

Biological 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** 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%, making it possible to reduce the size of a new treatment plant or increase the capacity of an existing one.

- 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 reduced by 25%. (High Purity O₂ transfer rate - up to 13kg O₂/kWh vs Air transfer rate - up to 4kg O₂/kWh.)

- Reduced Emissions

Water emissions are caused by the overwhelming presence of nitrogen through air injection. Due to the competition for solubility in the water, once saturated, nitrogen will strip out the oxygen as well as greenhouse gases such as CO₂, CH₄ and N₂O. By using our **High Purity Oxygen**, nitrogen levels are dramatically reduced.

- Reduction of foam formation

Foam is often formed in water treatment plants due to a combination of the excess growth of filamentous bacteria and high amounts of injected air. Using pure oxygen reduces the amount of bacteria and gas flow requirement fivefold.

- Removal of odours

When there is insufficient dissolved oxygen for microorganism respiration, the bacterial activity consumes the oxygen contained in sulfur compounds, generating volatile H₂S and odours. This can be avoided by injecting **High Purity 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.

Nexelia for biological treatment consists of:



Oxygen (O₂) supply:

Supplied in liquid storage or 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.



Process Expertise:

You will benefit from the full support of our water treatment experts to include:

- The auditing of your current system capacity
- Preliminary and detailed designs
- Complete implementation, including commissioning, monitoring and maintenance



Application Technologies:

Through the use of our gas control cabinets, we offer the following Nexelia solutions:

- Oxy Injector-Ventoxal
- Oxy Injector-Turboxal
- Oxy Injector- Poroxal
- Ozonation Unit

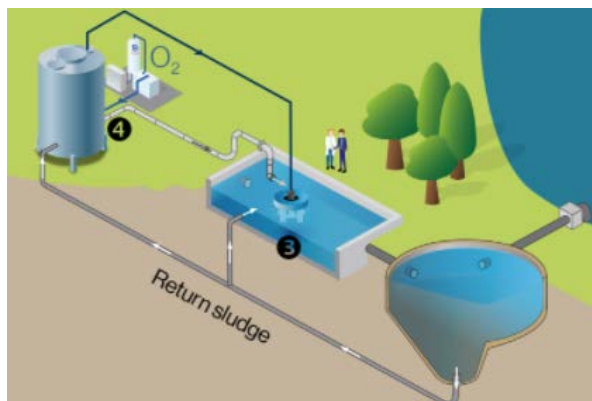
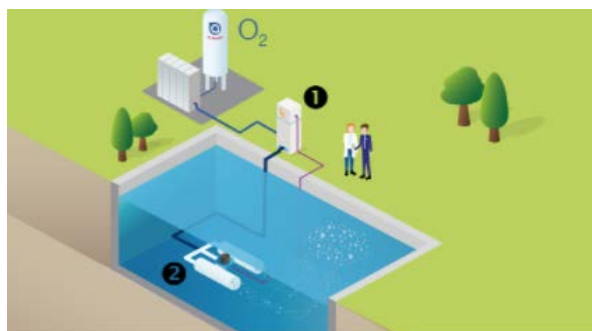
Application Technologies in detail:

- 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 transfer system designed for treating low bio-degradable in biological basins and lagoons.

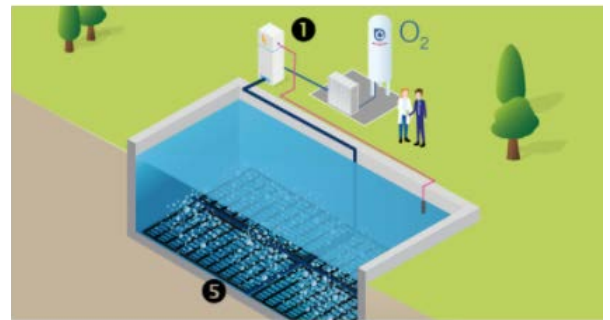
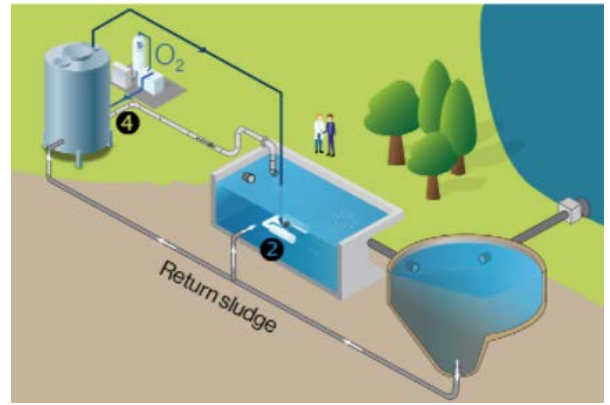
- The OZONATION UNIT (4) consists in three different modules: ozone production unit, injection and pumping unit reactor.



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 (4) 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 (5) is the best option in deep static basins (>5m).



Case Studies

Case study #1: Capacity Increase

Customer need: Accommodate feed values in excess of 50%

Existing Configuration:

- 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 to a large 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

Want to find out more?
Get in touch!



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