

## Example of Installations



**Spain, CENTA 40 m<sup>3</sup>/day (10,500 GPD)**

- Packaged system to meet EU discharge limits
- Includes integral pretreatment and secondary clarifier



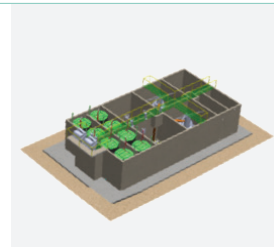
**Philippines 400 m<sup>3</sup>/day (106,000 GPD)**

- Efficient nutrient removal to meet DAO2016 effluent limits
- Modular plant for a new residential area



**China, ITEST 200 m<sup>3</sup>/day (53,000 GPD)**

- Highway service area wastewater treatment
- High loads of Nitrogen in the influent
- Minimal odor and noise



**Jamaica, Port Authority 650 m<sup>3</sup>/day (171,000 GPD)**

- SUBRE Plant based on MABR process
- Low energy consumption and footprint



**Israel, Ma'ayan Zvi 10,500 m<sup>3</sup>/day (2.7 MGD)**

- Upgrade project to increase the treatment capacity
- SUBRE modules installed in the anoxic zone



**China, Xilingang 800 m<sup>3</sup>/day (211,300 GPD)**

- Meets Class 1A effluent standards
- Small footprint of 3,544 m<sup>2</sup> for the entire plant
- Smart remote monitoring and control



**USA, Orenco 70 m<sup>3</sup>/day (18,500 GPD)**

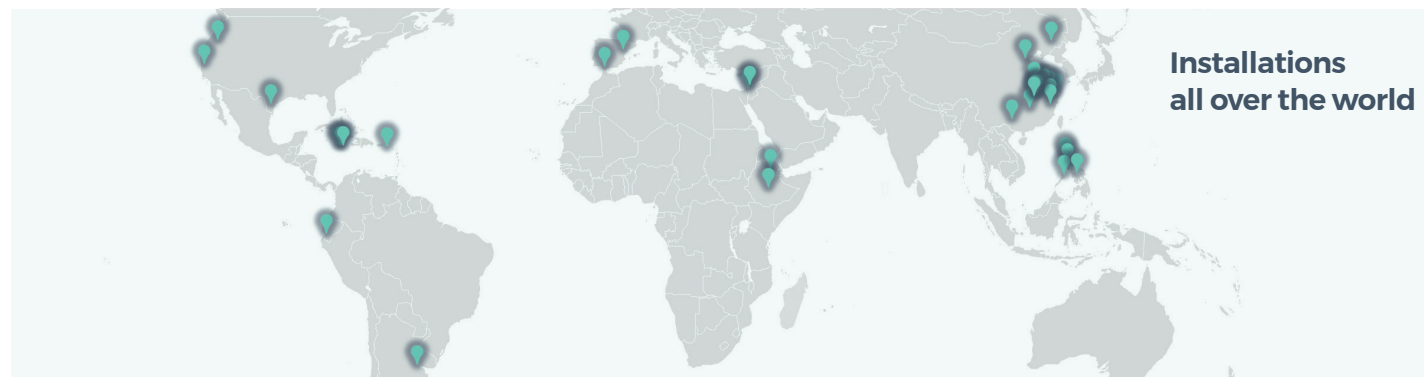
- MABR modules integrated in existing packaged plant of the customer
- Improved TN removal in existing solution



**China, Siping 1,200 m<sup>3</sup>/day (317,000 GPD)**

- Local low temperature, -20°C in winter
- 6 Aspiral L5 systems

## Global Fluence MABR Installation Map



### ABOUT FLUENCE

Fluence is a leader in the decentralized water, wastewater and reuse treatment markets, setting the industry pace with its Smart Products Solutions, including Aspiral™, NIROBOX™ and SUBRE. Fluence offers an integrated range of services across the complete water cycle, from early stage evaluation, through design and delivery to ongoing support and optimization of water related assets, as well as Build Own Operate Transfer (BOOT) and other project finance solutions. With established operations in North America, South America, the Middle East, Europe and China, Fluence has experience operating in over 70 countries worldwide and enables businesses and communities worldwide to maximize their water resources.



