

Leadership Perspective

Water Reuse: Waiting for Change Is Not a Strategy

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Any schoolchild learning about the water cycle knows water is constantly reused, but water reuse at an industrial scale regularly prompts a response that is out of kilter with this reality.

Why water reuse matters more than ever

Many parts of the world, including the UK, are grappling with the requirement for water reuse for the first time as a result of shifting populations, ageing infrastructure and climate change. Closer to home, environmental protection and net-zero targets are a core focus of Asset Management Period 8 (AMP8) – the UK water industry's regulatory investment cycle running from April 2025 to March 2030. Utilities are therefore increasingly expected to have strict compliance mechanisms in place, with financial penalties paired with short timelines to catalyse adoption.

From reducing storm overflow events to meeting tighter nutrient limits for phosphorus and nitrogen, as well as reducing forever chemicals and preparing for emerging contaminants – companies are doing this while facing an already stretched compliance environment. These challenges mean everything must happen more quickly than traditional infrastructure delivery models currently provide. Australia and Spain are key leaders in the reuse space, with the U.S. rapidly accelerating its efforts – and global shifts mean it's time for the rest of the world to catch up.

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Globally, the market is shifting from a traditional "take-use-discharge" model toward a circular water economy, where wastewater is increasingly viewed as a recoverable resource rather than a disposal challenge. This shift is accelerating investment in advanced treatment trains capable of converting municipal and industrial wastewater into high-quality reuse water suitable for agriculture, industry and, increasingly, potable applications.

The case for regulated reuse is made stronger still by the wave of data centres that are springing up across the globe. They are water-hungry, and are increasingly planned for locales with significant water stress, like the southeast England. While there are no accurate usage forecasts for AI's water requirements, estimates can be stark. Data centres could require 6.6 billion cubic metres of water globally by 2027, equivalent to almost two-thirds of England's annual consumption, and this is set against rising scarcity. Developing closed loop water recycling technology can support the rise in computing capability while minimising water demands on the environment.

The technical barriers and opportunities associated with water reuse

Membrane technologies are becoming increasingly central to advanced treatment strategies. Membrane bioreactors (MBR), ultrafiltration (UF), reverse osmosis (RO) and advanced oxidation processes are being combined into multi-barrier treatment trains capable of producing exceptionally high-quality recycled water. These technologies are no longer niche solutions. Declining membrane costs, improved energy efficiency and modular manufacturing approaches are making advanced reuse systems commercially viable at a far wider range of scales.



With modular, factory-built solutions, a new water treatment works can be completed in six months, down from a traditional four years

The combination of biological treatment, membrane filtration, RO, UV disinfection and advanced oxidation creates multiple independent barriers that collectively deliver water quality standards that can exceed many conventional raw water sources. Regardless of application, successful water reuse is – of course – a technical matter, requiring high-quality equipment to meet regulator-mandated clean water standards. In the UK, it is important that regulators provide a clearer view on quality limits for drinking water.

Robust quality standards doesn't mean infrastructure deployment needs to move slowly, however. Historically, it took around four years to design, build, and commission a new water treatment works; including typically two years of on-site work. Today, by shifting to modular, factory-built solutions, we can complete that same build in just six months; delivery and install in three months and commissioning in three months.

Our systems can also allow factories to achieve closed-loop recycling – ultimately moving toward zero liquid discharge – or help municipalities to reclaim wastewater for irrigation, street cleaning, and other non-potable needs. As water becomes an increasingly valuable commodity, innovative reuse rises up the value chain.



Public perception barriers and opportunities associated with water reuse

Increasing water reuse requires public trust in the quality of drinking water – even when reuse plans don't directly relate to potable water – and informed understanding of the pressures the system is under.

Water reuse and desalination should not be viewed as competing technologies. Increasingly, resilient water strategies combine both approaches, using desalination for drought resilience and recycled water for sustainable baseload supply and environmental protection.

