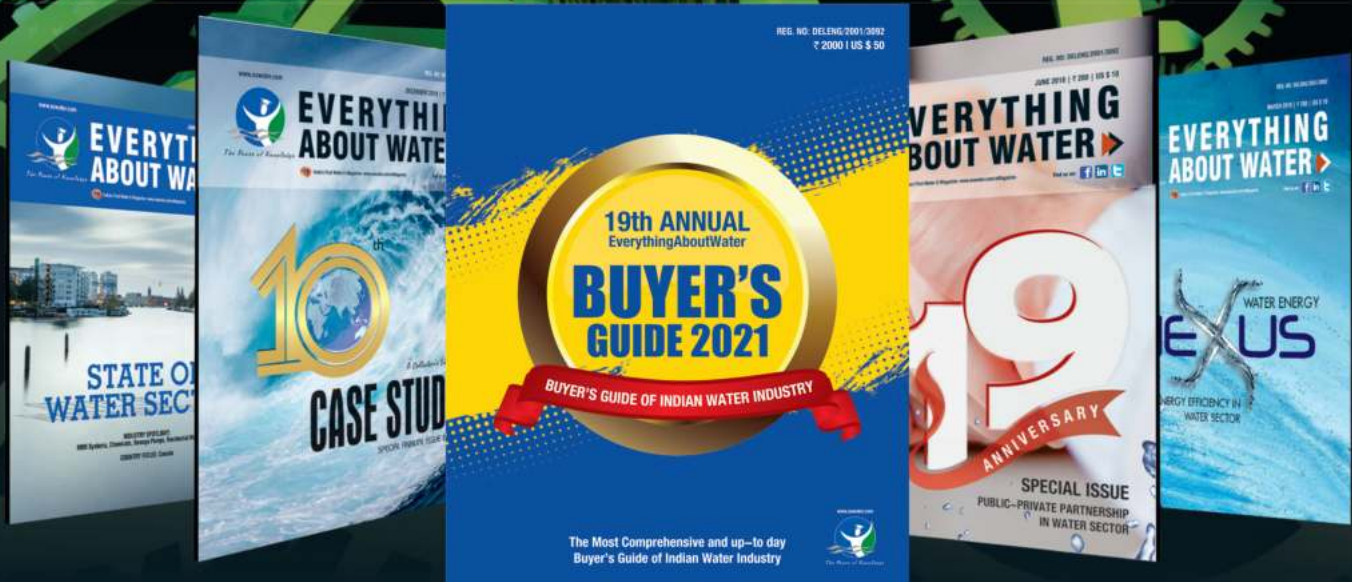


Julius Glöckner, Chief Growth Officer at CERAFILTEC Germany GmbH, leads the company's business growth, marketing, PR, and communication efforts. With an MBA and a distinguished background as a former CPA, CIA, and CFE, Julius brings extensive experience in strategy, finance, and leadership. At CERAFILTEC, Julius is dedicated to driving the company's growth and empowering customers to solve their water and wastewater challenges through innovative filtration solutions. Previously, as Chief Commercial Officer, he focused on expanding the commercial team across regions, and business development to support CERAFILTEC's mission to address global water challenges: CLEAN WATER. EVERYWHERE.

Julius Glöckner
Chief Growth Officer, CERAFILTEC Germany GmbH



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SMART WATER: HOW AI TECHNOLOGY CAN TRANSFORM INDIA'S WATER CRISIS

Ivy Ng, Director of Digital Ventures, Mann+Hummel

N.P. Singh, Sales Leader, Mann+Hummel Water and Membrane Solutions

India is grappling with a severe water crisis that affects millions of lives and threatens the sustainability of its economic growth. The country, home to over 1.4 billion people, faces multiple water-related challenges, including depleting groundwater levels, contamination of water supplies, inefficient water management, and increasing water demand from a burgeoning population and industrial sector. According to the NITI Aayog, a government think tank, nearly 600 million people in India face high to extreme water stress, 35 million people lack access to safe water, and by 2030, the country's water demand is projected to be twice the available supply, leading to severe water scarcity.

With the escalating demand and declining quality of water resources, efficient water management has become paramount. Amid this dire situation, innovative solutions are imperative to secure India's water future. MANN+HUMMEL, a global leader in filtration technology, is at the forefront of addressing these challenges through its cutting-edge smart water technologies. Their STREAMETRIC solutions leverage the power of Artificial Intelligence (AI) to offer comprehensive water management strategies tailored to the needs of industrial, commercial, and agricultural sectors. By utilizing AI-based software, these companies aim to revolutionize water management practices, ensuring sustainability, efficiency, and resilience against the looming water crisis.

THE POWER OF AI IN WATER MANAGEMENT

AI is becoming the key technology for innovative filtration solutions. Smart water technology integrates advanced sensors, AI algorithms, and IoT (Internet of Things) devices to monitor, manage, and optimize water usage. By implementing digital water quality monitoring through AI-driven platforms like STREAMETRIC, facilities can improve the reliability of their filtration systems, reduce engineering hours, and enhance reporting.

A cloud-based platform then analyzes and controls all data using AI and machine learning (ML). To facilitate reporting for engineers and technicians, managers can also design personalized dashboards for team members, operators, and service providers. All data is gathered and stored in the secure and scalable STREAMETRIC cloud, while a digital logbook allows teams to capture and store all historical data without the need for manual referencing or data entry. Through a streamlined framework, engineers can build cleaning schedules and prediction parameters,



How STREAMETRIC water technology works? IoT sensors collect reliable data, either by installing sensors on-site or accessing existing data directly through specific communication protocols.

use AI-based predictive technology to set limits and detect anomalies, including forecasting membrane permeability and transmembrane pressure.

Manual monitoring is no longer necessary as these systems offer real-time supervision, automated dosing, and in-depth data analysis.



APPLICATION FIELDS

Industrial Applications: Optimization and Efficiency

Industries are major consumers of water, and efficient water management is crucial to reduce costs and meet environmental regulations. However, traditional water management methods are often inefficient, leading to significant wastage. STREAMETRIC smart water solutions address these inefficiencies through:

- **Real-Time Monitoring and Maintenance:** AI-powered sensors can continuously monitor water quality and usage, identifying leaks, and inefficiencies promptly. This allows industries to take immediate corrective actions, reducing water waste and associated costs.
- **Predictive Maintenance, Increase productivity:** By analyzing data trends, AI algorithms can predict equipment failures before they occur. This proactive approach minimizes downtime and maintenance costs while ensuring optimal water usage.
- **Reverse Osmosis (RO) Optimization:** RO is a membrane filtration technology that removes particles larger than 0.0001 microns from a liquid, including ions, organic molecules, and other contaminants, which is crucial for desalination and water purification in industrial applications. AI algorithms analyze water quality data and operational parameters in real time to predict membrane fouling and scaling, allowing for proactive maintenance and extending membrane life. This results in significant cost savings and improved water recovery rates.

Commercial Sector: Ensuring Sustainable Water Management

STREAMETRIC smart water management solutions are designed to optimize water use across a wide

range of commercial buildings, including swimming pools, water playgrounds, wellness centers, and fountains.

- **Automated Water Quality Monitoring:** Continuous real-time monitoring eliminates the need for manual sampling and on-site checks. An automated dosing mechanism ensures that parameters such as pH levels consistently meet regulatory standards. This safeguards the health of visitors and guests, maintains high water quality, minimizes downtimes, and prevents damage to the infrastructure.
- **Manpower Efficiency & Resource Savings:** The solution prevents issues like overdosing and over-pumping, which saves energy, water, chemicals, costs, and time. By reducing the need for manual interventions and providing precise control over water quality, smart water systems enhance operational efficiency and ensure compliance with water conservation regulations. The integration of these technologies has demonstrated up to 50% savings in manpower maintenance, freeing up resources for other critical tasks and reducing operational downtime.
- **User-friendly Water Management System:** A user-friendly online dashboard allows facility managers to access water quality data anytime and anywhere, even for multiple sites. This centralized management system provides detailed analytics on water consumption patterns, enabling commercial entities to implement water-saving measures and optimize resource use efficiently.



