

*Five key trends highlighting
the urgency to tackle pollution*

POLLUTION SOLUTION



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This report features third party quotes that do not relate to Veolia Water Technologies

António Guterres, United Nations Secretary-General; Jacques-Yves Cousteau, French naval officer and oceanographer; and Thomas Fuller, 17th-century British author.

This report features third party facts and figures that do not relate to Veolia Water Technologies

Agency for Toxic Substances and Disease Registry: NTP (National Toxicology Program). 2016. Monograph on Immunotoxicity Associated with Exposure to Perfluorooctanoic acid (PFOA) and Perfluorooctane Sulfonate (PFOS) Last Reviewed: November 1, 2022; BDO, UK “ESG and sustainability projections for mid-market businesses and organisations” 2021; CDP: Global Water Report 2020; CHEM Trust “PFAS – the ‘Forever Chemicals’” - signatory to the “Zürich Statement on Future Actions on Per- and Polyfluoroalkyl Substances (PFASs)” (2018); EcoWatch: “50% of U.S. Lakes and Rivers Are Too Polluted for Swimming, Fishing, Drinking”, Olivia Rosane, May 29, 2022; GlobeScan: “Healthy and Sustainable Living Global Consumer Insights Study,” 2021; National Library of Medicine (NLM), National Center for Biotechnology Information: PFAS Concentrations in Soils: Background Levels versus Contaminated Sites, Mark L. Brusseau, R. Hunter Anderson and Bo Guo, Sci Total Environ. 2020 Oct 20; 740: 140017; Nature Journal: “Europe sounds alarm over freshwater pollution” Gilbert, N. Europe sounds alarm over freshwater pollution. Nature (2015); Power Technology “Analysis: global electric vehicle market set to grow 16% by 2035”, Annabel Cossins-Smith August 15, 2023; The Barometer of Ecological Transformation, Ecological Transformation: “Are we ready?”, Elabe and Veolia, 2022; The World Counts, Global challenges: Deaths from dirty water and related diseases; Stockholm Resilience Centre, Stockholm University “Outside the Safe Operating Space of the Planetary Boundary for Novel Entities Environ. Sci. Technol.” Persson, L., Carney Almroth, Collins, C.D., Cornell, S., de Wit, C. et.al. 2022; United Nations, Academic Impact: “World Water Day Reminds Us of the Value of a Precious Resource”; United Nations, Educational, Scientific and Cultural Organization: International Initiative on Water Quality (IIWQ) “Water Quality Facts”; United Nations, Environment Programme GEF, Chemicals and waste: “Pollution action: the missing link in biodiversity protection” 2023; United Nations, Habitat and WHO, 2021. Progress on wastewater treatment – Global status and acceleration needs for SDG indicator 6.3.1. United Nations Human; Settlements Programme (UN-Habitat) and World Health Organization (WHO), Geneva; United Nations, Water. Summary Progress Update 2021 – SDG 6 – water and sanitation for all. Version: July 2021. Geneva, Switzerland; World Health Organization WHO/UNICEF Joint Monitoring Programme (JMP): Progress on drinking water, sanitation and hygiene: 2000-2017: Special focus on inequalities, A.Keenan, 2019.

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Descriptions contained herein apply exclusively to those examples and/or to the general situations specifically referenced, and in no event should be considered to apply to specific scenarios without prior review and validation.



Treating water pollution is not optional.

It is a moral imperative, economic necessity and public health priority. Furthermore, we owe it to the generations that will inherit this planet from us.

At Veolia Water Technologies, we are intentionally looking, listening and finding answers to the most significant water challenges of our time, including the ones brought on by pollution.

This report serves as a resource for stakeholders seeking to understand and contribute to the global effort to combat pollution and create a more sustainable future. It explores five trends and showcases technologies that empower our customers to reduce water pollution, protect human health and the environment, minimize waste and mitigate soil pollution.

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As a father of four and a concerned human being, I'm convinced that treating water pollution is not optional but vital for our future.

For too long, our water sources have faced increasing threats from pollution. From industrial discharges to agricultural runoff, plastic waste to chemical contaminants, it's clear that our water bodies are under siege, and this poses grave risks to both human health and the ecosystems we depend on.

First and foremost, we must consider the health implications. Contaminated water leads to a myriad of health problems, ranging from waterborne diseases to long-term health issues caused by exposure to harmful chemicals.