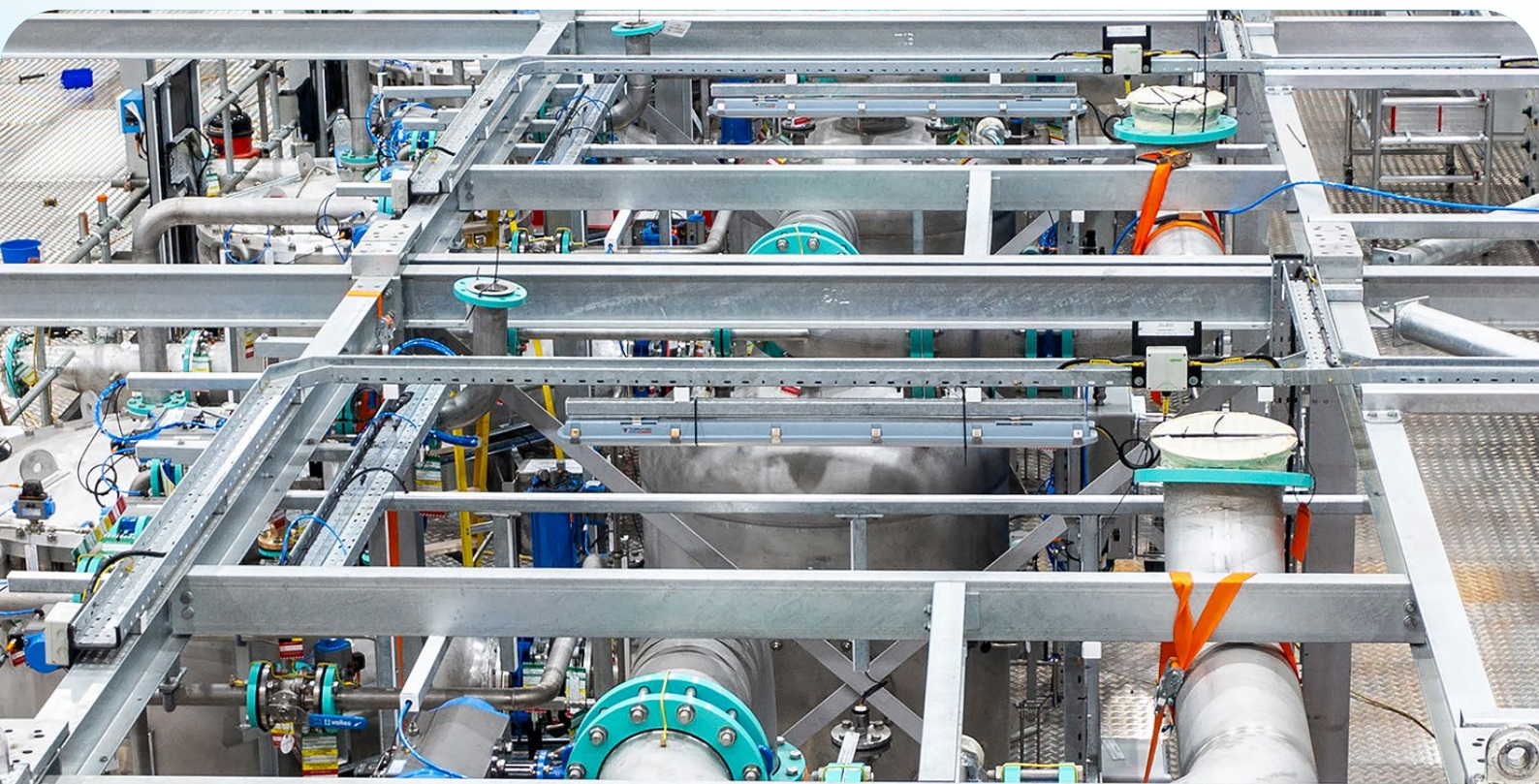
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The realities of system pressures can be lost in understandable cost-of-living discourse, and the fact that UK water bills are rising at the fastest rate since 2005. The picture in the U.S. is no better; the American Water Works Association predicts that bills stateside could more than double as a result of required infrastructure investment. It would push 30.4 million households above the 2.5% income affordability threshold.

We will not inspire people by wringing our hands, instead we must celebrate the engineering that can drive effective water reuse, ultimately keeping everyone's taps open. This industry and government need to communicate cohesively and effectively about our water systems is an underweighted part of the task ahead. If consumers believe they are getting a sub-standard product against this cost backdrop, it is a recipe for disaster.

