

FUTURE OF THE WATER INDUSTRY IN TECHNOLOGY

The Australian water industry is in the process of a change marked by the infiltration of technologies that will shape the future of how we treat this resource, writes John Darmody.

Two decades ago the water industry was heavily managed, with a large internal workforce, substantial overheads and significant inefficiencies. Today it is a much better model of efficiency, with significant steps having been made towards more productive capital delivery and operational efficiency.

Equally as exciting as the structural improvements are the technological developments. The knowledge we are gleaned from our American and global counterparts, particularly when it comes to cutting edge technology, has the potential to revolutionise our industry, especially regarding our treatment of wastewater.

In recent years, the US has made some sharp technical advances worth noting, delivering a wide range of creative solutions to industry problems.

MWH Global has been closely following the development of a new water treatment process being developed there, which it plans to bring to Australia.

Introducing the technology

Biological nutrient removal (BNR), or the use of micro-organisms to remove pollutants, has been standard practice in water and wastewater treatment for decades. Only recently, however, has a modern-day improvement to BNR been introduced, and it stands to revolutionise the industry.

In a standard reactor the BNR process can be slow, sometimes requiring hours to degrade pollutants to desired levels.

This required time is largely due to the efficacy of the micro-organisms in a population, some of which are more effective than others.

Microvi, a leading US-based biotechnology company that discovers, develops, manufactures and commercialises innovative biocatalytic solutions, has introduced a set of technologies to quickly eliminate pollutants in water by enhancing the natural environment of the most



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powerful natural degraders. The company's core business is based on its MicroNiche Engineering Technology Platform, where the micro-environment of biological systems is synthetically designed to enhance microbial physiology and optimise metabolic and enzymatic performance.

The resulting products for water treatment are biocatalysts that can be shaped as small balls that are extremely permeable and packed with specifically selected and highly effective natural organisms.

The process promotes the flow of polluted water to enter the biocatalysts, be treated in a matter of minutes (sometimes even seconds), and exit as clean water and inert end products (for example, N_2 , CO_2 , H_2O). The benefits of this technology over a standard reactor are many.

Firstly, the treatment plant has a much smaller physical footprint. The size of treatment components is generally dictated by hydraulic retention time (HRT) and Microvi's effective technology drastically reduces HRT from 18-20 hours to 2-3 hours depending on the treatment goals, therefore treatment plants can be smaller.

Also, a simple design allows the biocatalysts to adapt to various reactor designs with minimal modification.

Physical and chemical treatments produce waste streams that must be disposed of, and conventional BNR produces sludge as non-effective microbes die. Microvi's solution by comparison

produces no secondary waste or sludge, reducing water loss, energy use and environmental impact.

Further, Microvi's biocatalysts require far less energy due to the fact that they don't require a fluidised bed or continuous stir reactor, and smaller reactor volumes mean less energy for pumping or aerating.

The Microvi technology has already been successfully trialled in the US and in Australia there are now a small number of successful commercial applications in operation.

The company is currently in discussions with a number of water utilities in Australia to build demonstration plants.

When proven at a municipal scale, the technology will be a game-changer for the Australian water industry, significantly reducing the footprint, capital and operating costs of our wastewater treatment plants.

This technology, combined with other technologies and learnings from around the world, means that Australia's water industry is taking on an increasingly international and technologically developed model. The next decade will see the emergence of many new exciting technologies that will change the processes that we have relied on for the past generation and significantly increase the efficiency.

John Darmody is director at MWH Global Management Consulting – John.Darmody.au.mwhglobal.com

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