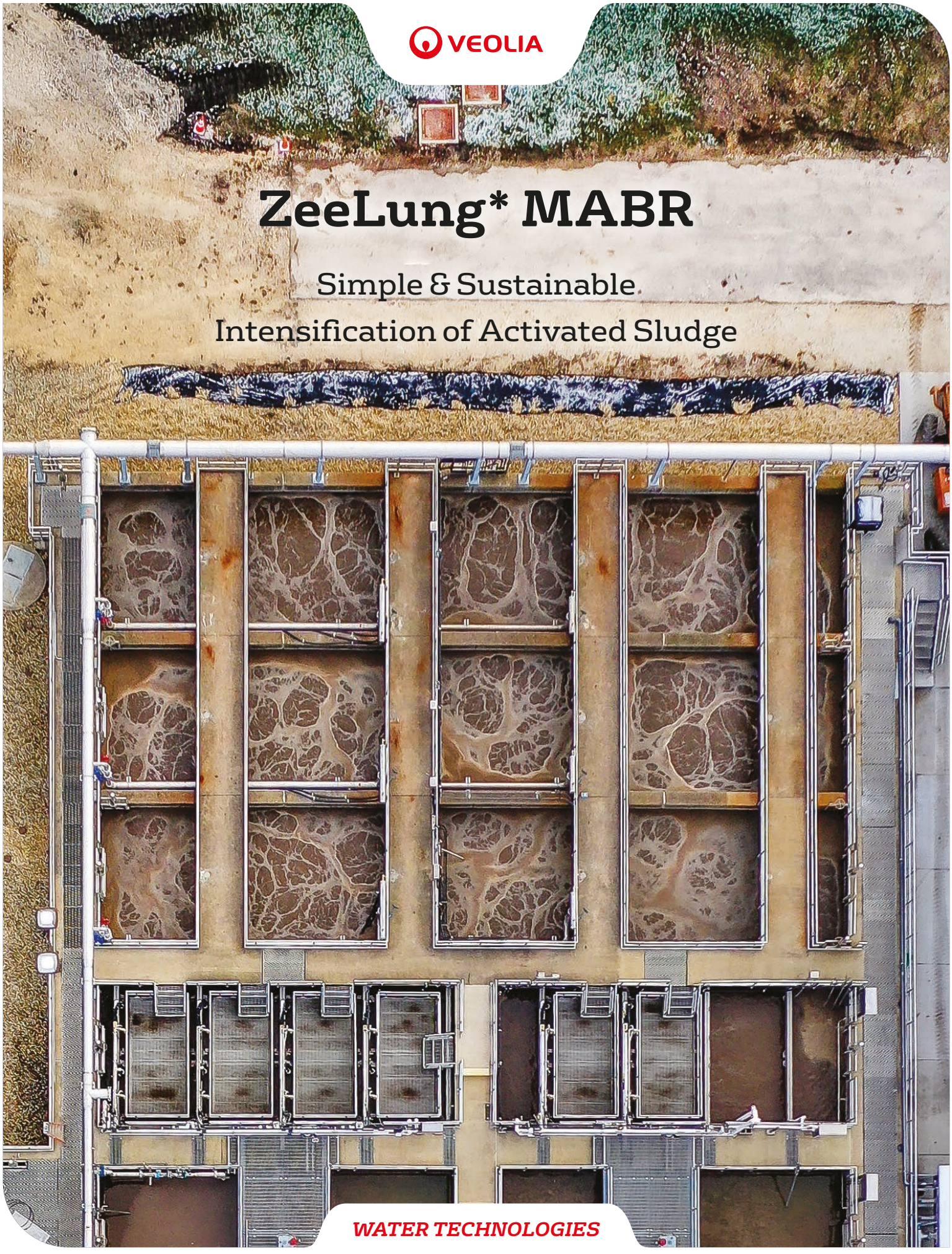
VEOLIA

ZeeLung* MABR

Simple & Sustainable Intensification of Activated Sludge



WATER TECHNOLOGIES

Get more from your activated sludge assets

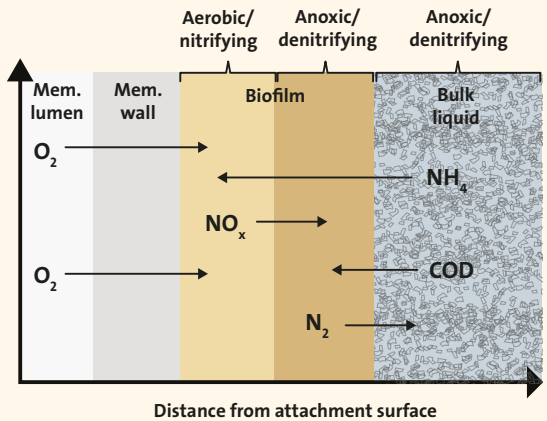
The Zeelung Membrane-Aerated Biofilm Reactor (MABR) is a game-changing technology used to upgrade conventional activated sludge plants and avoid the construction of new bioreactor tanks. ZeeLung MABR expands plant capacity and improves nutrient removal in a simple, fast and modular way while also reducing energy and mitigating GHG emissions.

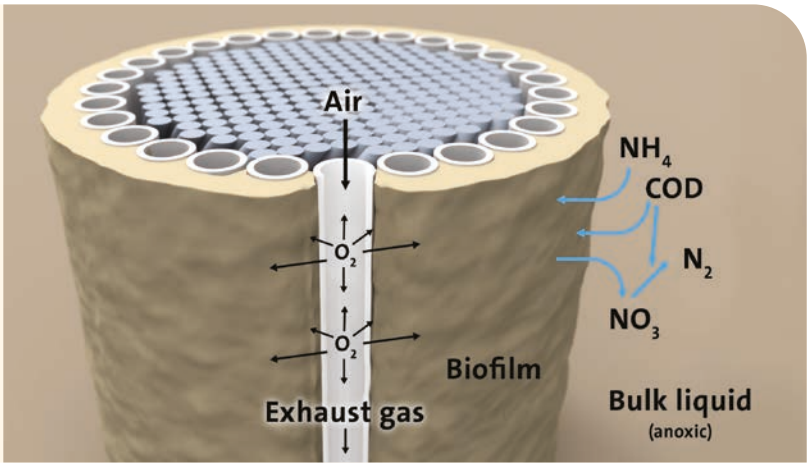
ZeeLung MABR is a simple and sustainable solution that offers:

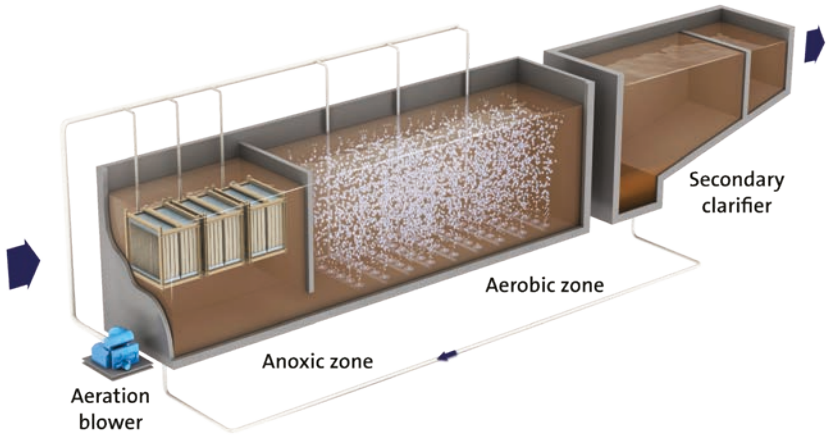
- **Process Intensification:** Up to 50% more treatment capacity in existing tanks
- **Simplicity:** Installed in existing tanks, no civil works, fast implementation
- **Resilience:** Dependable in upset conditions
- **Energy Reduction & GHG Mitigation:** 4X reduction in aeration energy & N_2O mitigation potential

How It Works

1. ZeeLung cassettes are immersed in the mixed liquor of existing tanks
2. The ZeeLung media supports the growth of a biofilm that increases the inventory of nutrient removal biomass in the system without increasing mixed liquor concentration
3. The ZeeLung media "breathes" – transferring oxygen to the biofilm at very high efficiency without the use of bubbles
4. The counter-diffusional biofilm (pollutants enter from one side & oxygen from the other side) favors the growth of nitrifying bacteria







Experience

Upgrading wastewater treatment plants for capacity expansion or nutrient removal can be complex and expensive because of the need for new tank volumes and increased energy consumption. Unlike conventional solutions, ZeeLung enables utilities to get more out of their existing wastewater treatment assets with a simple solution that also saves energy.

