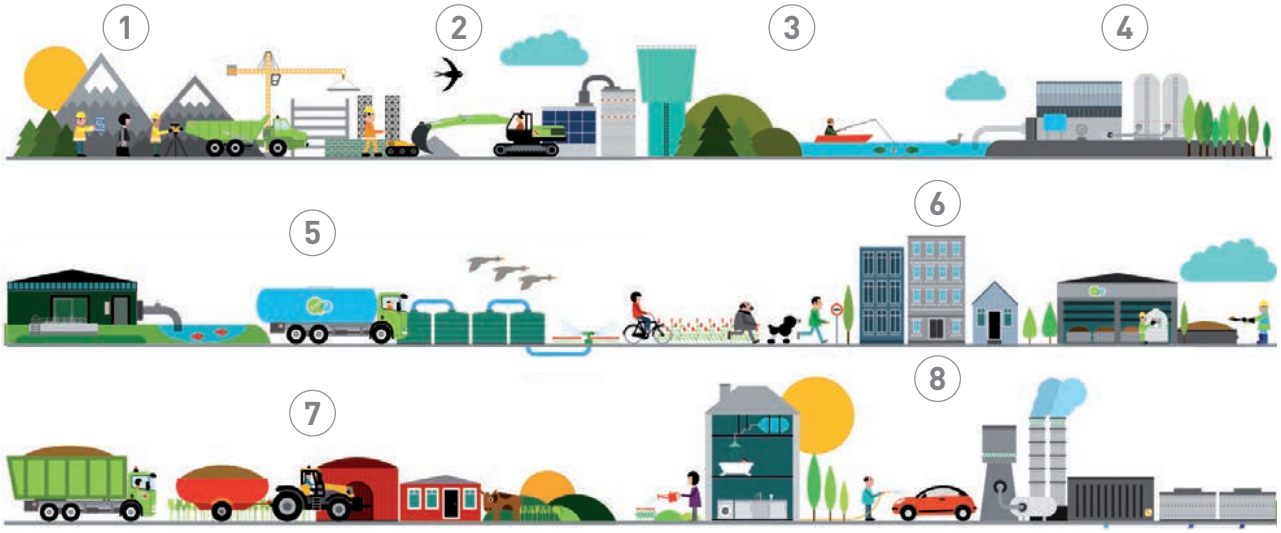
treatment of micropollutants

for wastewater management

SUEZ

what are micropollutants?

Micropollutants are problematic and persistent substances that are detrimental to the environment, even at trace levels. The world has hit the milestone of 100,000 different substances being discharged to water.



1. Contamined site
Runoff and leaching from sensitive sites (Works, former industrial sites, quarries...).

2. Atmospheric deposits
Precipitationn provoques soill leaching, as well as deposition of volátiles.

3. Aquatic recreation
Lake tourism and human water activities such as fishing create exchanges.

4. Industry
From processes to production chains, numerous micropollutants are inherent to industrial aplications.

5. WWTP discharges
Badly equipped WWTPs can discharge numerous micropollutants to the environment.

6. Drainage
Water from roadways carry urban pollution (particles, heavy metals...)

7. Agriculture
Phytosanitary productos (fungicides, herbicides) used to protect crops generate runoffs.

8. Domestic uses
Cleaning products, cosmetics and pharmaceuticals (including endocrine disruptors) all enter the water cycle.

why should micropollutants be treated?

- **97% of European** households are connected to a waste water treatment plant (WWTP).

  Many WWTPs currently struggle to treat micropollutants and significant quantities are discharged to the environment.

- **The consequences can be severe**, such as analgesics causing kidney damage in trout or flame retardants disrupting reproduction in aquatic organisms, and behavioural problems or damage to the immune system of organisms have also been documented.

- **According to the World Health Organization**, the infertility of couples rose from 5.4% to 16% between 1984 and 2012, whilst breast and testicular cancer rates went up, respectively, to 20% and 47% (1994-2006 study by The International Agency for Research on Cancer).

- **Long-term impacts on human health** cannot be excluded.

regulations

The European Union Water Framework Directive (2000/60/EC) sets targets for the improvement of European waters and defines priority and dangerous priority substances to be respectively reduced and faded out by 2015 and 2021.

