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EurEau position paper on PFAS in the urban water cycle

Summary

PFAS is a large group of very persistent chemicals that tend to accumulate in the environment and in human and animal bodies. They therefore pose a serious threat to the environment and human health. A 2020 opinion of the European Food Safety Authority found that at least some of these substances are even more harmful than previously thought.

Removing PFAS from the urban water cycle causes a wide range of problems for water service providers. While technologies exist to remove most PFAS, they are unsustainable, mainly due to their technical complexity, resource intensity (water, energy, treatment chemicals etc.) and the generation of PFAS-containing residues. Reliance on end-of-pipe solutions creates a substantial stumbling block on the water sector's journey towards climate neutrality.

Any emissions of chemicals belonging to this group into the environment need to be avoided, using the Precautionary Principle and the Control-at-Source Principle. This can be best achieved by an EU-level **ban of all PFAS uses**. If policy makers consider certain uses as essential and unavoidable, it must be ensured that the PFAS chemicals are not released into the environment. The Polluter Pays Principle must be applied (possibly through mandatory extended producer responsibility schemes) to remedy any existing or future contamination of drinking water resources and waste water. Furthermore, it must be ensured that PFAS substitutes are not themselves harmful. Acting now is clearly the most sustainable and effective way to limit the exposure of consumers to PFAS and preserve our valuable water resources for now and future generations.

1. What are PFAS and why are they used?

PFAS - short for per- and polyfluoroalkyl substances - is a chemical family consisting of almost 5,000 individual substances. They are a group of widely used, synthetic, persistent chemicals that may accumulate over time in humans and in the environment. It includes groups such as PFOS, PFOA, PFNA, PFHxS and others in the same family.

In manufacturing, PFAS are favoured for their durability and useful properties such as non-stick, water repellence and anti-grease. PFAS are used in the manufacture of many domestic products, including skin creams and cosmetics, car and floor polish, rinse aid for dishwashers, textile and fabric treatments, food packaging and microwave popcorn bags, baking equipment, frying pans, outdoor clothing and shoes. They also have many and widespread uses in industry, most notably in firefighting foam.

The properties of these substances mean that they are very resistant to biodegradation and as a result, they are ubiquitous in the environment. Concerns raised regarding the most popular PFAS (PFOS, PFOA[1]) led to a voluntary phase-out of PFOS by the largest producer in 2001. Nonetheless, its widespread use in long-life domestic products, particularly carpets and furniture, means that it represents a major legacy issue to be managed. Furthermore, the substitutes developed for these PFAS, such as GenX (HFPO-DA), have been found to be almost equally as harmful to human health[2].

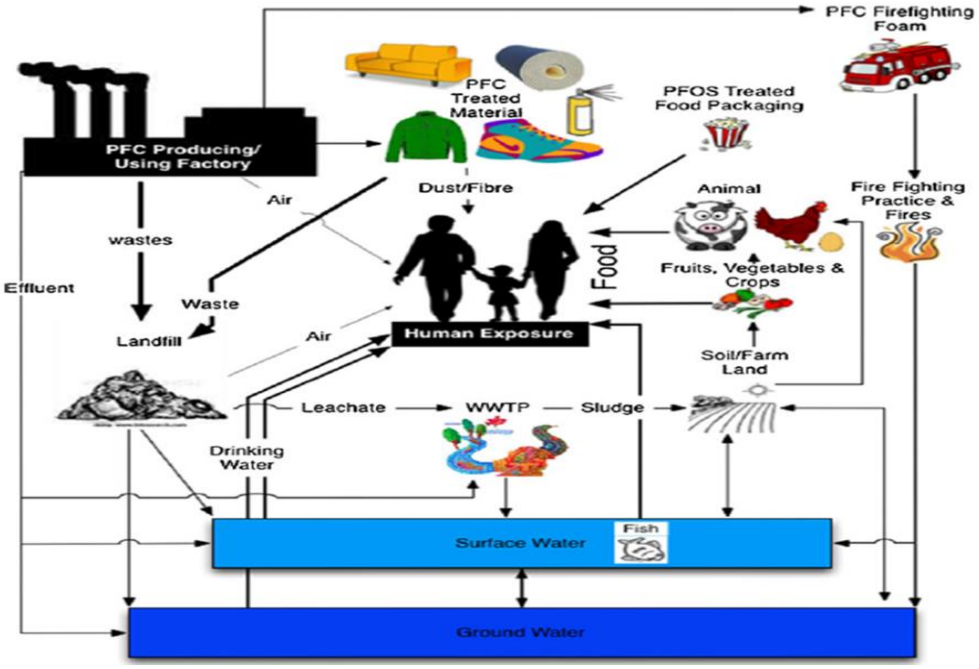
2. Why is the water sector concerned about PFAS?

PFAS either are, or degrade to, very persistent chemicals that can accumulate in humans, animals and the environment and may cause adverse effects. They are widely present in the environment, in soil, in water and in food.

