BIOLOGICAL WASTEWATER PROCESS INTENSIFICATION TECHNOLOGIES

SMALL FOOTPRINT | BIG IMPACT

VEOLIA

SAVE MONEY & SPACE WITH BIOLOGICAL WASTEWATER PROCESS INTENSIFICATION

Biological wastewater process intensification is a cost effective and sustainable approach to address the challenges that treatment plant owners & operators face:

- Increasing treatment capacity
- More stringent discharge regulations
- Footprint limitation
- Construction cost & complexity
- Adopting water reuse

Process intensification involves using different technologies to upgrade conventional activated sludge in order to enhance the performance and efficiency of wastewater treatment.

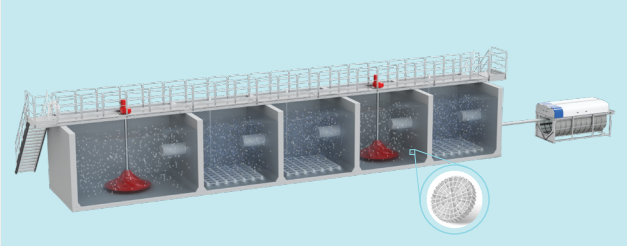
Veolia offers a portfolio of biological wastewater process intensification technologies for a broad range of applications and treatment bottlenecks. Choosing the right technology for the job involves evaluating the existing plant assets, treatment constraint, time horizon, among other considerations. No two projects are the same. The Veolia team of experts can support you in making the right technology choice and designing an optimal solution for your municipal or industrial treatment plant.

4 TECHNOLOGY PLATFORMS

AnoxKaldnes*
Moving Bed Biofilm Reactor (MBBR)

Modular and flexible biofilm-based process intensification for municipal and industrial applications

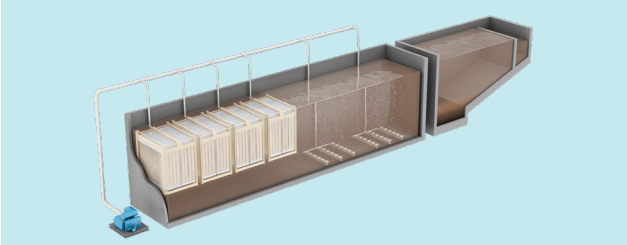
MBBR | Hybas* | AnitaMox* | Cella*



ZeeLung*
Membrane Aerated Biofilm Reactor (MABR)

Simple and sustainable intensification of activated sludge without the construction of new tanks and with reduced energy and GHG emissions

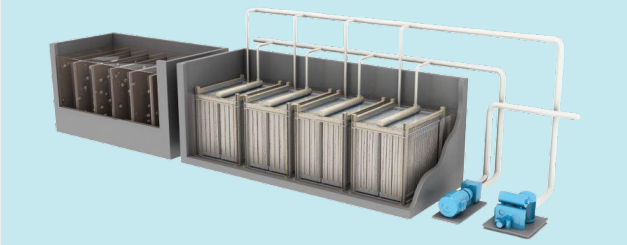
ZeeLung | ZeeLung with zeeDENSE*



ZeeWeed*
Membrane Bioreactor (MBR)

Reliable delivery of high quality reuse-ready effluent in a compact footprint

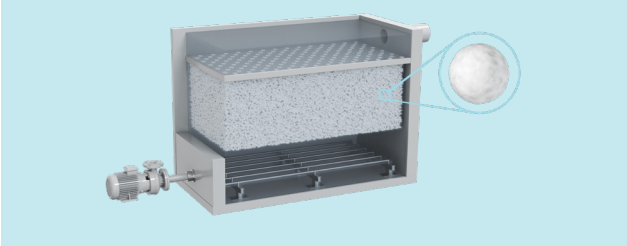
ZeeWeed | ZeeWeed with zeeDENSE*



Biostyr*
Biological Aerated Filter (BAF)

Biological treatment and filtration in one compact footprint for large greenfield municipal plants

Biostyr | Biostyr DUO



ANOXKALDNES
MOVING BED BIOFILM REACTOR (MBBR)

Modular and flexible biofilm-based process intensification for municipal and industrial applications

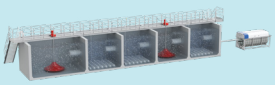
HOW IT WORKS:

Engineered carriers support the growth of a biofilm to perform specific treatment functions in a smaller volume than conventional treatment. Our technologies are adapted for a range of applications including greenfield and brownfield, liquid line and solids line, municipal and industrial.