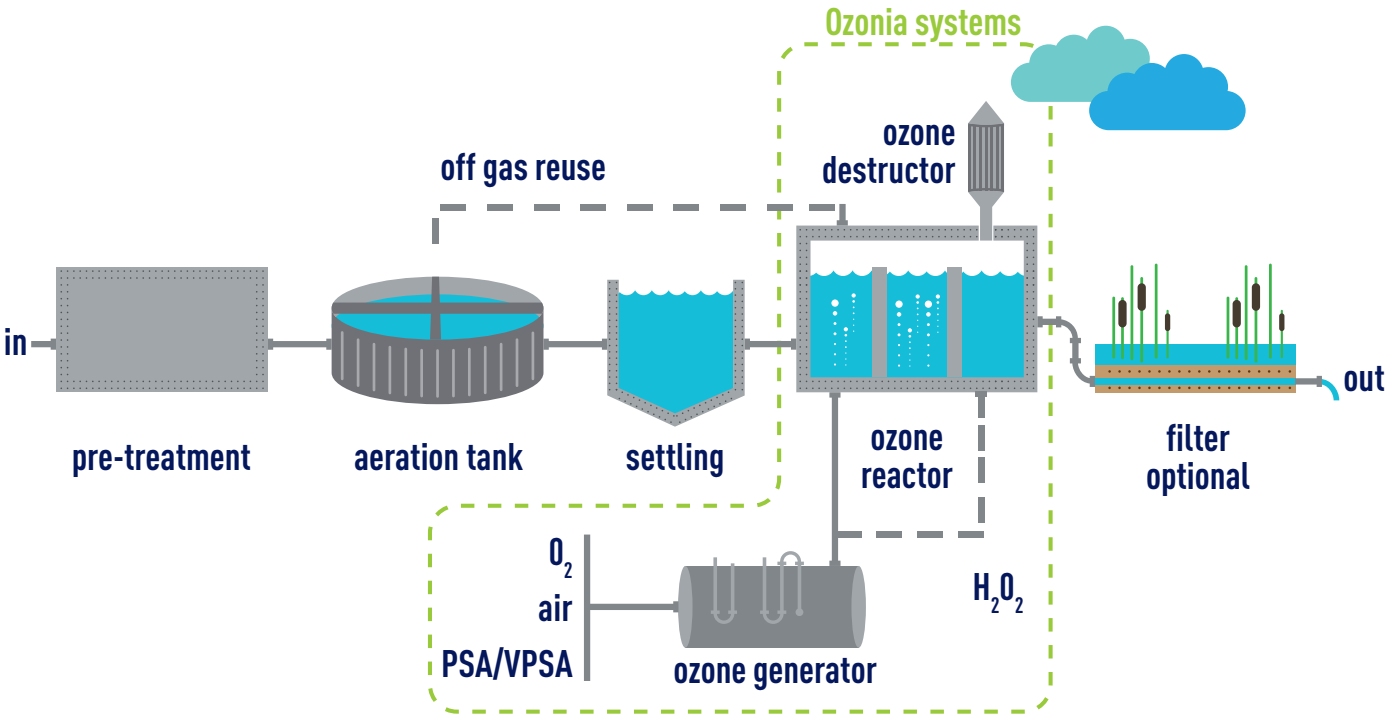
Some countries are taking a leading role, such as Switzerland where a micropollutant regulation comes into force on 1 January 2016. The target is to reduce the concentration of representative substances by 80%, with about 100 of the biggest WWTPs being equipped to undertake the work, with inhabitants paying a 9 CHF/year tax to cover the conversion costs.

our solutions in a nutshell

- **Up to 99%** micropollutant removal with an adapted treatment for every water matrix.
- Turnkey solutions with the **best cost/efficiency ratio** on the market.
- **Easy operation** with low maintenance.
- High reliability and **long system lifetime**.
- **15 years of experience** in micropollutant treatment and thousands of ozone plants installed worldwide.

3 € population Equivalent/year

combined Investment & Operation costs over 20 years (source: Swiss Government for a 300,000 PE WWTP)



comparison O_3 vs. other techniques

	population equivalent	O_3	$O_3 + H_2O_2$	activated carbon	extensive treatments
investment cost	8,000	100	103	105	230
	60,000	100	109	135	470
operating cost	200,000	100	120	380	1200
	8,000	100	102	280	75
operating cost	60,000	100	109	410	95
	200,000	100	134	600	150

substances

Source: ARMISTIQ (2014)

elimination rate through %	O_3	H_2O_2
carbamazepine	100	100
sulfamethoxazole	92	98
diclofenac	100	100
acenaphylene	97	95
4-NP2EO	96	93
diuron	91	93

Les Bouillides WWTP, Sophia Antipolis (France)

Les Bouillides' WWTP was the first facility in France (and one of the first in the world) to integrate a micropollutants removal process. The plant has been successfully protecting the local receiving environment and water table used for drinking water production since 2012.

The "Neugut" WWTP, Dübendorf (Switzerland)

The "Neugut" WWTP near Zürich was the first Swiss treatment plant to remove micropollutants from water. From spring 2013, the facility has sucessfully removed micropollutants, ahead of Swiss legislation which has enter into force in January 2016.

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