We've long known that there isn't enough potable water for our planet's population and the significant new projects planned. Water reuse can be an important part of the solution, but this will require investment from water companies, backed by regulator courage. None of it exists in a vacuum either. The unfair stigma that water reuse attracts in public consciousness needs to be tackled head-on.

Waiting for change is not a strategy. We now have the technology, expertise and a proven cost-effective methodology that can enable a new era of effective water reuse, but we do not yet have the political and regulator will, and the associated public support to deliver it at the scale required.



Interview with

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What are the key challenges when it comes to water reuse at scale?

The UK, like many places, has ageing infrastructure, and this must be urgently addressed. This means time and cost are essential, so being able to find solutions that accelerate deployment, reduce risk and deliver long-term value across the water network is absolutely essential.

The future of water resilience will not depend on a single technology, but on intelligently integrated treatment trains that combine biological processes, advanced membranes, digital monitoring and modular delivery models. The technology already exists to safely recycle wastewater into high-quality reusable and even potable water at scale. The challenge now is accelerating deployment while building the public trust and regulatory confidence needed to support this transition.

What's an emerging trend in water reuse?

The combination of treatment process trains, where high recovery rates secure circular water use, is not only an emerging trend but an imperative for the water industry. Creating systems that can recover water and treat it to a high standard either to be directly entered to public drinking water supply or to recharge water resources such as aquifers or reservoirs. The growing understanding of the huge pressure on global water supplies is elevating focus on water reuse. In this environment, it becomes a necessity, and focus falls on costs and delivery timescales to maintain access and quality, especially at a time of record consumer bills.

The technology already exists to recycle wastewater at scale; the challenge now is accelerating deployment and building trust and confidence.

We are also watching how data centres fit into the mix, particularly in water-stressed parts of the UK and other geographies. Water reuse plans will likely get much more attention from governments and regulators in the future.

Why are water companies turning to RSE for support?

Our ability to deploy modular technology quickly and effectively, leading to improved water quality results is the primary motivator. At the same time, everyone in the water industry is having to adapt to rapidly changing conditions and demands. Our proven ability to continuously innovate is something our clients and partners value highly. With 40 years of experience delivering high quality products in the water industry, RSE is an expert integrator in combining and commissioning different technologies quickly and efficiently for the best outcome for customers.

What can technology integration achieve?

RSE uses an integrated suite of technological solutions to develop a single delivery model, structured with efficiency and scalability in mind. Our approach combines advanced process technologies with real-time controls and monitoring, as well as nature-based solutions, to keep our customers ahead of new targets.

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At the core of RSE's operations is modularisation, designed to simplify construction and improve operational performance. Our standard products are fully designed, manufactured and tested in-house before delivery. This saves our customers time and money by reducing build time and disruption on-site. New treatment facilities can therefore be deployed rapidly and scaled to site-specific requirements at the time – making up-front commitments less costly and more adaptable as needs change over time.



This helps utilities respond more effectively to complex and evolving targets such as storm overflow reduction. RSE's modular treatment facilities remove pressure from treatment works by providing the effective capacity needed to process more incoming flow during peak conditions like heavy rainfall events or flooding. Where overflows can't be avoided, our wider treatment capabilities can improve the quality of discharged water through targeted treatment stages to mitigate environmental impact and improve water quality standards more generally.

The same modular approach enables a more targeted response to environmental compliance. RSE's configurable process trains (allowing customers to customise, add, or remove manufacturing steps and equipment to meet specific requirements without redesigning the entire system) combine chemical dosing, mechanical filtration and biological water treatment solutions to help meet strict quality standards such as those relating to nutrients or forever chemicals.

Our m-MBBR® and m-MBR are both high-efficiency modular wastewater treatment systems. They can be scaled and integrated to the needs of the client, providing a flexible platform to combine other treatment processes and support greater circularity of water resources.

About RSE

RSE is a trusted water technology company solving today's water challenges. From treatment to controls, we design, manufacture and integrate the technologies and systems that keep water moving. Working across municipal and industrial markets, we deliver solutions spanning water and wastewater treatment, chemical dosing, automation, offsite modular build and lifecycle support.

Our integrated approach combines specialist engineering, manufacturing and digital expertise to help customers improve performance, resilience and sustainability. Through innovative modular solutions and a commitment to continuous improvement, RSE is transforming how water infrastructure is designed, delivered and managed.