Agricultural Innovations: Enhancing Productivity and Sustainability

Agriculture is the largest consumer of water in India, accounting for about 80% of the country's total water use, and efficient irrigation practices are essential to address the water scarcity issues.

- **Comprehensive Water Management:** Smart water solutions support diverse agricultural applications, including indoor farming, greenhouses, livestock management, irrigation of land farms, agriculture with isolated tanks, and aquaculture. AI-powered systems can monitor and adjust water quality parameters in real-time, ensuring optimal conditions for each specific type of agriculture.
- **Zero Liquid Discharge & Sustainable and Efficient Irrigation:** AI-driven water management solutions can be directly installed within agricultural irrigation or water storage systems. These systems help farmers utilize water sustainably while maximizing yield and meeting industry KPIs. By ensuring that water is used efficiently and effectively, these technologies contribute to long-term agricultural sustainability and productivity.
- **Real-Time Monitoring and Automated Dosing:** Farmers can access real-time water quality data via PC and phone, reducing the need for on-site working hours. Accurate, automatic chemical dosing minimizes the presence of bacteria and algae, maintaining key parameters such as pH and chlorine within the required range. Automated pumping adjustments save energy, costs, and prevent water wastage, allowing for more efficient water usage and improved crop yields.



CONCLUSION

Smart water technology exemplifies how AI can transform water management, providing efficient and sustainable solutions to pressing water challenges. As more data becomes available and the technology continues to evolve, even greater improvements in water efficiency and sustainability are anticipated. Companies like MANN+HUMMEL are leading the charge in this innovation, actively seeking solutions to enhance water management through reduced energy consumption, minimized chemical use, and effective bacterial control. Their commitment to innovation and sustainability positions them as key players in addressing India's water crisis and paving the way for a more water-secure future. By removing the harmful from the useful, such technologies ensure a resilient and sustainable water management system for generations to come.



About the Author



Ivy Ng,
Director of Digital Ventures,
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Ng, Ivy is the Director of Venture Innovation Studio based in Singapore. Key areas of involvement include global innovation programs to support the overall water innovation programs in the company. Most recent project include the ideation of smart water optimisation solution from an intrapreneurship programme called Incube 4.



N.P. Singh,
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N P Singh leads the water and membrane business for Mann+Hummel in India. He has 26 years of experience in the water industry, working in different areas like R&D, sales, and projects, especially in filtration and digital water technologies.



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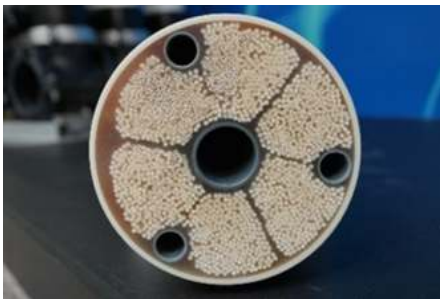
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THE POWER OF MICROBES: HOW INNOVATIVE MICROBIAL FORMULATIONS CAN ENHANCE ULTRAFILTRATION MEMBRANE LONGEVITY

Sanjay Bahl, CEO, Superweld Ecosolutions

From the past few years, the significance of ultrafiltration membrane technology in wastewater treatment has grown a lot. It is universal and is able to produce high-quality treated water, making it a key component in modern wastewater treatment processes. However, due to various factors there are concerns that must be taken into consideration before incorporating it into the wastewater treatment.



In this article, we will explore the importance of UF membrane technology, address the cost concerns, and introduce innovative solutions to enhance the longevity of this membrane technology.

Let's first dive deeper into the technology!

Benefits of Ultrafiltration Membrane Technology in Wastewater Treatment

EFFICIENT REMOVAL OF IMPURITIES:

UF membrane technology is a game-changer in wastewater treatment due to its ability to efficiently filter out suspended solids, bacteria, and even some viruses.

Compact Design:

UF membrane systems are known for their compact design, making them suitable for both large-scale treatment plants and smaller installations. Their small footprint reduces the space required for treatment facilities.

Flexibility:

UF technology is versatile and can be applied in various wastewater treatment scenarios, including the removal of contaminants from sewage, industrial effluents, and stormwater. It can also be used in water

reuse and desalination processes.

Environmentally Friendly:

The use of UF membranes contributes to a sustainable environment by reducing the discharge of pollutants into natural water bodies. It helps protect aquatic ecosystems and supports the conservation of freshwater resources.

These were some of the few importance or benefits of the Ultrafiltration Membrane Technology in Wastewater Treatment. Let's now understand the cost structure and see how we can make the right decisions.

IMPLEMENTATION OF ULTRAFILTRATION MEMBRANE TECHNOLOGY CAN BE QUITE EXPENSIVE.

While UF membrane technology offers a lot of benefits as we have discussed before, the high initial cost of these membranes sometimes becomes a barrier in adopting the technology by a lot of outlets. For

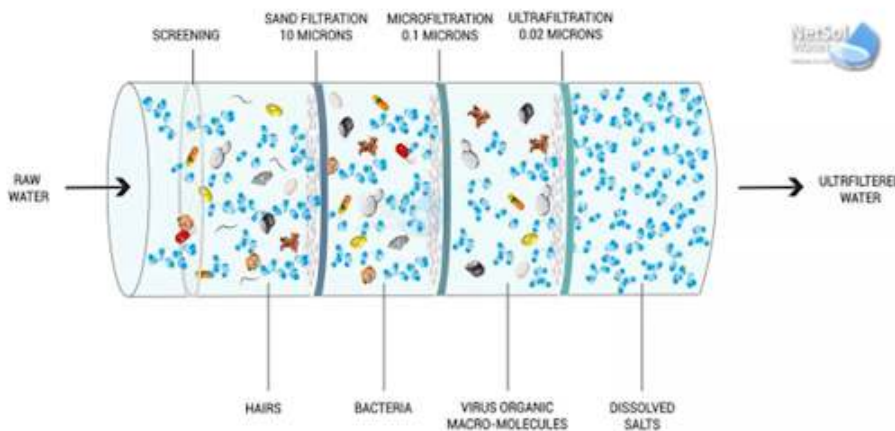
example, a 10,000 litres per day (10KLD) Sewage Treatment Plant (STP) would require a UF membrane plant worth Rs 2,00,000. However, it is essential to consider the long-term advantages and other good adaptations that will boost the wastewater treatment for your plant.

One of the major reasons for its highest costs is membrane fouling which is a common issue in UF systems, which requires additional investments in anti-fouling measures, cleaning, and replacement. Fouling should be prevented properly to avoid extra money on replacements for UF membranes.

MEMBRANE FOULING AND CLOGGING LEADS TO THE DAMAGE OF UF MEMBRANES!

Let's imagine a water filter in your home. The filter is like a super-thin sheet with tiny holes. It cleans water by letting water pass through these holes and blocking out dirt and impurities.

Now, think of this filter getting dirty because of all the stuff it has caught from the water. This dirt and slime stick to the filter and make it harder for water to go through. This is what we call "fouling."



Similarly, membrane fouling happens when dissolved particles in the feed water collect on the surface of the UF membrane. These particles can include organic matter, bacteria, algae, minerals, and other contaminants present in the wastewater. When these substances come into contact with the membrane, they stick to its surface.

Here are some of the common reasons why membrane fouling can happen in your plant:

Increased Operating Pressure:

To maintain the desired flow rate and water quality, the UF system must compensate for the reduced permeability caused by fouling. This often necessitates an increase in the operating pressure, which places additional stress on the UF membrane and the entire system.

Reduced Permeability:

The presence of biofilms and trapped particles in the membrane can reduce the effective pore size and permeability of the UF membrane. This reduction in permeability can lead to decreased filtration efficiency and an increase in the membrane pressure needed to get the wanted flow rate.