Next, pollution in our water has a devastating impact on biodiversity, especially aquatic ecosystems that are interconnected. This means once we pollute one part of the system, it has a ripple effect throughout the entire web of life.

But it's not just about the immediate consequences; it's about our long-term sustainability. We cannot separate our well-being from the health of our environment.

Now when I work with customers and leaders, I'm more and more convinced that pollution in water is not just an environmental issue; it is an economic one. The cost of mitigating and remediating the damage caused by pollution is staggering. Meaning, prevention is not just more humane, it's also more cost-effective.

When I speak to leaders from all walks of industry, most realize we have a unique role to play and that responsible business does not come at the expense of business success... it underlines it.

As the CEO of Veolia Water Technologies, our mission is to depollute water. Our purpose is to help our customers avoid creating pollution from the onset; to create technologies that reduce water pollution at source; treat chemicals that are used in manufacturing processes; and champion sustainable water practices across the board.

Addressing water pollution is not just a moral imperative; it is an economic necessity, a public health priority, and, lastly, it is a fundamental responsibility we owe to the generations that will inherit this planet from us.



Arnaud Valleteau de Moulliac
CEO
Veolia Water Technologies

A stylized, handwritten signature in black ink, consisting of a large, sweeping 'A' followed by a horizontal line.

Our world is facing a water crisis on every frontier. Not only are we seeing the demand for water increase but compounding the issue further is the decrease in water quality.

We must acknowledge that water pollution is not a localized issue. After all, unsafe drinking water is a growing concern as contaminants such as heavy metals, pesticides and pharmaceuticals find their way into our drinking water sources, jeopardizing the health of millions. Likewise, untreated wastewater in the environment has long been an area of concern and with the increasing appearance of new pollution, we foresee long-term consequences for the environment and human health.

Bad water quality is also the root cause of significant social injustice because as pollution spreads economic consequences are certain, ranging from disruption of industries to our global food security being compromised. All of this without even mentioning the impact on the environment which many depend on for their livelihood.

Progress toward the United Nations' Sustainable Development Goal Six: Clean Water and Sanitation, is faltering. But there is still time. We need to reassemble and reaffirm our commitments to ensure we meet the targets we set for ourselves by 2030.

Often referred to as blue gold, water quality must be a global priority. This resource demands our immediate attention and collaborative efforts across both our operations and day-to-day life.

At Veolia Water Technologies, we are committed to both the environment and business performance without compromise. We will continue to make technological advancements in water treatment and monitoring which play a pivotal role in addressing pollution both upstream and downstream.

The rise of water pollution is alarming, but it must serve as a call to action. I believe by working together with all our stakeholders, we can — and will — turn the tide, protect our blue gold, and build a sustainable and healthy future for all.



Anne Abraham

*Sustainability Director
Veolia Water Technologies*

Anne Abraham

MULTITUDE OF MICROPOLLUTANTS

Treating past missteps to safeguard tomorrow

For decades water treatment has been neglected according to the International Journal of Water Resources Development. Now in an era marked by escalating population growth and a diminishing supply of clean water, addressing water pollution and revolutionizing water management as a whole is paramount.

Water treatment is a linchpin in safeguarding our global water supplies and the environment. It is imperative to tackle the root causes of water depletion, one of which is pollution.

Decontamination requires a bilateral approach. Treating water before use ensures it is safe, and treating wastewater before it is discharged can

significantly mitigate pollution entering the water cycle. Inevitably helping reduce the spread of disease, food chain contamination and damage to aquatic ecosystems.

“Water seems so widely abundant that we feel it could never be depleted. And yet it can be, and will be if we do not take a responsible approach to water, including wastewater, and move towards sustainable industrial practices.” — Thomas Fuller, 17th-century British author

However, compounding this issue further are the various micropollutants.

Bacteria, viruses, parasites, fertilizers, pesticides, active pharmaceutical ingredients and trace metals present a multifaceted challenge that demands a comprehensive approach. More often than not, a combination of treatment

steps is needed from coagulation and flocculation to sedimentation, filtration, advanced oxidation, activated carbon treatment and disinfection, not to mention biological treatment in the case of wastewater. And the complexity of treating water will continue the longer the cocktail of pollution in our water persists.

