

Biological Treatment

We deliver:

- Up to 50% capacity increase
- Up to 25% opex savings
- Reduced capex
- Removal of foam and odors
- Effective sludge treatment



The Industry Challenge

Wastewater treatment has become a major concern. In some regions, water is scarce, and environmental protection is a growing necessity. As a result, the industry needs reliable and cost-effective technologies to comply with today's strict regulations regarding wastewater discharge.

If you're looking to boost your plant capacity, optimize operating costs, or resolve various foam and odor issues, industrial gases can provide you with a truly effective solution.

The Nexelia Solution

A comprehensive gas solution designed for and adapted to your specific needs, **Nexelia for Biological Treatment** combines the best of our gases, application technologies and expert support. As with all solutions under the **Nexelia** label, we work closely with you to pre-define a concrete set of results, and we commit to delivering them.

Nexelia for Biological Treatment is an all-in-one gas solution, which consists of introducing pure oxygen into biological basins for the respiration of microorganisms (activated sludge) which consume biodegradable pollution. In combination with sludge ozonation, it also stimulates the whole biological process in a very efficient manner. Advanced application technologies are used to dissolve oxygen in the wastewater, ozonate sludge and re-use oxygen-rich off-gas from a sludge ozonation step.

Nexelia for Biological Treatment is suitable for municipal or industrial wastewater treatment plants.

Your Advantages

• Capacity increase

Pure oxygen dissolves better in water than air. Therefore, using pure oxygen can increase the capacity of a wastewater treatment plant by up to 50%.

• Opex savings

The total power consumption required to transfer pure oxygen in water is reduced by 50% compared to air. Operation and maintenance costs are 25% less.

• Reduced capex

Implementing pure-oxygen technology makes it possible to reduce the size of a new wastewater treatment plant or increase the capacity of an existing one. Additionally, better oxygen dissolution allows for nitrification in an existing aeration tank.

• Reduction of foam formation

Foam is often formed in water treatment plants due to excess growth of filamentous bacteria that high amount of injected air makes float on the water. Using of pure oxygen vs. air reduces the amount of the filamentous bacteria and the injected gas flow fivefold.

• Removal of odors

When there is not enough dissolved oxygen for the respiration of the microorganisms, the bacterial activity consumes the one contained in sulfur compounds of water pollutants. It generates volatile H_2S and bad smell which is avoided by using pure oxygen to dissolve enough oxygen.

- **Effective sludge treatment**

Sludge ozonation sustains the microbial activity, increases the settling speed (range of SVI index between 50-100 ml/g) and decreases the production of excess sludge by up to 60%. Our solution allows re-using the oxygen-rich off gas from the ozonation process, which makes the overall treatment very cost effective.

Core Features

Nexelia for Biological Treatment consists of:

- **Oxygen supply:**

From liquid storage or in low-pressure gaseous state from on-site production generators.

Oxygen requirements are calculated to ensure optimal biological activity in compact basins or lagoons. Both exogenous respiration of sludge (to ensure the digestion of biodegradable pollution) and endogenous respiration (to ensure bacterial metabolism) are taken into account.

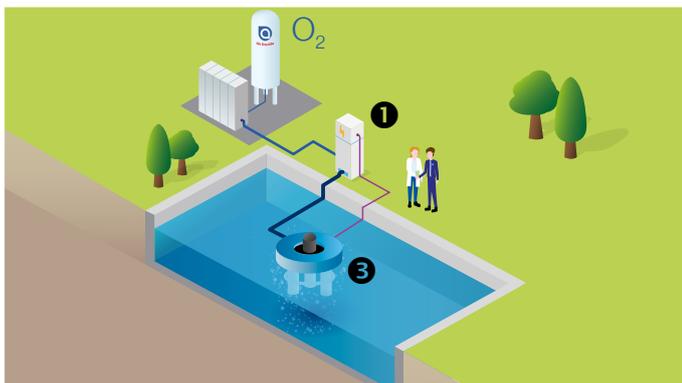
- **Application technologies:**

- The **GAS CONTROL CABINET (1)** is a valve train unit, which is suitable for gas injectors to control electrical motors up to 22 kW / 45 A when required and a dosing system to inject up to 200 kg/h.

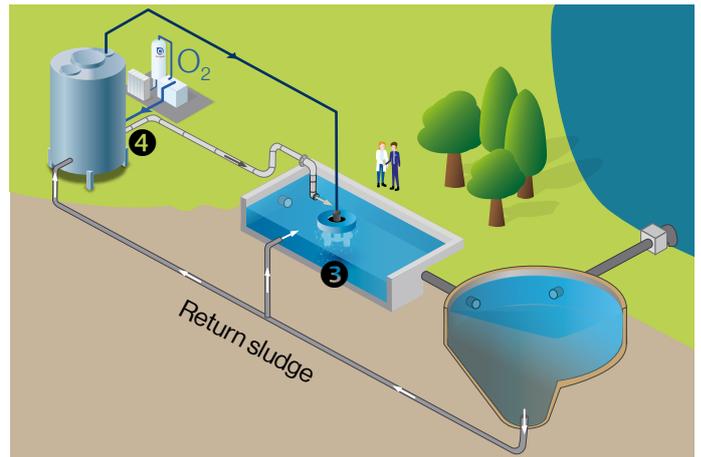
- The **OXY INJECTOR-VENTOXAL (2)** is an immersed pumping and venturi transfer system designed for treating varying levels of pollution in all kinds of wastewater basins.