VALUE PROPOSITION:

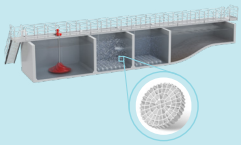
- Small footprint
- Process resilience
- Simple with low maintenance
- Energy neutrality

AnoxKaldnes MBBR



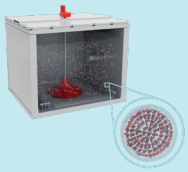
Simple and compact pure biofilm process for carbon, ammonia or nitrogen removal

Hybas



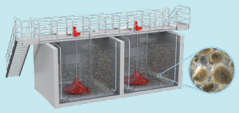
Integrated fixed-film and activated sludge for compact and efficient ammonia and nitrogen removal

Anita Mox



Low OPEX nitrogen removal for high-strength ammonia applications

Cella



Innovative next generation MBBR technology

CASE STUDY

AnoxKaldnes MBBR intensifies secondary treatment at **PLACERES WWTP**

CHALLENGE:

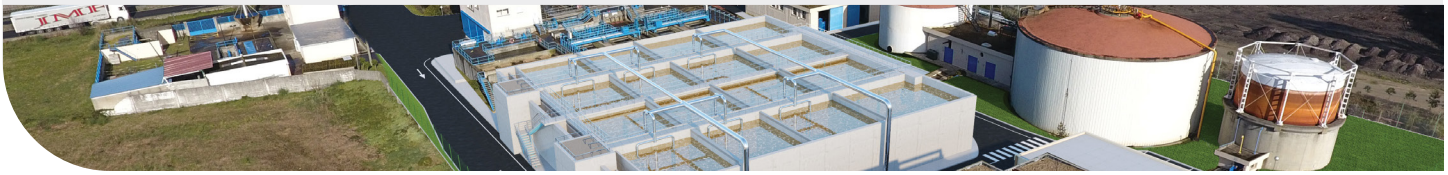
The WWTP at Placeres, Spain, required a 100% capacity increase within a limited footprint and with more stringent upcoming nitrogen regulations. The WWTP is also challenged by seawater infiltration, which leads to high conductivity variations into the biological plant causing a negative impact on the nitrification process.

SOLUTION:

The AnoxKaldnes MBBR technology was installed within the existing biological system, retrofitting the existing technology while reusing available concrete volumes. Actiflo Turbo was installed downstream of the MBBR for suspended solids separation.

RESULTS:

The plant achieved the target results for BOD, ammonia, total nitrogen and suspended solids removal while also achieving the target of treating the wastewater of 260 000 people equivalents. The performance of the plant exceeds expectations.



ZEELUNG
MEMBRANE AERATED BIOFILM REACTOR (MABR)

Simple and sustainable intensification of activated sludge without the construction of new tanks and with reduced energy and GHG emissions

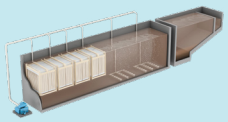
HOW IT WORKS:

ZeeLung cassettes are immersed in the mixed liquor of existing tanks. 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. The ZeeLung media "breathes", transferring oxygen to the biofilm at very high efficiency. The counter-diffusional biofilm favors the growth of nitrifying bacteria.

VALUE PROPOSITION:

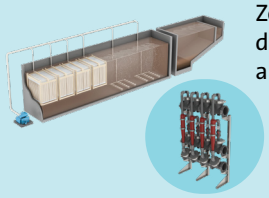
- Intensification of existing activated sludge plants
- Simple & fast retrofit
- Low OPEX & GHG emissions

ZeeLung



ZeeLung cassettes installed in anoxic zone increase biological capacity in existing tanks

ZeeLung with zeeDENSE



ZeeLung MABR and sludge densification for biological and hydraulic intensification

CASE STUDY

ZeeLung MABR with zeeDENSE increases nitrogen removal & hydraulic capacity of **Bolton WWTP in the UK**

CHALLENGE:

Existing 40 mgd conventional wastewater treatment plant that required 15% capacity increase and augmented nitrification capacity to meet new ammonia limit of 2 mg/L.