Microbial Growth:

Nitrogen and phosphorus are essential nutrients for microorganisms, including bacteria and algae. When these nutrients are present in sufficient quantities in water sources, they can promote the growth of these microorganisms. As microorganisms begin to increase, they can form biofilms on the surface of UF membranes.

This biofilm acts like a blockage on the filter. It can slow down the water from passing through, like a traffic jam on a road. That's why it's a problem when too much food (nitrogen and phosphorus) is in the water because it makes these slimy biofilms, which can clog up the filter.

HIGH-PERFORMANCE MICROBIAL FORMULATIONS TO THE RESCUE!

Here's how high-performance microbial formulations can address these challenges and avoid the

membrane fouling to maintain the clarity of water and its desired flow:

Enhancing Biodegradation

These formulations promote the growth and activity of aerobic bacteria, which are more efficient at breaking down organic pollutants.

- Enhanced biodegradation of organic matter leads to a reduction in BOD and COD levels and TSS, making the water cleaner and less prone to fouling UF membranes.

Nutrient Removal

These formulations include compounds that facilitate the removal of nutrients like nitrogen and phosphorus. They can encourage the formation of insoluble compounds with these nutrients, making them easier to remove from the water.

- For example, they might help convert ammonia (a form of nitrogen) into solid particles or facilitate the precipitation of phosphorus compounds. Removing these nutrients before the water reaches the UF membranes reduces the chances of membrane fouling caused by nutrient accumulation and biofilm formation.

By improving biodegradation, removing nutrients, and eliminating odors, these formulations can help maintain a more efficient and trouble-free wastewater treatment process. This, in turn, reduces the risk of membrane fouling in systems like ETPs, STPs, and other treatment processes.

Consequently, this can lead to reduced TSS in the effluent, which can significantly extend the lifespan of UF membranes, making your water treatment system more efficient and cost-effective.

REAL-WORLD EXAMPLE: REVIVING A TEXTILE MILL'S UF MEMBRANE

A textile mill's wastewater treatment plant was initially commissioned using traditional methods, relying on cow dung, urea, and DAP (Diammonium Phosphate) for bioculture development. However, this approach resulted in a weak biological floc in the aeration tank. This underperforming system was susceptible to frequent shock loads that disrupted the outlet water quality. As a consequence, the UF membrane had to handle the entire load of high TSS and BOD.

While the UF membrane was able to produce clear water within acceptable parameters, it was filtering well beyond its designed capacity. This resulted in the membrane becoming clogged within a year of operation.

THE CHALLENGES:

The textile mill's wastewater treatment process faced several key challenges:

- **Ineffective Traditional Approach:** The use of cow dung, urea, and DAP did not create a strong biological environment, leading to inconsistent treatment and frequent shock loads.
- **UF Membrane Overload:** The UF membrane was pushed beyond its design capacity due to high TSS and BOD levels, resulting in clogging.
- **Quality Control:** The mill struggled to maintain consistent water quality, making it difficult to meet regulatory and environmental standards.

THE SOLUTION:

Our team introduced a comprehensive solution that included high-performance microbial formulations.

- These formulations were designed to enhance the biological treatment process and improve water quality.
- By utilizing these formulations, the UF membrane could be bypassed, allowing the microbes to break down pollutants, remove nutrients, and eliminate odors.

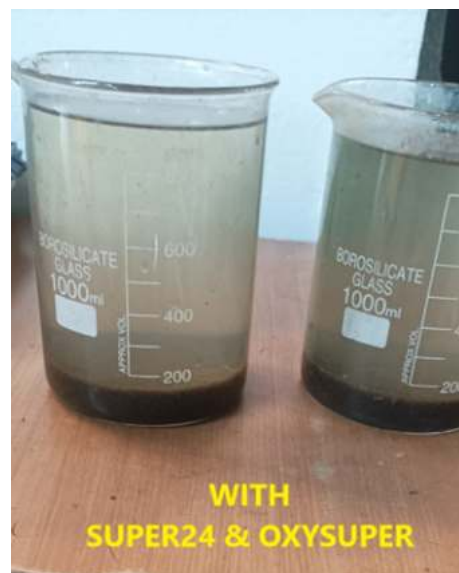


- Additionally, the team provided operational guidance to the treatment plant operators.

THE OUTCOME:

Our expertise led to the following positive outcomes:

- **Enhanced Wastewater Treatment:** The textile mill's treatment plant achieved a more robust and effective biological treatment process.
- **Lowered Membrane Load:** The UF membrane was no longer overloaded, extending its lifespan and reducing the need for frequent replacements.
- **Consistent Water Quality:** The mill consistently



produced high-quality treated water that met regulatory and environmental standards.

- **Management Appreciation:** The textile mill's management acknowledged the effectiveness of the high-performance microbial formulations and the value they brought to the wastewater treatment process.

This case study highlights the significant impact that modern microbial solutions can have on industrial wastewater treatment. By adopting these technologies, we can solve environmental issues and ensure sustainable industrial operations.



About the Author



Sanjay Bahl
CEO, Superweld Ecosolutions

Sanjay helps businesses and their leaders by providing Eco-logical solutions for pollution control and waste management problems. At Superweld Eco-Solutions, they create innovative products to treat wastewater, Malodors, Solid waste, Algae Treatment, Lake and Pond remediation. Sanjay has helped clients like Paper Mills, Pharma Companies, Hospitality Industry, Food and Beverage Industries to meet stringent wastewater discharge parameters. A Post Graduate from Symbiosis College, Sanjay and his team act as technical advisors and trouble shooters to 900+ clients. They help companies Like CETPS, Dairy, STPs and ETPs improve their biological wastewater treatment. He strongly believes Indian biotechnology is among the best in the world. Along with his passion for transforming the wastewater treatment industry; he likes to read about the latest technologies and does social work in his free time.



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INTERVIEW WITH THEOGENE RUSATIRA

Wash Expert
Movement for the Fight against Hunger in the World

Q: Can you provide a brief overview of your professional background and your role in the water industry?

A: I am called Theogene RUSATIRA, Water and Environmental Engineer from Rwanda. After my graduation in 2013, I worked as Water Engineer in different private companies like BETA Company, Hydraulic Engineering and Construction Company Limited until June 2019. From July 2019 up to April 2024, I worked as Sanitation Engineer in public institution called Water and Sanitation Corporation (WASAC Rwanda), Governmental Institution whose role is to provide adequate water and sanitation services for Rwandans. From April 2024 I am currently working as WASH EXPERT at Movimento Lutta Fame Mondo (MLFM), An International Non-Governmental International with a lot of duties including providing Water, Sanitation and Hygiene services in Rural Area in Rwanda.

Q: How would you define Smart Water Technology, and what are its core components?

- A:**
- Smart Water Management (SWM) refers to the use of technology, such as sensors, data analytics, and automation, to improve the efficiency, reliability, and sustainability of water systems.
 - The core components of (SWM) are Connecting smart devices, Speedy networks, and Digital solutions are critical for smart water management.

Q: What types of technologies (e.g., IoT, AI, big data, machine learning) are most critical to the advancement of Smart Water Systems?

A:

- Sensors and IoT (Internet of Things);
- Digital Meters and Smart Networks;
- Supervisory Control and Data Acquisition (SCADA) Systems;
- Geographic Information Systems (GIS);
- Machine Learning and Big Data Analytics;
- Smart Building Solutions.

Q: What are the primary benefits of implementing Smart Water Technology for urban water management systems?

A: Improved Water Systems Efficiency, Improved Public Health Standards, Improved Consumer Awareness, Reduced Waste in Water-Intensive Industries, Sustainable Urban Development.

Q: What are the main challenges faced in the deployment of Smart Water Technology, and how can these be effectively addressed?