On the positive, an overlooked aspect of water treatment is the potential for reuse. This untapped resource remains grossly undervalued, despite its potential to provide safe, affordable and sustainable sources of water, energy, nutrients and other recoverable materials.

Neglecting water treatment is no longer an option. The benefits of prioritizing water recycling and safe reuse far outweigh the costs of establishing better water management, while also contributing to reducing water scarcity and safeguarding our aquatic ecosystems.



Globally, only 56% of household wastewater flows were safely treated in 2020. Data from 128 countries representing 80% of the global population — United Nations, Water

There has been a 50-fold increase in the production of chemicals since 1950. This is projected to triple again by 2050 — Stockholm Resilience Centre



A multi-barrier system tackles micropollutants in Switzerland

A unique combination of technologies protects drinking water around Lake Geneva.

Overlooked by the Alps and straddling the border between Switzerland and France, Lake Geneva is the largest lake in Central Europe. Annually, the lake provides 70 million cubic meters of water to residents and holidaymakers alike, in the Vaud canton region of Switzerland.

However, a challenge emerged in the 2010s when the lake's water revealed the presence of micropollutants, consisting of pharmaceuticals, herbicides, fungicides and corrosion inhibitors. The cocktail effect of these pollutants became a cause for concern for local authorities and people alike.

To tackle the problem, our experts from OTV — a subsidiary of Veolia Water Technologies — are leading a consortium and using our cutting-edge multi-barrier system. The project — which began with pilot tests in 2015 — involves various treatment steps, including an advanced oxidation process, an

activated carbon treatment using Opacarb™ FL and an ultrafiltration step. A nanofiltration step for 10 to 15% of the capacity completes the process, enhancing the micropollutant treatment.

In 2021, a contract was signed to launch the refurbishment of the current drinking water plant to increase water production and significantly reduce micropollutant levels by 2026.

The project also seeks to ensure biologically stable drinking water, reducing or eliminating the need for chlorine disinfection in the coming years.

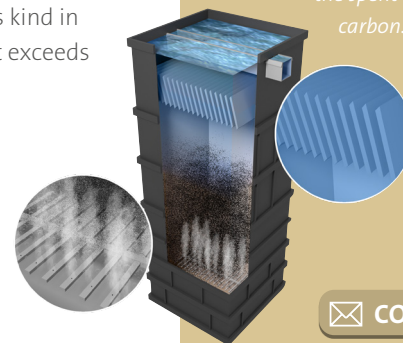
The new plant will be the first of its kind in Europe and will produce water that exceeds regulatory requirements.

Adsorption solution tackles micropollutants

Opacarb™ FL traps micropollutants

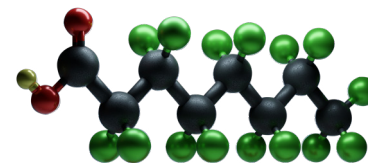
Our patented innovation, Opacarb FL was introduced to the market in December 2020. It is a compact, environmentally friendly process that uses energy sparingly and does not need chemicals, while also producing no sludge and minimizing water loss throughout its entire operation.

It works by trapping the micropollutants, such as pesticides and their metabolites, in an activated carbon fluidized bed reactor. It also addresses the treatment of chlorothalonil and offers several advantages over other activated carbon technologies, including continuous activated carbon dosing and reactivation of the spent activated carbon.



 **CONTACT US**

RISE OF FOREVER CHEMICALS



How to effectively treat PFAS in global water supplies

PFAS (per- and poly-fluoroalkyl substances), also known as forever chemicals, are a large group of over 10,000 persistent, man-made chemicals that do not degrade and are very mobile in water. Consequently, these complex synthetic substances have been found in the most remote areas of our planet and there is mounting concern regarding their impact¹.

Used in everything from pizza boxes and non-stick cookware to fire-fighting foams, these chemicals are found in a wide range of everyday products. They are renowned for their water and oil-repellent properties, as well as their resistance to heat and other chemicals.

However, their extreme persistent nature has raised concerns about their impact on human health and the environment.

A study from the Agency for Toxic Substances and Disease Registry has shown exposure to PFAS can have adverse effects on human health, including links to various cancers. These chemicals are also proven to contaminate water and soil, posing a threat to our entire ecosystems. Owing to this, there is a global effort to regulate and reduce their use.