Although a Europe-wide quantification of the different routes of human and environmental exposure is not complete, the Dutch National Institute for Public Health and the Environment estimates that the contribution of PFAS accumulation in humans through food is in the range of 83-98%, and the contribution through drinking water in the range of 2-17%. When looking at pathways, domestic products and food items will frequently present the largest potential pathways. Furthermore, inhalation has been identified as another important route[3]. The diagram below illustrates major PFAS pathways to the environment and human exposure.

[1] Perfluorooctane sulphonate; Perfluorooctanoic acid.
[2] https://echa.europa.eu/-/msc-unanimously-agrees-that-hfpo-da-is-a-substance-of-very-high-concern.
[3] The Air That We Breathe: Neutral and Volatile PFAS in Indoor Air, Environ. Sci. Technol. Lett. 2021, 2021.

Typical PFAS exposure pathways



Source: Environmental Science and Pollution Research: Oliaei, Kriens, Weber & Watson: PFOS and PFC releases and associated pollution from a PFC production plant in Minnesota (USA)

In September 2020, the European Food Safety Agency (EFSA)[4] published a *scientific opinion* **stating that certain PFAS are even more harmful than previously found. It calculates the group** *tolerable weekly intake* **(*TWI*) of** PFOA, PFOS, PFNA and PFHxS at **4.4ng/kg of body weight, much stricter than the previous EFSA opinion.** EFSA also concludes that significant parts of the European population exceed this TWI.

There are well-documented instances of local groundwater/drinking water contamination related to specific producers/users/disposals, linked to reported health impacts. It is clear however that low concentrations of PFAS are ubiquitous in the environment, and in most people[5].

Whilst the drinking water sector does not use PFAS, their presence in the water environment, including drinking water resources, and the use of modern analytical capabilities will mean that they are detectable in drinking water albeit in small quantities.

Equally, the waste water sector is a conduit that conveys PFAS from one medium to another, most notably from domestic and industrial premises to the environment. This is because conventional waste water treatment technologies are not designed to remove PFAS. Current waste water treatment technologies may separate some PFAS from the aqueous phase into sewage solids[6]. If sewage sludge is applied on farmland to increase its nutrient and carbon content, a certain quantity of PFAS might be transferred to the soil, and potentially into the food chain. Research work is currently underway to quantify this impact.

[4] https://efsa.onlinelibrary.wiley.com/doi/pdf/10.2903/j.efsa.2020.6223.
[5] Idem.
[6] EurEau Briefing Note on PFAS and Waste Water.

Very importantly, PFAS removal technologies in drinking water or waste water treatment are not able to destroy these molecules. This means they leave water operators with potentially toxic residual waste for which no sustainable management solutions exist. It also affects the sustainability and affordability of providing consumers with safe water services in the future.

3. PFAS - Regulatory controls and restrictions

At EU level, only a few of the nearly 5,000 PFAS are restricted today. PFOS is restricted under the EU POPs Regulation (Persistent Organic Pollutants Regulation). PFOA and its precursors are currently restricted under the REACH Regulation, including their presence in products made or imported into the EU. This will soon be replaced by a new restriction under the POPs Regulation, which will have more limited derogations, following a decision taken at the Stockholm Convention.

A limited number of other PFAS are on the REACH list of Substances of Very High Concern (SVHCs). In June 2019, the PFAS GenX, was the first chemical added to the SVHC list on the basis of its persistent, mobile and toxic properties posing a threat to drinking water and the environment.

The ongoing revision of the CLP Regulation (Classification, Labelling and Packing Regulation) aims to position it as the overarching instrument for the EU chemical legislation through the establishment of hazard classes EDC, PBT, vPvB, PMT and vPvM, and the criteria to assess these hazardous properties, together with the '*one substance-one assessment*' principle. This would mean that a substance classified for its hazardous properties under CLP, will be considered hazardous in all other pieces of chemical legislation, thus, allowing for a swifter classification and restriction of PFASs for their persistent, bioacumulative, mobile and toxic properties.

In 2021, the EU decided to ban around 200 long-chain PFASs from February 2023 onwards. While these PFAS substances are rarely used today, they are extremely difficult to degrade and could accumulate in living organisms.

A restriction of PFHxA, applying to uses in textiles, food packaging and fire-fighting foams, is in the pipeline.

Thanks to restrictions, the concentrations of the most commonly detected, studied and regulated PFAS - PFOA and PFOS – are gradually decreasing in the aquatic environment, whilst concentrations of more 'novel', substitute PFAS may be increasing.

While the substance-specific approach followed so far by the EU means that only very few PFAS are regulated at the source, stringent end-of-pipe thresholds were set to protect the health of water consumers. The revised EU Drinking Water Directive (DWD) includes requirements for a maximum amount of 0.5 µg/litre for PFAS total or 0.1 µg/litre for the sum of 20 PFAS in drinking water.