A: Infrastructure and Sensor Deployment:

- Challenge: Installing sensors and communication infrastructure across water networks can be expensive and logistically complex.
- Solution: Prioritize critical areas for sensor deployment, such as leak-prone zones or water quality monitoring points. Use low-cost, energy-efficient sensors and consider collaborative efforts with other utilities or stakeholders.

Data Management and Integration:

- Challenge: Handling large volumes of data from sensors, meters, and other sources can

overwhelm existing systems.

- Solution: Implement robust data management platforms that integrate real-time data from various sources. Use cloud-based solutions for scalability and interoperability.

Cybersecurity and Privacy:

- Challenge: Protecting data and communication channels from cyber threats is crucial.
- Solution: Employ encryption, authentication, and intrusion detection mechanisms. Regularly update security protocols and collaborate with experts to stay ahead of evolving threats.

Data Quality and Accuracy:

- Challenge: Ensuring accurate data collection and validation is essential for reliable decision-making.
- Solution: Calibrate sensors regularly, validate data against physical measurements, and implement outlier detection algorithms. Combine data-driven approaches with physics-based models for better accuracy.

Real-Time Decision Support:

- Challenge: Providing actionable insights in real time requires efficient algorithms and computational resources.
- Solution: Develop predictive models for leak detection, demand forecasting, and water quality assessment. Use machine learning and optimization techniques to enhance decision support systems.

Stakeholder Engagement and Adoption:

- Challenge: Convincing water utilities, regulators, and consumers to adopt SWT can be challenging.
- Solution: Educate stakeholders about the benefits of SWT, conduct pilot projects, and involve them in the design and implementation process. Showcase successful case studies to build confidence.

Legacy Infrastructure Compatibility:

- Challenge: Integrating SWT with existing infrastructure (e.g., aging pipes, pumps) can be difficult.
- Solution: Develop retrofitting strategies, prioritize upgrades based on critical areas, and gradually transition to SWT-compatible components.

Energy Efficiency and Sustainability:

- Challenge: SWT systems consume energy, impacting operational costs and environmental sustainability.
- Solution: Optimize sensor placement to minimize energy usage, explore renewable energy sources, and implement demand-side management strategies.

Regulatory and Policy Frameworks:

- Challenge: Navigating complex regulations and policies can hinder SWT adoption.
- Solution: Collaborate with regulators, advocate for supportive policies, and participate in industry forums to influence standards and guidelines.

Resilience and Adaptability:

- Challenge: Ensuring SWT systems can withstand natural disasters, climate change, and other disruptions.
- Solution: Design redundant communication channels, backup power sources, and emergency response plans.

Q: Could you share any notable case studies or success stories where Smart Water Technology has significantly improved water management and conservation?

A: The case study is my Country called Rwanda, from many years we had high non-revenue water (44.4% in 2020 and 41% in 2022) due to main reasons for this loss include leakages, illegal connections, road construction, metering inaccuracies, meter bursts, meter blocks, natural disasters, and water theft by moving meters. From 2018, Government of Rwanda has got loan from African Bank of Development oriented in improvement of water infrastructure development. It is in that regards so many water treatment plants were rehabilitated and upgraded to increase water production and installation of smart water technologies devices (SCADA) to properly manager water. As you see, non- revenue water start to decrease (3.4% from 2020 to 2022) and the targeted achievement is to reach at 34% in 2030 and 20% in 2050

Q: How do Smart Water Systems manage and protect the vast amounts of data they collect, and what measures are in place to ensure cybersecurity?

A: Smart Water Systems must proactively address cybersecurity through assessments, best practices,

emergency planning, and collaboration to protect critical infrastructure and sensitive data as follow:

Cybersecurity Assessments:

- Utilities should conduct regular cybersecurity assessments to identify vulnerabilities and assess risks. These assessments help in understanding the system's security posture and identifying areas for improvement

Reducing Exposure to the Public-Facing Internet:

- Water systems should minimize their exposure to the public-facing internet. Limiting access points reduces the attack surface and makes it harder for malicious actors to exploit vulnerabilities

Cyber Hygiene Practices:

- Implementing basic cyber hygiene practices is crucial. These include regular software updates, strong password policies, and network segmentation.

Emergency Response Plans:

- Having a well-defined emergency response plan is essential. It ensures that the utility can respond effectively to cyber incidents, minimizing damage and downtime.
- The Water and Wastewater Sector Incident Response Guide offers guidance for handling cybersecurity incidents.

Technical Assistance and Training:

- Utilities can seek technical assistance and training from federal agencies and industry experts.

Collaboration and Awareness:

- Collaboration among water utilities, government agencies, and private sector partners is critical.

National Databases and Interoperability:

- As water systems adopt digital capabilities, interoperability and national databases for water pipes become important

Q: In what ways does Smart Water Technology contribute to sustainability and the reduction of environmental impact?

A:

- Smart Water Technology identify areas where water can be conserved, reducing wastage, and supporting the preservation of this precious resource.
- It can help mitigate the growing problems of environmental degradation and climate change at large.

Q: What are the economic benefits for water utilities and consumers from adopting Smart Water Technology?

A: Economic benefits while adopting Smart Water Technology is the proper management of non-revenue water. There is a list of other benefits to consider as follows:

- Upkeep and expansion of water infrastructure
- Leaks in water distribution systems
- Rising energy costs
- Customer-affordable rates
- Emerging water pollutants

Q: Lastly, Looking ahead, what do you see as the future developments in Smart Water Technology over the next decade, and how might these transform the industry?

A: The future of Smart Water Technology holds exciting possibilities. Here are some key developments that are likely to shape the industry over the next decade:

Remote Sensing and IoT Integration:

- Remote sensing technology will play a crucial role in water management. It allows us to monitor water resources, detect leaks, and assess water quality from a distance.
- Internet of Things (IoT) devices will enable smart irrigation, real-time water quality control, and efficient utility operations. When combined with powerful computing capacity, IoT can help develop complex models for water management

Data Analytics and Artificial Intelligence (AI):

- Data-driven decision-making will become more prevalent. Advanced analytics will help utilities optimize water distribution, predict demand, and identify areas for improvement.
- Artificial Intelligence will enhance water treatment processes, automate leak detection, and improve overall efficiency. AI algorithms can analyze vast amounts of data to provide actionable insights.

Smart Metering and Leakage Prevention:

- Companies like Smarter Homes are producing smart metering devices that prevent leaks and monitor water consumption. These systems have already saved thousands of households significant water usage.
- Automated leakage prevention will reduce water losses and improve overall system efficiency.

Digital Twins and Asset Management:

- Digital twins-virtual replicas of physical water

infrastructure—will allow utilities to simulate and optimize operations. They can predict maintenance needs, assess performance, and enhance asset management.

- Intelligent asset management will extend the lifespan of water infrastructure, reduce downtime, and improve reliability.

Geographical Information Systems (GIS):

- GIS technology will continue to be essential for spatial analysis, mapping, and decision-making. It helps utilities visualize water networks, plan infrastructure, and respond to emergencies effectively.
- **5G Connectivity:**

- The rollout of 5G networks will enable faster data transmission and lower latency. This will enhance real-time monitoring, remote control, and communication between water infrastructure components.

Decentralized Water Solutions:

- Technologies like distributed water treatment and rainwater harvesting will empower communities to manage their water locally. This decentralization can improve resilience and reduce dependence on centralized systems.

Water Recycling and Reuse:

- As water scarcity intensifies, recycling and

reusing water will become critical. Advanced treatment methods will make reclaimed water safe for various purposes, including irrigation and industrial processes.

Climate Resilience and Adaptation:

- Smart water technologies will help cities adapt to changing climate patterns. Predictive models can guide water resource management during droughts, floods, and extreme weather events.

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Q: Can you provide a brief overview of your professional background and your role in the water industry?