Companies and manufacturers need to act to align their operations with fast-evolving legislation and restrictions that are becoming even more stringent. Action needs to be taken upstream — to prevent PFAS from entering the water cycle and soils — and downstream — to treat water before use or discharge to the environment.

As standardized analysis methods only exist for about 50 PFAS compounds in water, it is currently not possible to assess global PFAS removal.

Advancements in granular activated carbon, ion exchange resins and high-pressure membrane systems are our best line of defense for reduction in water. And, in situ thermal solutions perform well reducing PFAS in soil.

Whether you're an industry currently using these chemicals or a municipality needing to protect communities, action is needed.

(1) CHEM Trust "PFAS – the 'Forever Chemicals'" - signatory to the "Zürich Statement on Future Actions on Per- and Polyfluoroalkyl Substances (PFASs)" (2018).
 (2) Agency for Toxic Substances and Disease Registry: NTP (National Toxicology Program). 2016. Monograph on Immunotoxicity Associated with Exposure to Perfluorooctanoic acid (PFOA) and Perfluorooctane Sulfonate (PFOS). Last Reviewed: November 1, 2022.
 (3) National Library of Medicine (NLM), National Center for Biotechnology Information: PFAS Concentrations in Soils: Background Levels versus Contaminated Sites, Mark L. Brusseau, R. Hunter Anderson and Bo Guo, Sci Total Environ. 2020 Oct 20.



Stockholm Convention on Persistent Organic Pollutants was implemented in 2004, targeting 29 specific chemicals known to have harmful effects on human health and the environment. Following this, the list has expanded with the help of global monitoring.

Nations continue to implement policies and measures to eliminate or reduce the production of chemicals of concern, including PFAS.

- *In the USA, the Environmental Protection Agency has proposed a Federal Maximum Contaminant Level (MCL) for six PFAS compounds to protect communities.*
- *PFAS is increasingly regulated in Australia with new regulations focusing on the remediation of PFAS-impacted sites.*
- *Europe has called for PFAS bans in food packaging, cosmetics and clothing by 2025, and across all uses by 2030.*



Interview: Thomas Perry, Director of Product and Market Development, discusses the first national drinking water standard

Helping customers ensure compliance and readiness for the future.

With many individual U.S. states already having drinking water standards for PFAS, what impact could the upcoming federal EPA standard have?

"With various regulations in more than 20 states, it will ensure consistency, avert discrepancies and mandate a national drinking water standard. This guarantees safe and clean water access for all residents, irrespective of their location. Additionally, it promotes interstate cooperation for managing PFAS contamination in water bodies spanning multiple states, encouraging resource sharing to efficiently detect, monitor and remediate PFAS contamination."

In light of these and other increasing regulations, what have you been working on to ensure you can help customers meet these future demands?

"We have a wide portfolio of technologies to reduce PFAS but Actiflo® Carb is quite unique. We have been piloting it on groundwater

sources containing iron, manganese, organics and PFAS. This high-rate clarifier can significantly diminish the levels of metals and organics before standard filtration while concurrently reducing the PFAS load applied to PFAS polishing filters."

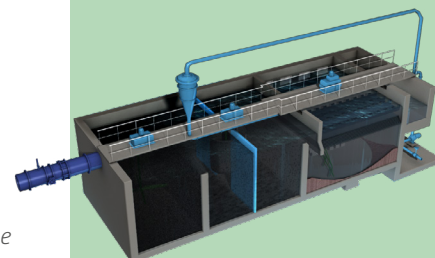
What observations can you share from this pilot testing, and how do these findings impact filter bed life and operational costs?

"The pilot testing showed we can maintain consistent PFAS treatment over time and our low waste volume (spent activated carbon) is discharged at a constant rate. This is the big differentiator to filters as their performance deteriorates over time and you need to replace all of the media at once. Keeping our spent carbon waste separated from other waste streams is easy and can reduce the total volume of PFAS-contaminated waste that needs to be managed. Reducing the contaminated load to the filtration steps allows for improved operational efficiencies that can reduce capital and operating costs associated with PFAS treatment."

