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Building on 40 years' experience in Membrane Technologies, he will be our guide to deep dive into the world of...

Membrane BioReactors - MBRs

The rise of Membrane Treatments

1748

Membrane filtration's first historical appearance dates back to 1748, with Osmosis's discovery by Jean-Antoine Nollet.

1920s

But even if the first commercial-scale membranes were produced in Germany in the 1920s, this was still an ultra-niche.

Crossflow filtration and polysulfone membranes would follow in the 1960s, eventually leading to petrochemical companies investigating the field in the 1980s.

1960s

1980s

By the early 1990s, membrane technologies were ready to take the market by storm!

1990s

But...

At times, municipal water companies would laugh at me when I presented them with membrane treatments. They said: "well, this is never going to happen."

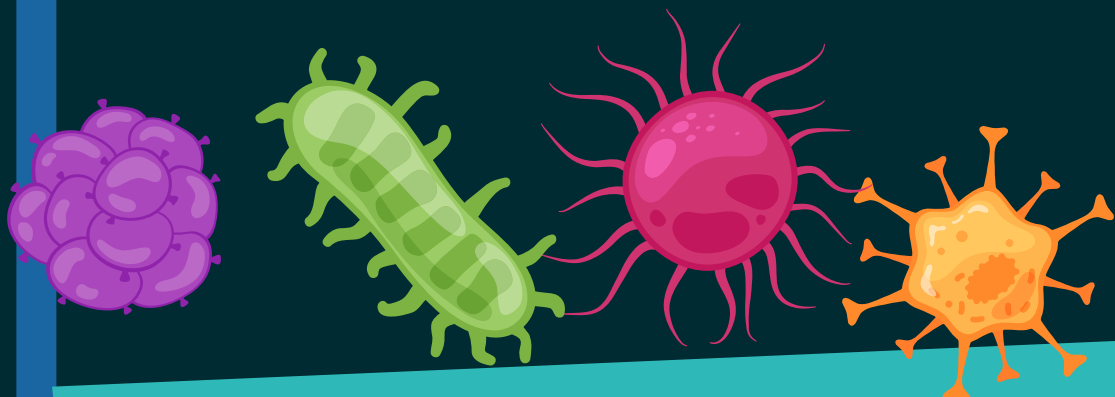


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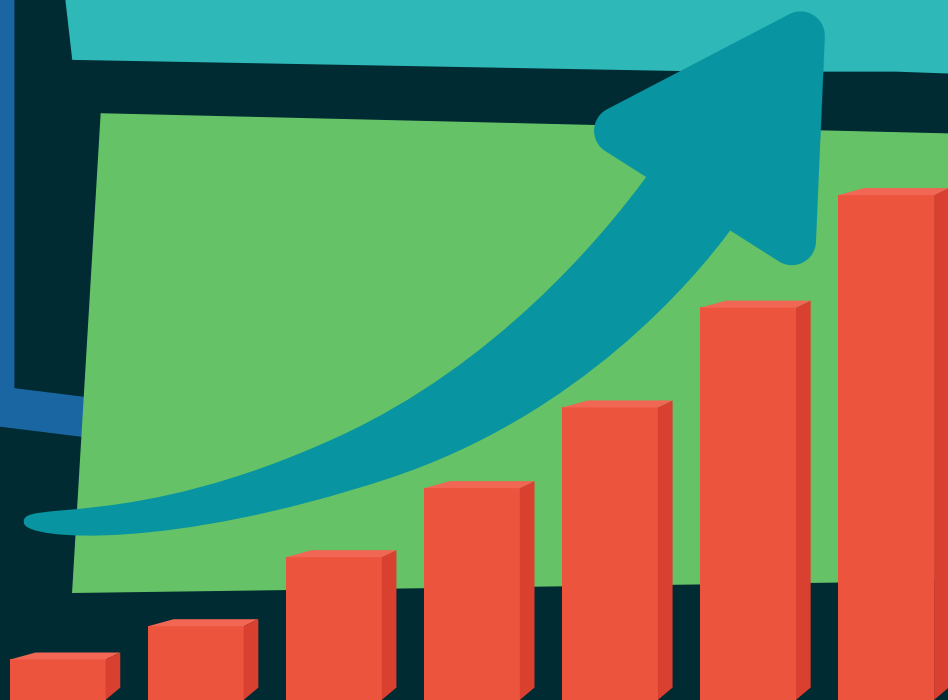
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Those utilities didn't anticipate the rising concern of cryptosporidium pollutions in the UK and the US, viruses, and micro-organisms in continental Europe.

Governments would react to that by adopting new regulations and...



Even though membranes were still an expensive technology, once you got the driver, prices start to tumble. So membrane technology became more acceptable for the users!



This created a whole new sector in the Water Industry, with membrane companies experiencing significant growth.

The rise of Membrane Bioreactors



In parallel to the frenzy around membranes in clean water in the 1990s, another frenzy was happening in the neighboring market of dirty water, around companies trying to get a membrane technology applied in wastewater.

That frenzy actually revolved around some lonely prophets: Zenon, Kubota, and later, Wehrle.



