

THE LIST

Water tech's best and worst of the decade

Which were the top breakthrough technologies of the 2010s? Which were the biggest blow-outs?

This month we list the biggest water technology breakthroughs and the worst busts of the past decade. The ranking is quite subjective, based on both the overall impact on the market and a view of the money gained or lost. The win-

ners are all quite self-explanatory. The losers are more of a mixed bag. Some did fail because they didn't live up to their billing (e.g. chemical crystallisation and pressure-retarded osmosis). Most, however, were good technologies which failed because

there was a mismatch between the amount of money they needed in order to prove commercial viability and the amount of time it took to reach that stage. So much credibility was burned along the way that the technologies became unfundable. ■

	Breakthrough technology	Developer	Description
1	Nereda	Royal HaskoningDHV	Aerobic granular sludge technology which saves 50% on energy costs while removing nitrogen and phosphorus. It has become a global success for its licencees.
2	Nanocomposite membranes	NanoH2O/LG Nano	High-performance nano-engineered thin film reverse osmosis membranes. The takeover by LG Nano represented the highest exit valuation of any water technology during the 2010s.
3	Thermal hydrolysis	Cambi, Veolia, Eliquo, Sustec, and others	High-pressure boiling and decompression as a pretreatment for sludge digestion. It is rapidly becoming the standard for maximising energy recovery in sludge treatment.
4	Membrane-aerated biofilm reactor	Fluence, OxyMem/DuPont, Suez WTS	A modular aerobic wastewater treatment system where the biofilm grows on the membranes which provide the aeration. Fluence has done extremely well with it in China.
5	Universal rack for low-pressure membranes	H2O Innovation, Wigen, Suez WTS and others	A membrane module configuration which enables users to change membrane suppliers without needing to change the whole membrane system. Has become popular in the US market.
6	Digital event management systems	TaKaDu, Suez, Veolia	Software that collates and analyses data from every available source to facilitate real-time response management. It is popular with utilities that will invest for performance.
7	Closed-circuit reverse osmosis	Desalitech/DuPont	Configuration for high-recovery reverse osmosis that is popular with industrial customers looking to reduce their water footprint. Achieved the second best exit valuation of the 2010s.
8	Struvite recovery	Ostara, Veolia, Suez, CNP, Paques and others	Nitrogen and phosphorus recovery and reuse as a fertiliser in the form of magnesium ammonium phosphate (struvite).
9	Multibore UF membranes	inge/DuPont	Robust UF membrane configuration which delivered a spectacular exit for its initial investors back in 2011 and was subsequently acquired by DuPont in 2019.
10	Satellite detection of network failures	Utilis/Suez, Rezatec	Utilis uses synthetic aperture radar data from satellites to help pinpoint leaks. Rezatec uses satellite data and machine learning to produce risk maps which quantify the likelihood of network failure.

Others considered include: Voltea capacitive deionisation, Typhon UV LED, Orège SLG, Paques Anammox, EmNet combined sewer overflow reduction, Innovyze live modelling, and digital twins.

	Technology bust	Developer	Description
1	SlurryCarb	EnerTech	A sludge-to-energy technology which produced a solid coal-like biofuel, which made its debut at a \$160 million plant in Orange County which never worked properly and closed in 2012.
2	Fathom	Global Water Resources	A smart meter data management and billing system developed by GWR, then spun off as a separate business. It went bust in 2019 leaving a lot of unhappy customers.
3	Forward osmosis for brine concentration	Oasys Water	Ammonia-based FO technology which thought it had got lucky in the Chinese coal-to-chemicals market before difficulties with implementation destroyed its reputation. Lost around \$70 million.
4	Ballast water treatment	OceanSaver, Resource Ballast Tech. and others	When the International Maritime Organization adopted the Ballast Water Management Convention in 2004, some calculated it would grow to be a \$34 billion market. It never happened.
5	Sludge gasification	MaxWest	A waste-to-energy technology which turned out to be a money-to-waste play after one of its investors lost patience with the amount of time it was taking to commercialise. Burned around \$50 million.
6	Kristal UF membranes	Hyflux	Hyflux used its polymeric low-pressure membranes for seawater pre-treatment at major desal plants in Algeria and regretted it. The plants couldn't make capacity, contributing to Hyflux's bankruptcy.
7	Seawater forward osmosis	Modern Water	Using pure salt as a draw solution, Modern Water thought it could reduce the cost of desalination by 30%. In fact all it managed to do was reduce the value of its shares by 99%.
8	PolyCera	WaterPlanet	UCLA Professor Eric Hoek followed up the success of NanoH2O with a hybrid polymeric membrane with ceramic properties. It wasn't quick enough to market for its \$9 million of funding.
9	Chemical crystallisation	Advanced Water Recovery	It promised to revolutionise brine concentration: sprinkle a little magic fairy dust in the water, and the salt would precipitate out. Too good to be true? It was.
10	Pressure-retarded osmosis	Statkraft	After ten years trying to make energy from the blending of freshwater with seawater, the Norwegian hydropower company gave up in 2014. Nevertheless, plenty of academics are still pursuing it.

Others considered include: Akaeno, memsys, Osmorec, Water Standard, RWEDI Solutions, Bactest, Okeanos Technologies, Robix, Catalysystems, Therna-flite, MAR Systems.