**Powdered
activated carbon
used to treat
PFAS**

Actiflo® Carb

As a high rate clarification technology, Actiflo® Carb is designed to treat and refine water. It combines fast flocculation and sedimentation performance with the adsorption capacity of powdered activated carbon to adsorb non-flocculable organic matter, taste and odor compounds, pesticides and emerging micropollutants, such as PFAS. It is specifically designed to efficiently treat pollutants resistant to traditional clarification methods to achieve superior treated water quality.



PUBLIC CONCERN OVER ENVIRONMENTAL ISSUES

Treating water pollution is good for business

In recent years, there has been a notable surge in public concern regarding environmental issues. As a result, addressing environmental problems is not only the moral thing to do but also makes good business sense, as customers and stakeholders place higher expectations on corporations to reduce their environmental impact.

The importance of preserving the health of our oceans and waterways is a belief no longer reserved for the scientific community. Findings from the Healthy and Sustainable Living Global Consumer Insights study, reveal 63% of people view climate change as a “very serious” issue and both depletion of natural resources and water pollution rank even higher — 64% and 65% respectively.

However, UNESCO estimates two million tonnes of sewage and other effluents drain into our water bodies every day; that 90% of sewage in developing countries is discharged untreated directly into water bodies; and that industry discharges between 300 to 400 megatonnes of waste into water bodies every year.

“Water and air, the two essential fluids on which all life depends, have become global garbage cans.” — Jacques-Yves Cousteau, French naval officer and oceanographer (1910 - 1997)

Habitat degradation is a second significant problem for the public that is inextricably linked to pollution. It is estimated chemical pollution is responsible for the decline of 40% of insect species and the effects of water

pollution on land and soils impact the health and food security of 3.2 billion people — equivalent to 40% of the global population.

These issues are growing threats that people feel deeply connected to and as the public’s awareness continues to increase so will their demands.

Consequently, industry must continue to meet and keep up with environmental regulations that are evolving in line with social pressures. This is where water treatment can help not only maintain your business but grow operations in the most sustainable way possible, to prevent environmental damage and avoid social issues. Having a successful and more virtuous activity, isn’t that more rewarding? Isn’t that the goal we should all have?



In the United States, 51% of the rivers and 55% of the lakes are polluted and are considered unhealthy for swimming, fishing or aquatic life — EcoWatch

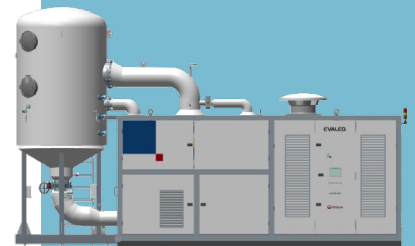
Around half of Europe’s rivers and lakes are still polluted, despite a 15-year-old target to restore all the continent’s waters to good ecological health by 2015 — Nature Journal

Evaled™ evaporation technologies help phase out combustion engines

**Ensuring full compliance
with strict environmental
regulations**

The traditional method of lithium extraction involves brine mining, which entails the retrieval of lithium from subterranean saltwater reserves. This approach can introduce toxic metals into water reservoirs.

To address this challenge, we provided a water treatment solution featuring Actiflo® clarification, high recovery reverse osmosis, three Evaled™ RVF 60 units and four ACR 12 evaporators for wastewater treatment. The Evaled team achieved an impressive 94% separation rate and completely eliminated any discharge of lithium into the environment.



 **CONTACT US**

The catch-22 of electric vehicles and lithium mining

Reducing lithium's environmental footprint on the path to net zero.

The global share of electric car (EV) sales has more than tripled in three years — from around 4% in 2020 to 14% in 2022 — with sales forecast to hit 51.6 million (16%) in 2035.

Strong growth in the sector is attributed largely to the electrification of the global transport industry, as consumers take action and shift to low-carbon alternatives in the fight against climate change.

EVs, much like any manufactured product, rely on raw materials for their production and some of these materials carry environmental consequences. In the context of the EV industry, lithium producers and recyclers are facing a dual challenge. They must meet growing global demand while minimizing the environmental footprint of their operations.

Australia has become the world's largest lithium supplier and our evaporation experts are

working with a prominent local player supplying products for the clean energy revolution.

The customer's facility has open-cut mining pits dedicated to extracting spodumene, a crucial lithium mineral. Their primary concern was to ensure full compliance with legal standards. Being mindful of local indigenous communities and their connection to the environment was also paramount so protecting the environment was multilateral.