- The **OXY INJECTOR-TURBOXAL (3)** is a floating turbine mixer transfer system designed for treating low bio-degradable pollution in biological basins and lagoons.

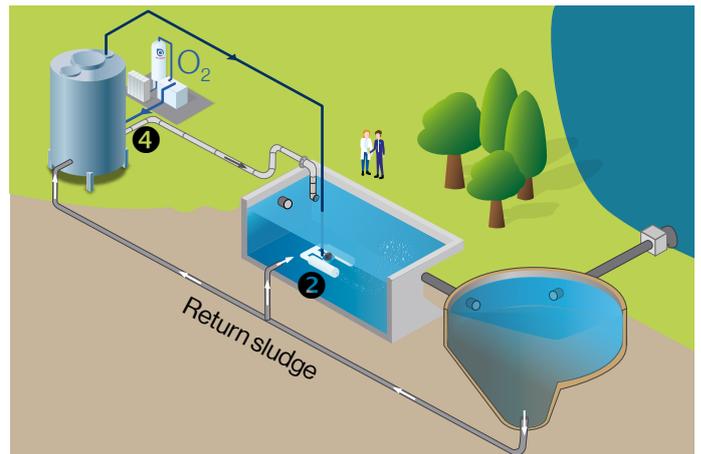


- The **OZONATION UNIT (4)** consists in three different modules: ozone production unit, injection and pumping unit reactor.

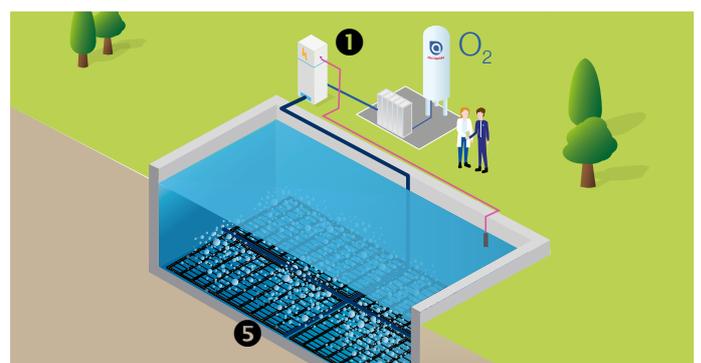


The equipment design is always based on pre-analysis that is carried out by water treatment specialists to determine the optimal ozone dosage that meets discharge limits.

The oxygen-rich off-gas from the **OZONATION UNIT** can be recovered at atmospheric pressure and re-used to make up for oxygen injection in upstream or downstream biological basins using the patented **OXY-INJECTOR-TURBOXAL (3)** or **OXY-INJECTOR-VENTOXAL (2)**.



- The **OXY INJECTOR-POROXAL (5)** is a ground injection system made of perforated hoses and immersed in biological basins for O₂ injection. It works without electricity for gas injection or any other power source unless an impeller is added to enhance the medium circulation. **OXY INJECTOR-POROXAL** is the best option in deep static basins (>5m).



All systems are installed quickly and easily. They are mobilized with a crane. Power control cabinets and gas cabinets are placed closely to the basins. A monitoring system using a dissolved oxygen sensor can optimize the oxygen quantity which is transferred to the wastewater.

You benefit from full support of our water treatment experts, from the auditing of your current aeration system capacity to the preliminary and detailed designs, as well as the complete implementation in just a few days, which includes commissioning, monitoring and maintenance.

Case Studies

Case study #1: Capacity increase

• **Customer need: accommodate feed values in excess of 50%**

- Existing installation:
 - 5 000 m³ basin volume
 - 3 x 6 000 m³/h air blowers
- Nominal pollution load: 20 tonne COD/d

• **Our solution:**

- 6 OXY-INJECTOR TURBOXAL 200 providing up to 450 m³ extra oxygen per hour

• **Benefits:**

- Capacity increase of 10 tonne COD/d
- More cost effective vs. solution using air only
 - Lower OPEX (€0.87 million vs. €1.15 million)
 - Much lower CAPEX: no need for an additional basin (€0.25 million vs. €5 million)

Case study #2: Effective sludge treatment

• **Customer need: improve sludge settlement**

- Municipal wastewater treatment with a capacity of 1.22 million population equivalent in a large German city
- Wastewater intake: 30 600 m³/h

• **Our solution:**

- Return sludge is partially treated with ozone
 - Unwanted microorganisms (filamentous bacteria) are broken down
 - Damaged filamentous bacteria are consumed in biological water treatment steps
- Re-use of the oxygen-rich off-gas from the ozone reaction

• **Benefits:**

- Improvement of sludge volume index from 150-170 ml/g to 75-85 ml/g
- Flocculant cost savings

Related Offers

• **Nexelia for Tertiary Treatment**

• **Nexelia for pH Control**

Contact us

Air Liquide - IM-WBL
75 quai d'Orsay
75321 Paris Cedex 07 - France

www.airliquide.com