A: I hold a B.Sc. degree in Soil and Water Sciences and a master's degree in business administration. Throughout my life, I have been involved in introducing advanced technologies to the fields of water and the environment. I served as advanced technologies Division director at Netafim, a -global leader in smart irrigation technology. Prior to that I was part of the founding team and served as EVP at Miya, Arison group, one of the largest business groups in Israel. Miya is a global leading company in water efficiency NRW (Non- Revenue water) Large redaction projects worldwide, including Bahamas, Jamaica, Brazil, Philippines.... I was a member of the Steering Committee - International Standards for Water in the Smart City (ISO/TC), Led by the Israeli standards institute of Israel.

Q: How would you define Smart Water Technology, and what are its core components?

A: Sorry, but I think that it is not the correct question. Smart water technology is any new technology which can be implemented in water facilities, but as it has no real practical meaning, the right questions should be: Define Smart water Network, and the definition for that question is more complicated but have a meaning: Smart water network is a water network which use a bundle of productivity IoT tools & cloud programs from the infrastructure level through the ICT & SCADA level up to the Cybersecurity & data analytics level, that are commonly used for optimizing routine and emergency operational work tasks in the water network It is used to simplify tasks and processes of the entire organization workers, improve the coordination, collaboration, and data sharing within the

organization, reduces response time, and increase productivity, efficiency, security and safety.

Q: What types of technologies (e.g., IoT, AI, big data, machine learning) are most critical to the advancement of Smart Water Systems?

A: The most important type of technologies is the Real-time operational data management, if in the past the only requests was to have a simple SCADA system that will allow to monitor and remotely control the main device in the network. Today the main challenge is how to use all the data that the utility gathers to improve the efficiency and reduce the disaster events. So, the most important issue is not the technology by itself but the technological approach as a whole! The approach must be having one holistic real-time platform that will handle the data from "A to Z". From data acquisition & telemetry to real-time data management: data aggregation, data integration, data processing, and data sharing and that way you can use the data to improve the collaboration & coordination within the utility, reduce respond time and improve the efficiency & safety of the network operation. On top of that it is possible to add AI, Predictive maintenance and machine learning in utilities which can afford it and have the skill team to manage it.

Q: What are the primary benefits of implementing Smart Water Technology for urban water management systems?

A: It allows better management of routine and crisis events by having Real-time Data including warnings for exceptional events, by manage & Control remotely all system components. The real time Information enables improved service, quick reaction time to malfunctions. It contributes for better and safer management of both simple and complex water

networks.

Q: What are the main challenges faced in the deployment of Smart Water Technology, and how can these be effectively addressed?

A: There are three main Challenges: cost (CAPEX & OPEX), technology complexity (Not having in house skill team) & cybersecurity. For that you can add, the challenge of handling the huge amount of data collected (Most of the collected data is in most case unfortunately unused at all!). The best way to deal with those challenges is by using a holistic platform which combine all the tools and programs (from the infrastructure level through the ICT & SCADA level up to the Cybersecurity & data analytics level) as one integrated suite, what makes the installation almost plug & play and require no maintenance or qualified team.

Q: Could you share any notable case studies or success stories where Smart Water Technology has significantly improved water management and conservation?

A: Yes, we have such a project in CAEM Mexico state. The Challenge: The facilities' operation was entirely manual. Each facility had its own operational personnel who report to different regional managements. The note down of readings was manual with unreliable metrics such as scales drawn on the wall, or paint marks in the case of the valve opening control. The operation of pumps, motors, electrical circuits, and others were manual and depended on human intervention for stopping / starting. There was no preventive maintenance. Only flow rate was measured, and the readings were noted and calculated visually in front of the local instruments. Calculations were done manually, and Data obtained from instruments between One hour and Four hours were transmitted verbally by radio.

Due to human errors or the absence of personnel in the facilities, sewage overflows have been registered in dams that have affected the population and a flood of facilities in a drinking water storage tank. The events lead to higher operating expenses for commissioning company in terms of inconvenience to the population and repairing cost of damaged facilities.

The solution: The project started with a single installation with complex operation of applied

complete solution, including high level local automated control, connected to RealiteQ –IoT and cloud computing holistic platform for real-time remote control and data management. The Project includes:

- Installation of electrical and communication network at each site.
- Automation configuration: networking, device programming, provision of various measuring instruments and sensors.
- 24/7 permanent maintenance of the automation system.
- Remote monitoring and control of site operation 24/7 from any place.
- All sites are connected to one centralized remote monitoring and control system.

The results:

- **Increase in safety in the operating guidelines.**
- **Service without interruption.**
- **Stability in different basic parameters, such as: - - Storage levels.**

Exact water consumption for each circuit.

- **Significant savings of water & electrical power**

The project was extend and today more than 120 water facilities of the network are connected to RealiteQ.

Q: How do Smart Water Systems manage and protect the vast amounts of data they collect, and what measures are in place to ensure cybersecurity?

A: There are several key parameters to ensure Cybersecurity:

1. The first and most important one is to know that you can't "ensure" cybersecurity, you can minimize the risk, so be all the time aware to what is going in your system!
2. When system was Built from scratch as an IoT and cloud platform with all the right Cybersecurity measurements in most case it will be safer from old system with local server with added IOT device.
3. Use reliable cloud provider as host (AWS, Azur, Google...) as they invest heavily in cybersecurity, implementing robust security measures to protect data and infrastructure.
4. Using only End-to-End fully secured solution with most advanced Security procedures applied.
5. Use Multi Factor Authentication (like in Banks)
6. Use IoT device with DMZ (demilitarized zone or perimeter network or screened subnet) is a physical or

logical subnetwork that add an additional layer of security.

7. Remote operational notification – any remote change of critical values or abnormal operation request will generate security notification

Q: In what ways does Smart Water Technology contribute to sustainability and the reduction of environmental impact?

A: 1. Efficiency and Conservation: Smart water technologies enable efficient monitoring, control, optimization, of water & sewage operation.

2. Reducing Carbon Emissions: By embracing smart water technologies, companies can significantly reduce their carbon emissions while improving their overall sustainability performance.

3. Remote Sensing and Data Analytics: Remote sensing of water can help with water accounting and non-revenue water remediation.

4. Reduce respond time - Can prevent/ minimized disaster events with huge negative impact on the environment.

Q: What are the economic benefits for water utilities and consumers from adopting Smart Water Technology?

A: The Economic benefits of smart water technology is as follow:

1. Increase efficiency – improving operational efficiency saves operational costs as well as reduction in water and energy waste which can save a lot of money.
2. Reduce OPEX – using Smart technology reduce the manpower needed to operate the network as well as the traveling cost and the waste from inefficient operation.
3. Reduce respond time – prevent/minimize disaster events which can cause huge economical (and environmental) damage.
4. Reduce NRW- using smart technology can help in identify leaks with in the network as well as at the customer property and save money for booth the utility and the customer.
5. Predictive maintenance - The adoption of smart water

technologies can lead to long term savings by enabling proactive maintenance and preventing costly infrastructure failures¹.

Q: Lastly, looking ahead, what do you see as the future developments in Smart Water Technology over the next decade, and how might these transform the industry?

A: I believe that the future developments will be in 3 areas:

1. Making the technology much more friendly to the users
2. The high end of the technology (AI, Machin learning and, Predictive maintenance...) will become much more affordable and accessible than it is today.
3. Everything will be done via Cloud and not by local servers.
4. Satellite communication will replace the Cellular communication and will make it much more reliable also during crisis events.

This will push the water industry to the 21st century, it will turn the traditional water industry to a modern one, will reduce the water costs, it will reduce dramatically the water waste, increase the water reuse and will make water (and sewage) available also to Remote rural and poor communities.



WHY IS OZONE CONSIDERED A BETTER DISINFECTANT THAN UV

Water treatment technologies such as Chlorine & UV have been used for years together. Each of this technology has its advantages and disadvantages. Most of the time they are also combined together. Ozone technology has been present for more than decades now. Ozone technology is now close to becoming a priority in water treatment. Quite often ozone is also used in conjunction with other technologies.

UV VS OZONE

Pathogens of concern in any water treatment system consist of Bacteria, Virus & Protozoans. According to available literature UV irradiation's effectiveness depends on the UV dosage applied.