# MABR

## MEMBRANE AERATED BIOFILM REACTOR



MABR Technology for Efficient Biological Nutrient Removal  
Wastewater Treatment for Every Need at Any Scale



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Value from Water

Value from Water



## How it Works

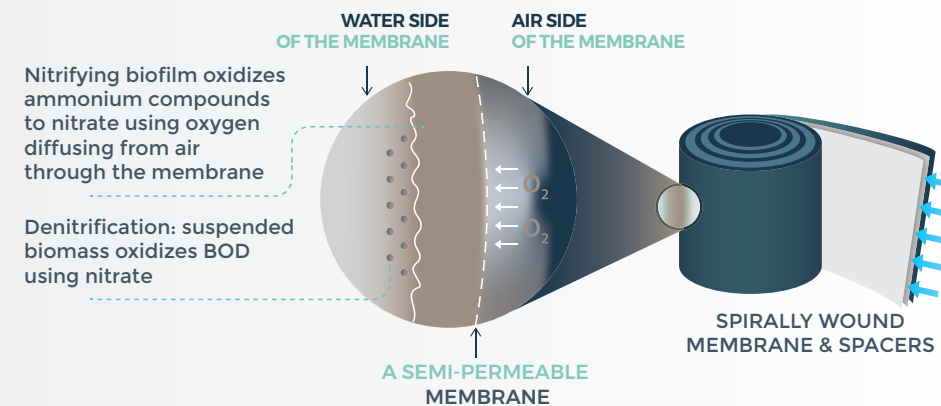
Fluence's MABR is a patented, validated technology for treating municipal wastewater. Fluence's MABR is a spirally-wound self-respiring membrane that supports the formation of an aerobic biofilm in an anoxic environment, resulting in simultaneous nitrification and denitrification.

The semi-permeable membrane is submerged into the wastewater tank while low pressure air is blown through the air side of the membrane.

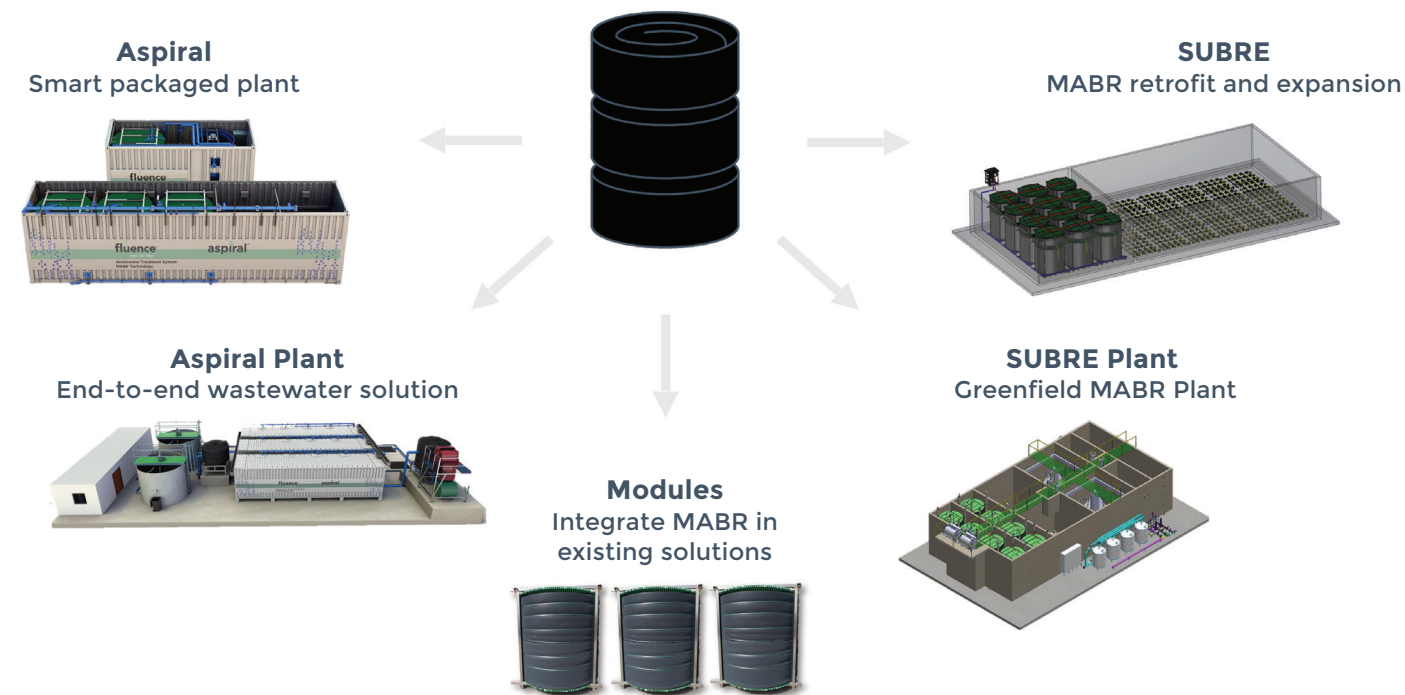
Oxygen is constantly supplied to the fixed nitrifying biofilm that develops on the wastewater side of the membrane while denitrification occurs in the anoxic bulk liquid.