They are not permitted to discharge any lithium into groundwater and must reach zero liquid discharge (ZLD) — a water treatment engineering approach where all water is recovered and contaminants are reduced to solids — for the treatment of wastewater coming from the mining process.

Helping to reduce the operational footprint and ensuring zero lithium discharge in the environment, our evaporator system is implemented as a third step for the separation of lithium from the water and its concentration with the other salts.



HUMAN HEALTH CONSEQUENCES

The vital link between pollution, treatment and human health

Water pollution has a profound impact on human health. Preventing and mitigating water pollution is crucial to protect public health and reduce the burden of water-related diseases and health issues in communities around the world.

Even in today's world, half of our global population lacks access to safely managed sanitation services and roughly 785 million people do not have basic drinking water services. This crisis extends beyond water scarcity as water pollution has escalated in almost all major rivers since the 1990s. Pollution makes untreated water unsafe for consumption, accounting for 3,575,000 deaths annually.

Contamination brought by bacteria and fecal waste exposes humans to a plethora of infectious diseases, including cholera, legionella and polio. Health risks from chemical-based pollutants, including fertilizers, active

pharmaceutical ingredients (APIs) residues and PFAS, are believed to cause cancer, brain and nervous system disorders, and early life development issues; however, their short and long-term impact is still debated.

Human health effects, which can range from subtle to severe depending on the pollution and total exposure, include:

- **API residues** – hormone disruption and altered brain function.
- **Arsenic** – a known human carcinogen causing skin, kidney and liver cancer.
- **Lead** – behavioral and developmental effects in children, cardiovascular and kidney problems.
- **Pesticides** – neurodevelopmental effects and Parkinson's disease.
- **PFAS** – liver damage, thyroid disease, fertility issues and cancer.
- **Fecal pollution from sewage** – cholera, diarrhea, dysentery and hepatitis.

Whether it's action to treat wastewater produced by industries or municipalities, all contaminants need to be treated before water is reused or released into the environment.

Treatment before being released is vital as water pollution can have a significant impact on soil, introducing harmful substances and contaminants that degrade its quality. Persistent pollutants can render soils unsuitable and pose health risks to humans as these contaminants can enter the food chain when plants or animals absorb them. Meaning the consequences of soil contamination can impact generations.



76% of people state they are deeply concerned about the pollution of essential resources and its immediate impact on human health — Veolia Group, Barometer of the Ecological Transformation¹.

(1) A survey conducted in 25 countries in 5 continents with more than 25,000 individuals.

Cleaning up agent orange residue

Soil excavation and remediation saves lives in Da Nang

IPTD was the chosen technique to tackle the herbicide soil contamination at Da Nang. This involved heating the soil to 335°C (635°F) over several months. A specially designed facility was built to house the contaminated soil to ensure controlled heating.

The heat causes the volatile and semi-volatile compounds to vaporize. These are extracted from the soil, collected and safely decomposed. The higher boiling compounds undergo a significant reduction in the soil leaving it safe for reuse.

Tackling soil contamination from the Vietnam War

Fourth generation still suffers from pollution.

During the Vietnam War, the American armed forces sprayed 80 million liters of the powerful herbicide, known as Agent Orange, on central Vietnam between 1964 to 1973.

The impact of this chemical warfare long outlasted the war as these dioxins persisted in the soil; four generations later, they have infected millions of people in Vietnamese, Cambodian and Laotian border areas causing health problems such as cancer, congenital birth disorders and life-threatening health complications including diabetes and heart disease.

In response to this humanitarian and environmental crisis, a collaborative effort between the Vietnam Ministry of Defense and the United States Agency for International Development was initiated in 2012. Their shared objective was to remediate 87,000 cubic meters of contaminated soil and sediment in the vicinity of Da Nang airport, a notorious hotspot for dioxin pollution due to its historical role in storing and handling the chemical.

Removing Agent Orange from soil is a challenging and complex process that requires extensive soil excavation and remediation. Our experts from Krüger — a Veolia Water Technologies' subsidiary — teamed up with TerraTherm (later part of Cascade) and used a remediation technique, In-Pile Thermal Desorption (IPTD). This process facilitates the evaporation and degradation of dioxins, making them accessible for extraction and treatment.