Bacteria

UV is most effective against bacteria followed by protozoan and least effective against virus. The normal UV dosage suggested for water treatment is between 20 and 40 mJ/cm². At this dose, most bacteria show a 2-4 log inactivation.

Disadvantage of UV: The potential for reactivation. Because UV irradiation does not immediately result in cell lysis, there is some opportunity for a UV inactivated cell to regain viability through repair mechanism. One such mechanism is called photo-reactivation. Following UV inactivation, exposure to wavelengths in the range of 350-450 nm (Present in sunlight) triggers an enzyme that can repair UV inflicted damage to the DNA of the bacteria. Not all bacteria have this ability to reactivate and it has been found that reactivation decreases with increase in dose from 20mJ/cm² – 140 mJ/cm². *As most UV generators are designed at the lower range, the potential for reactivation is a reality!*

Virus

Viruses are extremely resistant to UV irradiation. California 22 standards require a minimum of 140 mJ/cm² dose for inactivation of polio virus, while rota virus needs a minimum of 50mJ/cm² dose for effective inactivation and adenovirus needs a minimum of 120mJ/cm² dosage. This is clearly lower than the dose recommended by most UV manufacturers.

Protozoan

UV is not considered a viable technology for inactivation of protozoan pathogens. Cryptosporidium and Giardia require large dosages for 3-4 log inactivation, thus making UV economically unviable for protozoan inactivation.

Water quality

Water quality such as pH, dissolved ions and turbidity affect UV effectiveness.

a) With higher pH, the possibilities of precipitation of carbonates in the water along with scaling of precipitates can foul UV lamps enough to reduce the effectiveness of UV inactivation.

b) High hardness affects UV lamps adversely as any scaling of these precipitates can foul the UV systems.

c) Any turbidity in the water reduces UV irradiation effectiveness.

The role of Ozone and advantages over UV

Unlike UV, Ozone has a high germicidal effectiveness against a wide range of pathogenic organisms including bacteria, protozoa, and viruses and require much lesser contact time than UV. Because of its high germicidal efficiency, ozone can be used to meet high inactivation required by water treatment systems with or without filters. Unlike UV, there is no potential for reactivation as Ozone results in complete inactivation/destruction of pathogens.

Apart from micro organisms, Ozone also has the following benefits: a) Removes Odour b) Removes Colour c) No toxic-by products and makes chlorine use safe, unlike UV which has no effect on Organics at very low doses.

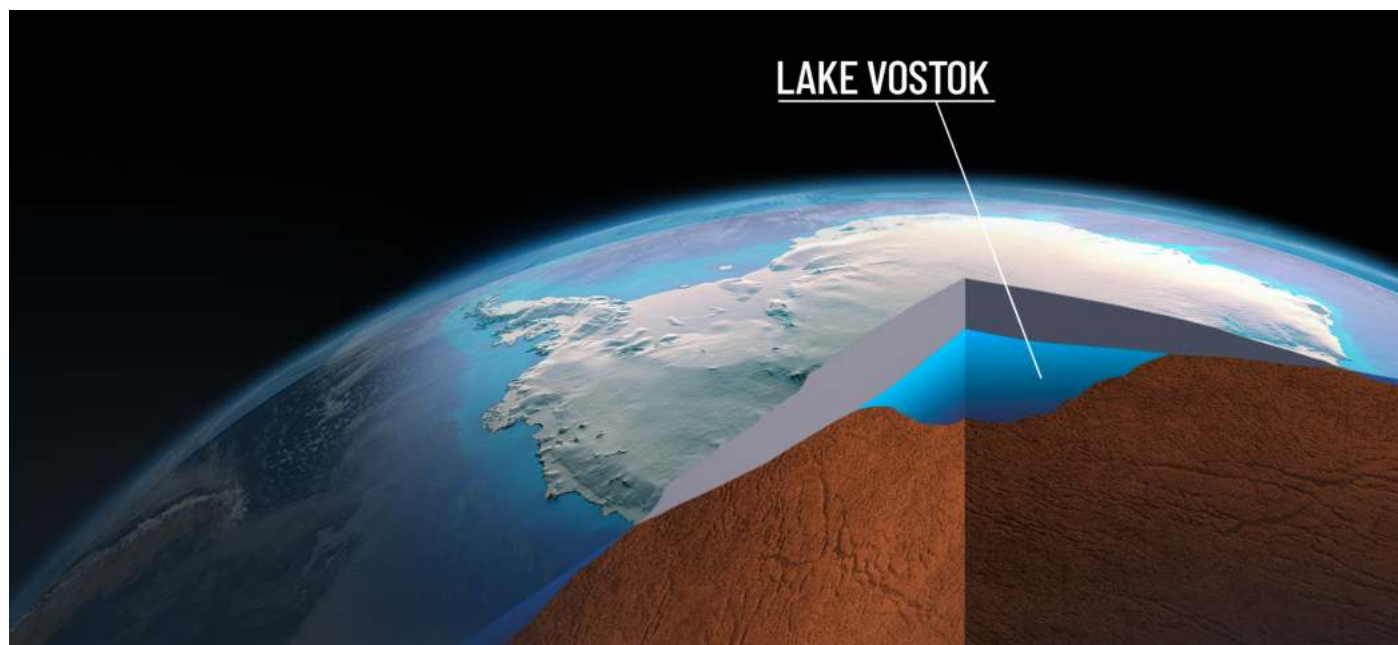
This is precisely the main reason that in Europe and in America it is very common to use both ozone and UV in conjunction. The process called AOP is becoming more popular nowadays. If UV are to be used alone, then the dose should be above 140 Mj, when reactivations cease.

ISSUED IN PUBLIC INTEREST BY
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LAKE VOSTOK: THE HIDDEN GEM BENEATH ANTARCTICA'S ICE



Lake Vostok, a hidden gem beneath the Antarctic ice, stands as one of the most mysterious and captivating water bodies on Earth. Located beneath nearly 4 kilometers of ice, Lake Vostok is one of the largest and deepest freshwater lakes globally, holding an estimated volume of 5,400 cubic kilometers of water. This subglacial lake, buried for millions of years, has been shielded from the atmosphere, creating an isolated environment unlike any other.

What makes Lake Vostok particularly intriguing is the potential for unique life forms. Scientists speculate that the lake's waters, cut off from the outside world for such an extended period, might harbor microbial life forms that have evolved in complete isolation. In a groundbreaking expedition, Russian researchers drilled into the lake, extracting water samples that contained previously unknown bacteria. These findings suggest that Lake Vostok could provide a glimpse into

how life might survive in extreme conditions, offering parallels to environments on other planets, such as Mars or the icy moons of Jupiter and Saturn.

The lake's ecosystem, if indeed one exists, could offer invaluable insights into microbial evolution and survival.

The extreme conditions—high pressure, frigid temperatures, and complete darkness—pose significant challenges to life, yet also create opportunities for discovering resilient and potentially novel organisms. This makes Lake Vostok a focal

point for astrobiologists and microbiologists alike.

In addition to its biological mysteries, Lake Vostok also holds climatological secrets. The pristine condition of its waters may reveal historical data about Earth's past climate, offering clues about the planet's environmental changes over millions of years. As we continue to explore and study Lake Vostok, this hidden Antarctic lake promises to unlock secrets of life, climate, and our planet's history, enhancing our understanding of extreme environments both on Earth and beyond.