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They hardly got any attention, and their weird idea of using ultrafiltration pore size membranes submerged in wastewater streams was seen as expensive and actually never going to work.

Yet, two drivers slightly helped:

1.

The EU Urban Wastewater Directive wasn't expressively calling for treatment levels only achievable with membranes, but it enforced better wastewater treatment.

2.

Wastewater reuse started popping out here and there, thus pushing for higher water outlet quality. Still, quite tenuous.



So what moved the needle? How did the MBR technology evolve from being totally forgotten in most of the reference water books of the late 90s and early 2000s to the wide adoption we see today?

Well, the answer is straightforward.

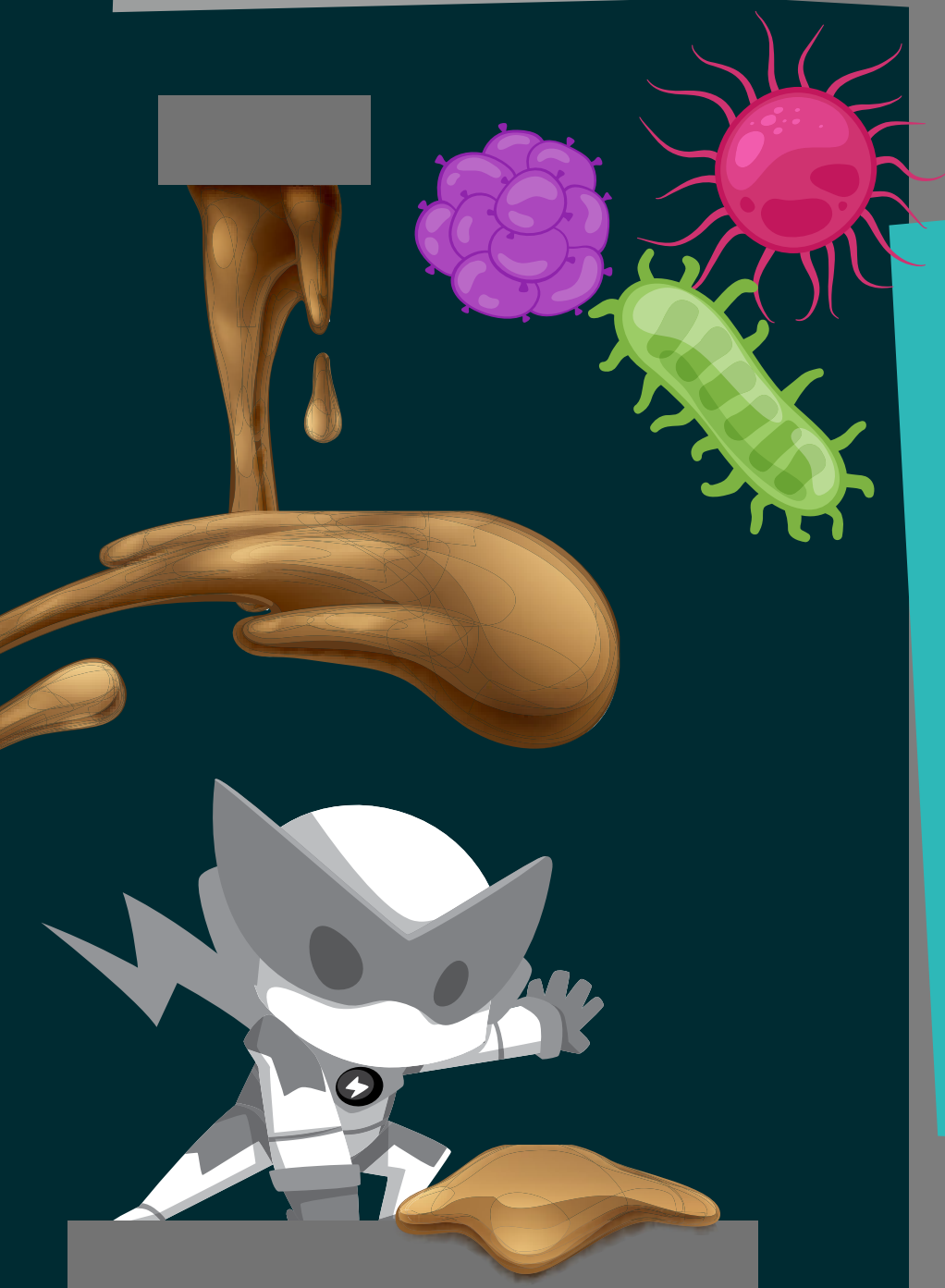
It proved to be better.



