

Staying ahead of legislation

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Meeting the future challenges of water treatment today

Water quality legislation is being tightened globally. The most precious resource on the planet is suffering from contamination and countries around the world are drawing up new regulations to tackle this challenge. It is the responsibility of municipalities to deliver the new standards and, in most cases, that will require additional treatment processes to be implemented.

Three of the major challenges at the forefront of the remodeled legislation are pharmaceuticals, 'forever chemicals' and phosphorous. Each one poses a significant threat to water quality and presents a technical problem for those responsible for delivering water to domestic and industrial consumers or releasing it into natural water bodies.

Making polluters pay

Pharmaceutical residues are having a detrimental effect on wildlife and human health, which has led to a revision of European Union (EU) Directive 91/271/EEC. The latest proposals will require producers of pharmaceuticals and cosmetics to pay for the cost of removing micropollutants that come from their products and end up in wastewater, thus implementing the "polluter pays" principle.

Many pharmaceuticals can remain in wastewater throughout the treatment and discharge processes and have been detected in rivers, streams and lakes around

the world. Once in the environment, these chemicals can detrimentally affect aquatic wildlife.

Natural and synthetic estrogen compounds are known to cause decreased fertility and other negative reproductive effects in fish. The inhibition of growth and development of secondary sexual characteristics was reported in some species after exposure to a variety of endocrine-active chemicals.¹

Additional treatment solutions

Furthermore, commonly used antidepressant drugs have been shown to elicit behavioural changes in fish. Antibiotics in the environment lead to the development and propagation of antibiotic resistance, contributing to potential public health concerns. In addition, exposure to antimicrobial ingredients, which are not covered by the current legislation, will exacerbate the global antimicrobial resistance crisis.

Fortunately, filtration technologies exist capable of removing pharmaceutical residues, but there is no 'one-size-fits-all' solution, there are several aspects that need to be addressed to achieve the optimal result. Central to these solutions is the use of granular activated carbon (GAC), and in some cases, existing filtration equipment can be upgraded to work with this material and improve performance. If an extra filtration process is required, the additional footprint can be kept to a minimum with the use of continuous up-flow filters.

Forever chemicals

¹ Impacts of endocrine disrupting chemicals on reproduction in wildlife and humans; V.L. Marlatt et al, January 2022.

Of equal importance is the growing crisis involving the use of per- and polyfluoroalkyl substances (PFAS), which, due to their persistence in the environment, are often referred to as 'forever chemicals'. These common materials are widely used in industrial and consumer applications including stain- and water-resistant coatings for fabrics, oil-resistant coatings for paper and cardboard, floor polishes, insecticide formulations and fire-fighting foams.

In the EU, member states will have to ensure they do not exceed stringent levels of PFAS from 2026, but this will require improved monitoring and data collection. The process of removing these chemicals from water supplies can be achieved by a number of technologies including nanofiltration and reverse osmosis, but one of the most cost-effective methods uses granular activated carbon.

Similar to removing pharmaceutical residues, a bespoke approach for each treatment plant is essential to achieving the best results.

Meeting challenging regulations

Finally, phosphorus; an essential nutrient for all living organisms, but its presence in excessive quantities in rivers and lakes poses significant environmental challenges. Phosphorous causes a phenomenon known as eutrophication, which occurs when nutrient levels in a freshwater source become too high, leading to excessive algae growth. This depletes oxygen levels in the water, resulting in hypoxic or 'dead zones' where aquatic life cannot survive.

Europe, in particular, has strict regulations aimed at protecting rivers and lakes from eutrophication. The European Union has implemented several directives and regulations to address phosphorus pollution. Countries like the United States have

also introduced regulations to limit phosphorus discharges, such as the Clean Water Act, which includes phosphorus limits.

Most large wastewater treatment plants will already have processes in place that can remove a significant portion of the total phosphate content. To achieve better results, either chemical treatments or additional filtration will be required. Lamella plate clarifiers, sand filters and disk filters all offer the ability to meet the most stringent legislation.

As local regulations become tighter on water pollutants such as phosphorous, PFAS and pharmaceuticals, treatment plants will need to upgrade existing processes and install additional equipment to ensure they comply. Fortunately, many of the technologies required have already been developed and proven in hundreds of reference installations and by working with experts in this field, such as Sulzer Nordic Water, treatment plants can stay one step ahead of the legislation.

Image captions:



Image 1: Additional technologies are required to remove micropollutants and improve water quality.



Image 2: Pharmaceutical residues in water have a detrimental effect on wildlife as well as human health.



Image 3: European legislation on water quality is being tightened to reduce micropollutants.

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