T E N D E R

Comprehensive Maintenance Of 750 Kld Sewage Treatment Plant With Round The Clock Services In The Premises Of New Ggh, Super Specialty Block At Vijayawada For L Year. Est. Rs.18.00 Lakhs (2 Nd Call)			
Category	AMC, Repair, Maintenance, Installation tenders		
Location	Andhra Pradesh, Vijaya Wada		
Bid Open Date	15 June 2024	Tender Value	9 Lac
Doc Collection Date	15 June 2024	FTID	240611416220
New Anion And Cation Exchanger In Water Treatment Plant			
Category	Scientific Equipment Tender		
Location	Tamil Nadu, Cheyyar		
Bid Open Date	26 June 2024	Tender Value	3.16 Cr
Doc Collection Date	27 June 2024	FTID	240611425240
Providing And Laying Cement Concrete Interlocking Paver Blocks Around Water Treatment Plant Rear Side Of Kedaram And Parking At Classroom Cum Laboratory Complex (C 06) At Sahyadri Campus			
Category	Construction, Infrastructure, Civil Work tenders		
Location	Tamil Nadu, Tirukkoyilur		
Bid Open Date	26 June 2024	Tender Value	12.72 Lac
Doc Collection Date	25 June 2024	FTID	240611426430
Desilting Of 1.5 Mg Service Reservoir Of 10.00 Mgd Water Treatment Plant Doodhganga Water Works Division Srinagar			
Category	Construction, Infrastructure, Civil Work tenders		
Location	Jammu & Kashmir, Budgam		
Bid Open Date	15 June 2024	Tender Value	11.50 Lac
Doc Collection Date	15 June 2024	FTID	240611428670
Urgent Ditch Filling Along The Bank Of Hooghly Right Embankment From Existing Filling Work To Concrete Ramp Adjacent To Water Treatment Plant For A Length Of 97.00 Metre In Uluberia Municipality In P.			
Category	Cement, Asbestos, Building Material tenders		
Location	West Bengal, Howrah		
Bid Open Date	20 June 2024	Tender Value	9.40 Lac
Doc Collection Date	19 June 2024	FTID	240413479660
Construction Of 1.00 Mld Sewage Treatment Plant Cum 1.00 Kld Fecal Sludge Treatment Plant Under Sbm 2.0 At T.Kallupatti Town Panchayat, Madurai District			
Category	Miscellaneous tenders		
Location	Maharashtra, Osmanaba		
Bid Open Date	11 July 2024	Tender Value	18.90 Lac
Doc Collection Date	12 July 2024	FTID	2406114158430

T E N D E R

Supply, Erection And Commissioning For Addition Of Anion And Cation Exchanger In Water Treatment Plant (15 Mw)			
Category	Construction, Infrastructure, Civil Work tenders		
Location	Tamil Nadu, Walajapet		
Bid Open Date	26 June 2024	Tender Value	30.62 Lac
Doc Collection Date	25 June 2024	FTID	2406114166290
Outsourcing Of Man Power Required For Operation And Maintenance Of 10 Mld Bhouri Water Supply Project Comprising Water Treatment Plant And Intake Well Pump House Borevan, Bairagarh Under Zone 01, Bhop			
Category	Agro, Marine, Food Products tenders		
Location	Madhya Pradesh, Huzur		
Bid Open Date	25 June 2024	Tender Value	67.79 Lac
Doc Collection Date	24 June 2024	FTID	2406114190350



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EVENT CALENDAR



May 2024

Maryland Rural Water Association Conference

06 - 09 May 2024

Roland E. Powell Convention Center, Ocean, USA

<https://10times.com/mrwa-ocean>

Power of Water Canada Technical Conference & Trade Show

08 - 10 May 2024

Niagara-on-the-Lake, Canada

<https://www.owa.ca/conference/>

IFAT Munich

13 - 17 May 2024

Exhibition Munich, Munich, Germany

<https://ifat.de/en/trade-fair/>

Renewable Energy Show

16 - 18 May 2024

International Convention City Bashundhara (ICCB), Dhaka, Bangladesh

<https://10times.com/renewable-energy-show>

Water Management Show

16 - 18 May 2024

International Convention City Bashundhara (ICCB), Dhaka, Bangladesh

<https://10times.com/water-management-show>

West Africa Water Expo

21 - 23 May 2024

Landmark Centre, Lagos, Nigeria

<https://elanexpo.net/waweexpo/>

June 2024

SIEE Pollutec

02 - 05 Jun 2024

Add Safex - Foire d'Alger, Mohammadia, Algeria

<https://siee-pollutec.com>

International Exhibition on Environmental Technology & Green Energy

03 - 05 Jun 2024

COEX Convention Center, Seoul, South Korea

<https://www.envex.or.kr/eng/main/index.asp>

Watertech Africa

05 - 07 Jun 2024

Kenyatta International Convention Centre, Nairobi, Kenya

<https://www.expogri.com/watertech/>

GreenTech Amsterdam

11 - 13 Jun 2024

RAI Amsterdam, Amsterdam, Netherlands

<https://www.greentech.nl/>

China (Guangzhou) International High-end Drinking Water Industry Expo

14 - 16 Jun 2024

China Import and Export Fair (Canton Fair Complex), Guangzhou, China

<http://www.ihe-china.com/cn/Invitation/40.IWE/>

Singapore International Water Week

16 - 20 Jun 2024

Singapore

<https://www.siwv.com.sg/>

Egypt Infrastructure & Water Expo

25 - 27 Jun 2024

Egypt International Exhibition Center, Cairo, Egypt

<https://www.egyptinfrastructureexpo.com/>

July 2024

European Wastewater Management Conference & Exhibition

02-03 July 2024

The Point at Emirates Old Trafford, Manchester, UK/Online

ewwmconference.com/

Thai Water Expo 2024

03 - 05 Jul 2024

Queen Sirikit National Convention Center, Bangkok, Thailand

www.thai-water.com

12th Annual International Forum on Water

15-18 July 2024

Athens, Greece

www.atiner.gr/water

Water and Aqueous Solutions Gordon Research Conference

20 - 21 Jul 2024

Holderness School, Holderness, USA

<https://www.grc.org/water-and-aqueous-solutions-conference/2024/>

August 2024

The Water Expo 2024

20 - 22 Aug 2024

Miami Airport Convention Center, Miami, USA

www.thewaterexpo.com/

AgriTech India 2024

22 - 24 Aug 2024

BIEC Bengaluru International Exhibition Centre, Bengaluru, India

agritechindia.com

September 2024

19th EverythingAboutWater Expo 2024

10-12 September 2024

Yashobhoomi, IICC, Dwarka, New Delhi

www.eawaterexpo.com

EcwaTech 2024

10 - 12 Sep 2024

Crocus Expo, Moscow, Russia

en.ecwatech.ru

CamWater 2024

11 - 13 Sep 2024

Diamond Island Convention and Exhibition Center, Phnom Penh, Cambodia

www.camwaterexpo.com

Taiwan International Water Week 2024

11 - 13 Sep 2024

Taipei World Trade Center, Taipei, Taiwan

www.taiwanintwaterweek.com

Water & Wastewater Management Expo 2024

11 - 12 Sep 2024

The Emergency Services Show, Birmingham, UK

www.ess-expo.co.uk

Indo Water Expo & Forum 2024

18 - 20 September 2024

Grand City Mall & Convex Surabaya, Surabaya, Indonesia

indowater.com/

Water and Wastewater Fair 2024

24 - 26 Sep 2024

Elmia, Jönköping, Sweden

www.elmia.se/en/va-massan/

October 2024

Aqua Ukraine

15-17 Oct 2024

Ukraine, Kyiv | International Exhibition Centre

www.iec-expo.com.ua/en/aquaen-2024

WWEM - Water, Wastewater and Environmental Monitoring Conference

09-10 Oct 2024

NEC, Birmingham, UK

www.ilmexhibitions.com/wwem/

EVENT CALENDAR



WETEX 2024

01-03 Oct 2024
Dubai World Trade Centre (DWTC)
www.wetex.ae

IFAT India

16-18 Oct 2024
Bombay Exhibition Centre, NESCO, Mumbai
www.ifat-india.com

Cairo Water Week 2024

13 - 17 Oct 2024
The Nile Ritz-Carlton Cairo, Cairo, Egypt
www.cairowaterweek.eg

November 2024

Produced Water Management, Treatment & Reinjection 2024

28 Oct - 01 Nov 2024
Dubai, UAE
10times.com/e1x5-z5p1-f9sp

Deepwater Operations Conference & Exhibition 2024

05 - 07 Nov 2024
Moody Gardens Hotel Spa and Convention Center, Galveston, USA
www.offshore-event.com/2024home/home