The low pressure, passive aeration offers significant energy savings over conventional, high pressure aeration. The unique MABR process provides highly efficient biological nutrient removal which results in operational savings and minimal footprint requirements.

## Simultaneous Nitrification and Denitrification



## MABR Configurations



aspiral™

## Smart Packaged Wastewater Treatment Solution

### Aspiral S1



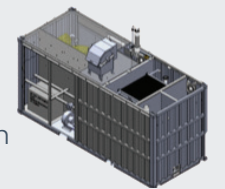
- Treats up to 50 m<sup>3</sup>/day (13,250 GPD) of municipal wastewater
- Includes integral pre-treatment and a secondary clarifier

### Aspiral L1-5



- Treats up to 300 m<sup>3</sup>/day (79,500 GPD) of municipal wastewater
- Secondary clarifier or UF are available for cost-effective multiple-reactor treatment

Ultrafiltration



Secondary Clarifier

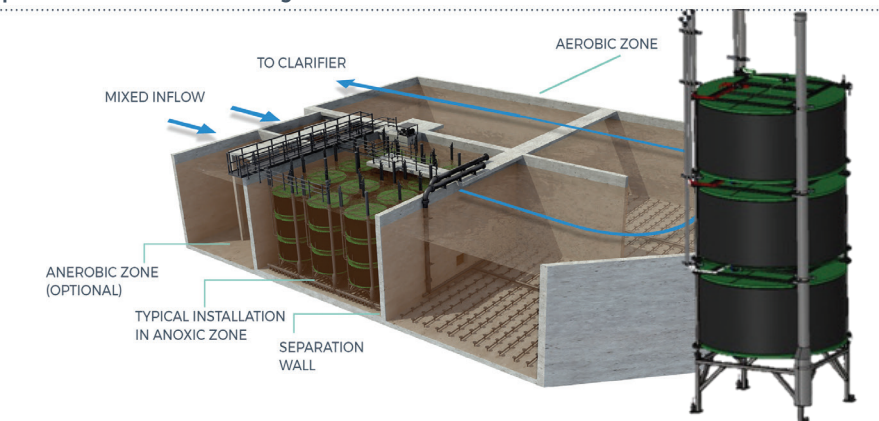


subre

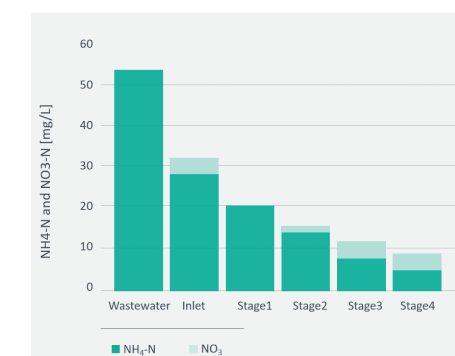
## Retrofit and Expansion of Wastewater Treatment Plants

- Enhanced biological nutrient removal
- Low OpEx and zero footprint
- Retrofit of capacity ranging from 2,000-100,000 m<sup>3</sup>/day
- Installation in an existing anoxic basin (if necessary, a separation baffle will be built)
- Utilizes existing aeration system
- One-pass treatment - no need for nitrate circulation
- Fast and easy installation with immediate results

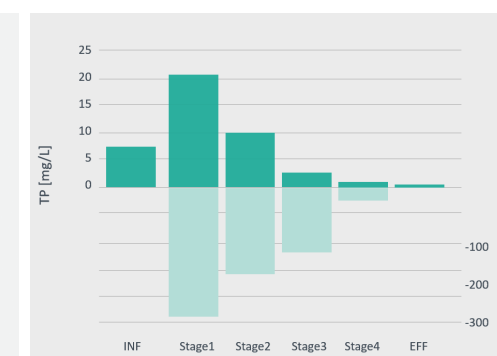
### Typical SUBRE Installation Configuration



## MABR Multi-Stage Performance



Nitrification is gradual and measurable along the reactor. Anoxic conditions in the mixed liquor enable denitrification.



Up to 90% Biological Phosphorus removal in one pass process, correlating to the ORP levels.

- Very low Total Nitrogen (TN) effluent is achieved with simultaneous nitrification and denitrification
- Up to 90% less energy required for aeration compared to conventional treatment
- Fixed film treatment ensures stable and reliable effluent quality
- Operating cost up to 50% lower than with conventional treatment

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Value from Water

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