SOLUTION:

ZeeLung cassettes installed in existing bioreactors to increase biological capacity and improve nitrification. zeeDENSE densification installed to improve solids settling and increase clarifier capacity. Project delivered in short time frame while plant continued to operate.

RESULTS:

Achieved a 15% capacity expansion and improved ammonia performance achieved without the need to build new tanks.

ZEEWEED MEMBRANE BIOREACTOR (MBR)

Reliable delivery of high quality reuse-ready effluent in a compact footprint

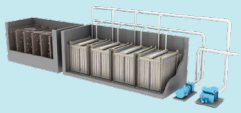
HOW IT WORKS:

ZeeWeed MBR replaces a secondary clarifier with membrane filtration for solids separation. This enables increased mixed liquor concentration, elimination of large clarifier footprint, and solids-free effluent in a single unit process.

VALUE PROPOSITION:

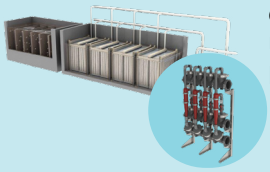
- Compact footprint (no clarifiers)
- Reuse quality water
- Resilience (absolute barrier)

ZeeWeed



ZeeWeed membrane filtration of activated sludge

ZeeWeed with zeeDENSE



ZeeWeed MBR and densification optimizes membrane & biological performance

CASE STUDY

ZeeWeed MBR increases water availability during **Texas drought**

CHALLENGE:

Abilene, TX was in a severe drought with the reservoirs being less than 30% full. The Hamby Wastewater Treatment Plant (WWTP) wanted to implement a solution to address the drought conditions and create an additional water source through water reuse.

SOLUTION:

The Hamby WWTP partnered with Veolia to install a ZeeWeed MBR that separates solids, bacteria and viruses from the water. Because of Veolia's expertise, the plant was fully operational in 14 months vs. the typical 24-30 months.

RESULTS:

With additional reverse osmosis treatment downstream of the MBR. the Hamby WWTP creates up to 7 million gallons/day (26,500 m^3/day) to use in potable drinking water.

BIOSTYR
BIOLOGICAL AERATED FILTER (BAF)

Biological treatment and filtration in one compact footprint for large municipal plants

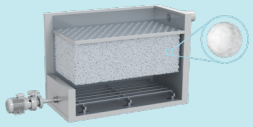
HOW IT WORKS:

Upflow biological aerated filter (BAF) technology using a nozzle floor that retains compacted, floating engineered media below (buoyant Biostyrene* + AnoxK* 5) that serve as support for biofilm growth and filtration of solids, eliminating the need for secondary clarifiers.

VALUE PROPOSITION:

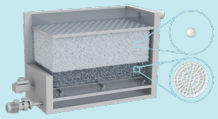
- One of the most compact solutions in the market
- No need for secondary clarifiers - biological treatment and filtration in a single stage
- Ease of operation and maintenance
- Energy efficient

Biostyr



Upflow media reactor for biological treatment and filtration in a compact footprint

Biostyr DUO



Latest generation of biofiltration for further increased performance, compactness and reduced OPEX

CASE STUDY

Biostyr Duo maximizes energy recovery and nutrient removal at **Cagnes-sur-Mer**

CHALLENGE:

In 2007, the region of Provence-Alpes-Côte d'Azur (France) decided to create a new advanced wastewater treatment plant in the commune of Cagnes-sur-Mer to prioritize environmental protection and energy neutrality. During the construction, the existing treatment plant needed to remain in operation and the site was limited with multiple constraints.

SOLUTION:

Multiple Veolia technologies, with the Biostyr Duo biological treatment at the core of the plant, gave the client a compact treatment with minimal environmental impact to the French Riviera tourism area. The Biostyr Duo technology was designed to maximize the energy recovery of the the plant through the generation of an excess sludge with hgh biomethane potential.

RESULTS:

The WWTP of Cagnes-sur-Mer was inaugurated in 2021 and serves the treatment of wastewater for 160,000 population equivalents. It is seamlessly integrated into the urban environment and the plant - on top of achieving stringent nutrients removal requirements.. It produces more energy than it consumes thanks to the valorization of the sludge produced by the Biostyr Duo technology.

Resourcing the world

Veolia

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www.veoliawatertechnologies.ie

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