ZeeLung Biological Nutrient Removal Upgrade Reference Plants

Yorkville-Bristol Sanitary District

13.7 MLD
CAS upgrade
2017
USA

Aquafin Schilde

8.8 MLD
CAS upgrade
2018
Belguim

VCS Ejby Mølle

3 MLD
Ox ditch upgrade
2018
Denmark

Severn Trent Spernal

5.8 MLD
CAS upgrade
2020
UK

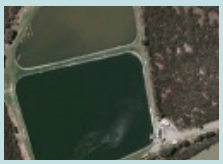
Hespeler WWTP

9.3 MLD
CAS upgrade
2022
Canada

VCS Søndersø

1.7 MLD
Ox ditch upgrade
2022
Denmark

Watercare Helensville



1.5 MLD
Pond upgrade
2022
New Zealand

North Toronto Treatment Plant

11.4 MLD
CAS upgrade
2023
Canada

Palo Alto

95 MLD
CAS upgrade
2026
USA

Case Studies

Increased Wastewater Treatment Capacity at **Yorkville-Bristol Sanitary District**

Population growth, the arrival of new industrial contributions and a new phosphorous removal permit required the Yorkville-Bristol Sanitary District in Yorkville, Illinois, USA to be upgraded. The existing site was footprint constrained and the end-user sought a retrofit solution that would minimize capital expenditure and avoid significant civil modifications. Yorkville chose a ZeeLung MABR upgrade because it could increase the organic treatment capacity of the plant by 45% in the existing tanks while also enabling biological phosphorous removal. The solution required ¼ of the investment compared to building a new conventional plant and was implemented in 16 months. The ZeeLung MABR system has been in operation since 2017.

Low-Energy Nutrient Removal at **Severn Trent Spernal**

The Spernal-Redditch Sewage Treatment Plant located near Birmingham, UK is home to Severn Trent Water's Resource Recovery and Innovation Centre where technologies compatible with a low energy and circular economy approach can be evaluated. In 2020, Severn Trent commissioned a ZeeLung MABR upgrade of an existing activated sludge lane to demonstrate the potential of the technology to treat increased ammonia loads associated with population growth and changing wastewater composition in existing infrastructure. The project has also focused on how ZeeLung MABR can reduce energy consumption and mitigate N_2O emissions to support the UK water industry commitment to carbon neutrality.

Future-Proof Nutrient Removal at Region of **Waterloo Hespeler WWTP**

The Region of Waterloo Hespeler WWTP was an activated sludge system that was permitted for TSS and BOD removal and was facing a need to increase capacity and anticipate a future ammonia removal requirement. Rather than building more activated sludge tanks, the Region of Waterloo upgraded the plant with a ZeeLung MABR solution in order to save 50% of the capital cost of a conventional upgrade. The ZeeLung MABR system preserves space on the site and saves aeration energy. The ZeeLung system has been in operation since 2022.

Reducing Nutrient Discharge to the San Francisco Bay at **Palo Alto**

The Palo Alto Regional Water Quality Control Plant has been in operation since 1934 and required upgrades to increase capacity, rehabilitate aging infrastructure, and reduce discharge of nutrients to the San Francisco Bay. A conventional approach would require the construction of new bioreactor tanks. Instead, a ZeeLung MABR upgrade was chosen because it could provide the capacity expansion and improved nutrient removal in the existing tanks, resulting in capital cost and footprint savings. The ZeeLung MABR system will be constructed in 2025-26.

zeeDENSE*:

Super-Intensification of Activated Sludge

zeeDENSE is an application of ZeeLung that couples MABR & inDENSE continous flow densification technology for super-intensification of activated sludge plants.

ZeeLung MABR intensifies biological capacity by up to 50% and inDENSE adds a further up to 50% intensification of secondary clarification. Waste-activated sludge or mixed liquor is processed through the inDENSE system and the dense biomass is returned to the bioreactor while the less dense biomass is wasted from the process.

zeeDENSE is tailor-made for the upgrade of activated sludge plants with modularity, process flexibility and speed of implementation.

zeeDENSE Delivers:

- Increased treatment capacity for biological reactors and secondary clarifiers
- Improved settling
- Enhanced nutrient removal, including biological phosphorous removal
- Greenhouse gas mitigation
- And more

Resourcing the world

Veolia Water Technologies
Please contact us via:
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