Vietwater 2024

06 - 08 Nov 2024
Saigon Exhibition and Convention Center, Ho Chi Minh, Vietnam
vietwater.com

SADC Groundwater Conference 2024

13 - 15 Nov 2024
Maseru, Lesotho
www.sadc.int

Annual WMAO Conference 2024

19 - 20 Nov 2024
Crowne Plaza Columbus North - Worthington, Columbus, USA
wmao.org

Clean India Show 2024

21 - 23 Nov 2024
Bombay Exhibition Centre (BEC), Mumbai, India
ctwindia.com/clean-india-show/

Floodex 2024

27 - 28 Nov 2024
ExCeL London, London, UK
floodex.co.uk

National Drainage Show 2024

27 - 28 Nov 2024
ExCeL London, London, UK
drainageshow.com

December 2024

GeoSmart India (GSI)

02 - 05 December 2024
Hyderabad, India
geosmartindia.net/2024/

Pak Water & Energy Expo 2024

03 - 05 Dec 2024
Karachi Expo Center, Karachi, Pakistan
www.pakwaterexpo.com

Exhibition on Water / Water Forum

04 - 06 December 2024
Belgrade Fair - Hall 3 / Belgrade / Serbia
www.sajamvoda.rs

Aquatech China 2024

11 - 13 Dec 2024
Shanghai New International Expo Centre (SNIEC), Shanghai, China
www.aquatechtrade.com/shanghai

January 2025

Water Exhibition & Conference

14 - 16 Jan 2025
ADNEC Centre Abu Dhabi, Abu Dhabi, UAE
www.worldfutureenergysummit.com

NEWEA Annual Technical Exhibition & Conference

26 - 29 Jan 2025
Boston Marriott Copley Place, Boston, USA
annualconference.newea.org

InterAqua

29 - 31 Jan 2025
Tokyo Big Sight, Koto, Japan
en.www.interaqua.jp

Michigan Onsite Wastewater Conference

07 - 08 Jan 2025
Kellogg Hotel and Conference Center, Lansing, USA
events.anr.msu.edu/event

February 2025

Indomach

06 - 08 Feb 2025
Adityapur Auto Cluster, Jamshedpur, India
indomach.in

World Ag Expo

11 - 13 Feb 2025
International Agri-Center, Tulare County, USA
www.worldagexpo.com

Mountain States Ground Water Expo

13 - 14 Feb 2025
Aquarius Casino Resort, Laughlin, USA
mountainstatesgroundwater.com

Water and Waste Expo

20 - 22 Feb 2025
Pragati Maidan, New Delhi, India
indiawatersolidwaste.in

World Water Tech Innovation Summit

25 - 26 Feb 2025
Park Plaza London Riverbank, London, UK
worldwatertechinnovation.com

Membrane Technology Conference & Exposition

24 - 27 Feb 2025
Long Beach, USA
www.amtaorg.com/awwaamta-membrane-technology-conference-exposition

Water Today's Water Expo

26 - 28 Feb 2025
Chennai Trade Centre, Chennai, India
www.waterexpo.biz

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WATER AFRICA AND WEST AFRICA BUILDING & CONSTRUCTION

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Date: 26-28 June 2024

Venue: Accra International Conference Centre, Ghana

Website: www.ace-events.com/ghana-water-africa-2024/

The UN's sustainable development goals for water, sanitation, and industrial growth are boosting the African water market. There's a wealth of opportunities in infrastructure, innovation, services, and equipment for water storage, treatment, distribution, sewage management, and flood control.

The Water Africa and West Africa Building & Construction 2024 exhibition and seminars offer a fantastic chance to connect with key stakeholders and showcase cutting-edge technologies, equipment, and services in Ghana and across Africa. This event aligns perfectly with Ghana's goals for water and sanitation and leverages ACE Event Management's extensive international network built over 30 years.

The event is proudly supported by Ghana's Ministry of Sanitation & Water Resources, Ministry of Works & Housing, and Ghana Water Company.



Date: 19-20 June 2024

Venue: QEII Centre, London

Website: futureofutilities.com/events/summit/

The Future of Utilities Summit is the premier conference bringing together senior executives from across the energy and water sectors. This is the event where conventional approaches are questioned, and groundbreaking ideas are given the spotlight. Here, collaboration is not just encouraged; it is celebrated as a driving force for progress.

Attendees will have the opportunity to engage with industry leaders, share insights, and explore the latest innovations that are shaping the future of utilities. The summit features keynote speeches from thought leaders, interactive panel discussions, and networking sessions designed to foster meaningful connections and partnerships. Participants can expect to delve into critical topics such as sustainable energy solutions, advancements in water treatment technologies, smart grid implementation, and the integration of renewable resources. The Future of Utilities Summit is not just a conference; it's a catalyst for change, where the future of the industry is envisioned and brought to life.

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19th EVERYTHING ABOUT WATER EXPO SOUTH ASIA'S LARGEST WATER EXHIBITION AND CONFERENCE 2024

Where the Water Community Comes Together

The 19th EverythingAboutWater Expo 2024 stands as a remarkable and all-encompassing annual event in India, spotlighting cutting-edge technologies and solutions within the water sector. This event serves as an exceptional gateway for stakeholders worldwide to immerse themselves in the expansive and dynamic realm of the Indian Water management Industry, facilitating the exchange of business opportunities, networking, and the exploration of innovative Water solutions.

Date: 10 - 12 September 2024

Venue: IICC, New Delhi

Website: www.eawaterexpo.com

India is currently on a trajectory towards severe water stress, with projections indicating a critical situation by 2025. The rapid pace of Industrialization and the burgeoning population have significantly widened the gap between water supply and demand, a matter of deep concern for both the Central and State Governments. Within the framework of the 19th Everything About Water Expo 2024, unparalleled business prospects will emerge for both domestic and international players in the Water Industry. Attendees will have the opportunity to gain valuable insights, discover future trends, and navigate the evolving landscape of the Indian Water market.



VODEXPO is the premier annual water management exhibition in Russia, showcasing the latest advancements and innovations in the industry. The event brings together the largest engineering, construction, and design organizations, along with top manufacturers and suppliers of industrial equipment for all areas of water use. The key task of VODEXPO is to demonstrate modern technologies and digital solutions for the development of the country's water management complex.

Date: 18-20 June 2024

Venue: Expocentre Fairgrounds, Moscow

Website: vodexpo.ru/eng

It focuses on the implementation of projects for the protection, rehabilitation, and rational use of water resources. Attendees will explore measures for the construction and reconstruction of hydraulic structures, reclamation systems, port infrastructure, hydropower facilities, as well as heat and water supply systems.

VODEXPO serves as a vital platform for professionals to connect, exchange ideas, and foster collaborations. The exhibition highlights cutting-edge innovations aimed at enhancing the efficiency and sustainability of water management practices. By attending VODEXPO, industry leaders can stay ahead of the curve, gain insights into emerging trends, and discover new opportunities for growth and development in the water management sector.

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132	World utilities Congress	23	+971 4 248 3221	nikitachavan@dmgevents.com	www.worldutilitiescongress.com

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The conference program will include internationally renowned keynote speakers encompassing experiences, challenges and solutions from around the world. The conference is structured into 4 sessions and 2 days training programs, spread over two days, focusing on specific theme, besides the inaugural and valedictory session.

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- **WATER RECYCLING**
- **CASE STUDIES: MULTIPLE FROM DIFFERENT INDUSTRIES**
- **PRACTICE EXAMPLE: SETTING UP 1000 M³/DAY WATER RECYCLING SYSTEM (WRS)**

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