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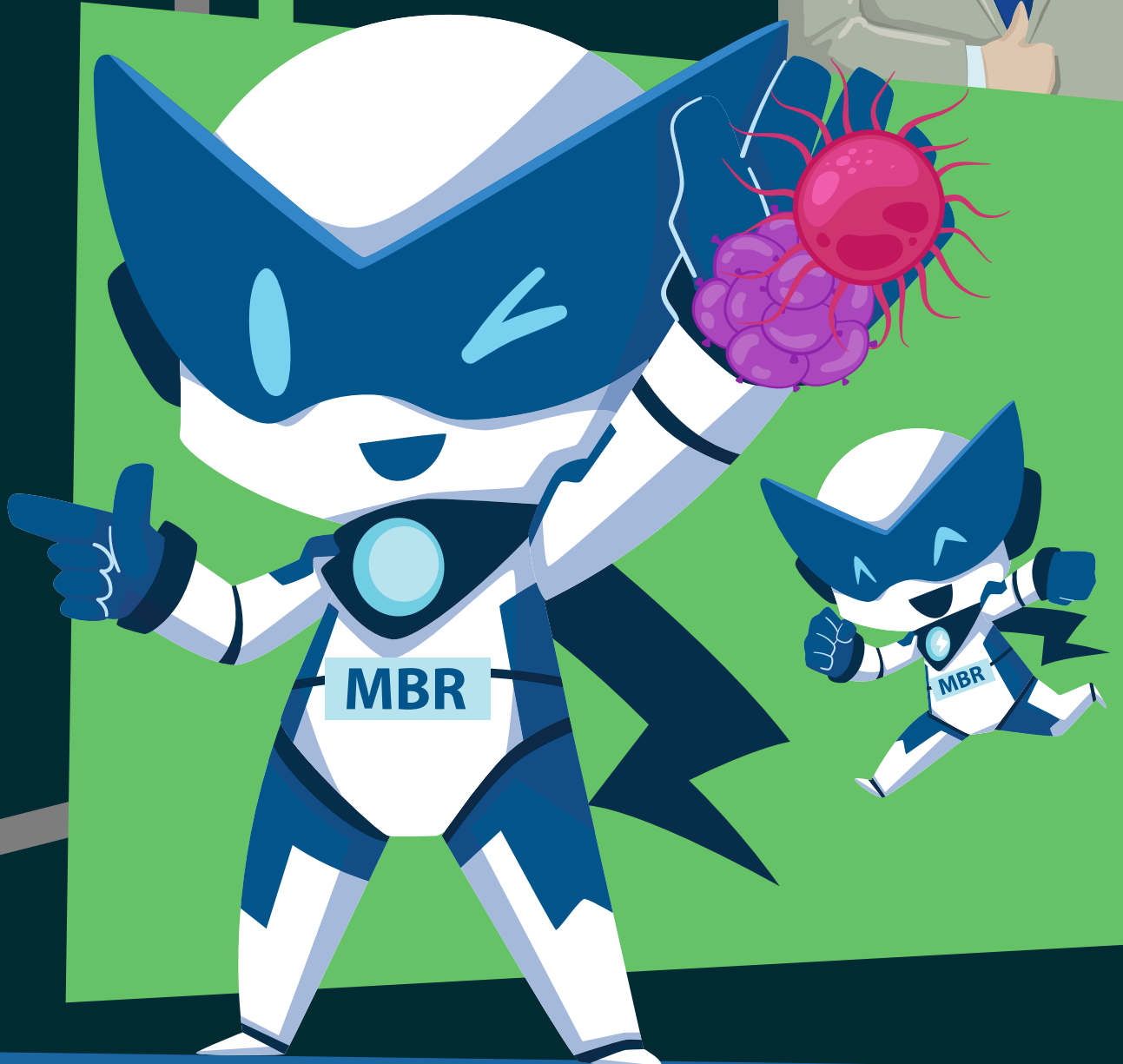
Without MBR



Your Wastewater Treatment Plant relies on a biological treatment within conventional activated sludge tanks. Micro-organisms break down the nutrients, and it creates sludge. This sludge then settles in clarifiers, and you might sometimes drive all of this on sand filters to remove some of the remaining solids.

With MBR

When MBR comes along, it basically deletes the whole of the train and says, 'we can do it better.' If we start all over again with a much smaller bio-reactor, we do the same biological reaction, but it's all intensified. And it has a much smaller footprint, too, because the solids strike a membrane barrier!



The Ideal Fit if you're building from scratch

65%



Today, 65% of the World's MBRs are installed in China. Why? Because if you don't have any infrastructure to leverage, it probably provides you with the best available CAPEX/OPEX/ Treatment Quality ratio there is.

For the same reason, it's an ideal all-in-one industrial wastewater treatment!

It adds the nice touch of being much more versatile and permissive to flow and load variations in the industrial world, thanks to the membrane element.

But if you're leveraging existing infrastructure, it's more of a case-by-case.

You can upgrade an existing plant's output many times by submerging MBR units in the tanks while running some improvements, such as creating some division into various stream zones.

Yet, it's still not a silver bullet either, and it might be tricky and sometimes expensive.

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What's Inside This Week's Podcast?

Well, all of what we've touched so far, and so much more, such as:

- The anatomy of a Membrane Bioreactor
- Polymeric vs. Ceramic Membranes
- Flat Sheet vs. Hollow Fiber
- Why Size Matters
- Why Wastewater Reuse will become Mandatory
- Limits of MBRs



The list goes on and on, so don't wait any longer, and listen to Graeme's magistral interview.

Check it out on dww.show!