The objective was to meet stringent cleanup standards while minimizing any further environmental impact. Within 20 months, this approach resulted in remediated and safe soil, ready to be reintegrated into the environment.



© USAID.

INCREASING ENVIRONMENTAL REGULATIONS

Embracing pollution prevention and sustainable water management

As a global community, we are realizing the significance of safeguarding our rivers, lakes, groundwater and bathing waters. This is being reflected in the development and implementation of regulations aimed at reducing water pollution. However, there is not a single global water pollution regulation that applies to all countries or industries worldwide.

As a result, regulations vary but as we have seen in recent years following the launch of the Best Environmental Practices (BEP) and Pollution Prevention and Control (PPC) Program, guidance and regulations will continue to evolve in

response to scientific advancements, emerging contaminants and changing public health concerns.

“No longer will we allow mindless environmental destruction to be considered as economic progress.” —
António Guterres, United Nations Secretary-General

Local and national agencies typically enforce these regulations. They may work in coordination with international organizations and guidelines but this will also depend on the country's unique water quality challenges and priorities.

One such regulatory framework is the Water Framework Directive (WFD), which has been instrumental in guiding water protection efforts in Europe since 2000.

It specifies pollution prevention measures that all industries must follow to maintain their license to operate. This often involves implementing advanced wastewater treatment technologies, minimizing pollutant discharges, and constantly monitoring their environmental impact.

And this is not alone. All regulations focus on reducing the release of pollutants, and guidelines now specify how industries must focus on water reuse — particularly the UAE, Spain, Australia, Singapore and California in the USA.

By embracing pollution prevention and sustainable water management practices, businesses not only fulfill their regulatory obligations but also contribute to the overall well-being of local ecosystems and communities.

Almost one-third of mid-market businesses say they face a high risk of losing business if they fail to act on environmental, social or governance policies — BDO UK

Water-related risks could cost companies up to \$425 billion — Carbon Disclosure Project





JSC Grindex takes action to meet regulations

Innovation helps prioritize sustainability and public health.

Treating pharmaceutical pollutants, including micropollutants, is highly complex and conventional technologies often fall short as they cannot completely isolate these contaminants. As a result, micropollutants escape into aquatic environments during wastewater treatment at both municipal and industrial sewage plants.

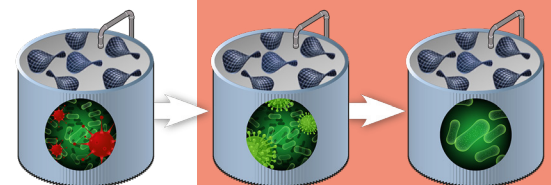
The most common practice for micropollutant treatment from water is activated carbon adsorption. However, there's also a sustainable post-treatment biological solution that can safely treat 50 to 80% of difficult-to-degrade pharmaceuticals from wastewater in situ.

As a member state of the European Union, Latvia is obligated to comply with the WFD. In response to this directive, JSC Grindex, an internationally operating Latvian pharmaceutical company, has taken proactive steps to meet regulatory standards.

Headquartered in Riga, JSC Grindex is renowned for its diverse pharmaceutical portfolio which focuses on cardiovascular, central nervous system, anti-cancer and diabetes medication.

To meet the regulatory requirements and address the challenge of pharmaceutical pollutants, such as active pharmaceutical ingredients (APIs) from its manufacturing processes, JSC Grindex embraced a specifically designed five-stage moving bed biofilm reactor (MBBR) process designed for the degradation of difficult-to-degrade organic compounds and nitrogen removal.

With a robust capacity of 500 cubic meters per day, the MBBR process offers an efficient and effective means to address these pollutants, ensuring compliance with environmental regulations while prioritizing sustainability and public health.



An effective, economic and environmentally friendly solution to pollution

eXeno™ removes multiple and complex compounds from wastewater

Developed by AnoxKaldnes® — a subsidiary of Veolia Water Technologies — eXeno™ is a MBBR technology that relies on the intelligent selection of specialized microorganisms growing on biofilms.

Using multiple reactors in series, the MBBR solution can select specific microorganisms specialized in difficult biodegradable compounds like pharmaceuticals. This is the case at JSC Grindex, where eXeno was used to treat phenols and high concentrations of organically bound nitrogen compounds, ensuring compliance with environmental regulations.

Resourcing the world