However, following the above-mentioned EFSA opinion, some Member States (DE, NL) are considering moving towards even stricter drinking water parametric values for the sum of the four EFSA-highlighted PFAS (PFOA, PFOS, PFNA and PFHxS). Denmark has already decided to adopt a parametric value of 0.002 µg/l.

4. Control-at-Source must be the guiding principle

Being aware of:

(1) the various exposure routes
(2) the ubiquitous presence of PFAS in the environment, soil, food and water
(3) the fact that PFAS are intrinsically persistent, and thus will continue to accumulate in the environment for the decades to come
(4) the growing knowledge of the environmental and health effects of these substances
(5) the fact that current water treatment facilities cannot filter out or destroy PFAS
(6) the fact that trying to solve the problem by adding additional drinking water treatment steps is in clear breach to Article 7.3 of the Water Framework Directive, and
(7) the fact that banned PFAS haven often been replaced by non-regulated "regrettable" alternatives with similar properties (short-chain PFAS), which are even more difficult to remove from the water cycle,

PFAS as a group must be regulated at source.

This is clearly the most sustainable and effective way to limit the exposure of consumers to PFAS and preserve our valuable water resources for now and future generations. Setting thresholds at the end of one of the exposure pathways, such as drinking water, will ensure that human exposure via this pathway is prevented. However, as long as the use of many PFAS is not regulated at source, consumers will remain exposed through other pathways. Total exposure is unlikely to remain below critical thresholds if these thresholds are set for drinking water only. Furthermore, relying on end-of-pipe treatment will mean that the Polluter Pays Principle is replaced by the Water Consumer Pays Principle.

PFAS present a serious challenge for drinking water operators. The impact assessment of the DWD (2020) does not, unfortunately, evaluate the technological solutions nor their substantial environmental impacts or associated costs that consumers will have to bear through their water bills. The EurEau Briefing Note on PFAS and Drinking Water provides an overview of available information[7].

Environmental monitoring

The protection of our water resources requires better knowledge of the scope of PFAS pollution across the EU. There is already a very stringent environmental quality standard (EQS) established for PFOS which is also a designated 'priority hazardous substance' and hence allied to the aim of eventually ceasing all emissions.

The Commission and the Joint Research Centre are currently exploring the setting of environmental standards for additional PFAS in surface water and groundwater. To ensure a standardised approach, these quality standards should be aligned with the PFAS regulated under the DWD.

In the case of exceedance, national authorities should take swift control-at-source action to eliminate point sources relating to PFAS producing or using sites, and support a far-reaching ban of all PFAS uses.

[7] EurEau Briefing Note on PFAS and Drinking Water.

5. The EU must take bold action now

Due to the large number of PFAS chemicals, a **substance-by-substance risk assessment and management approach is not the way forward** to efficiently prevent risk to the environment and human health from a single PFAS or mixtures of them. Taking **precautionary risk management actions for groups of chemicals** and promoting the use of chemicals that are 'safe-and-circular-by-design' is the only viable way to limit future pollution. **In the case of PFAS, we call for a complete ban of all PFAS uses** to protect our water resources. The key reasons are:

- The EFSA opinion of September 2020 states that PFAS are even more harmful than previously thought.
- Measurements show that large ground- and surface water resources will remain contaminated for many decades and this at a level that will require complex and expensive additional treatment to ensure the safety of drinking water. Even the smallest PFAS discharges from manufacturing sites lead to measurable concentrations in surface water bodies.
- Emissions from PFAS-containing products during their use-phase and end-of-life stage cannot be excluded and cause uncontrollable diffuse pollution.
- There are no technologies that can completely remove all PFAS from the urban water cycle. Even partial removal results in very substantial financial and environmental burdens for water operators without destroying the molecules.

With this in mind, EurEau has recently co-signed a declaration to call to end the use of PFAS chemicals.

It is encouraging to see that both the Council and the European Parliament call for a ban of PFAS, although limited to non-essential uses, while the Commission committed to proposing such a restriction under REACH in its Chemical Strategy for Sustainability[8]. We welcome the efforts of five countries (Netherlands, Denmark, Germany, Sweden and Norway) to prepare the restriction in cooperation with ECHA.

If a complete ban cannot be achieved, any exceptions should be subject to strict governance and control. Only those substances and uses of substances that are proven to be truly essential, that have certified and audited take-back schemes and that do not lead to any PFAS release to the environment, should be authorised.

If contamination of surface or underground water bodies occurs, the Polluter Pays Principle must be applied in line with TFEU article 191.2 and the recent recommendations of the European Court of Auditors[9]. This means, whenever drinking water or waste water operators need to take specific action to prevent the exposure of water consumers and the aquatic environment to PFAS, producers should cover the investment and operational costs through extended producer responsibility schemes.

[8] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2020%3A667%3AFIN (2021).
[9] https://www.eca.europa.eu/Lists/ECADocuments/SR21_12/SR_polluter_pays_principle_EN.pdf.

The text and facts are mainly based on the following sources:

https://www.eea.europa.eu/themes/human/chemicals/emerging-chemical-risks-in-europe
http://norden.diva-portal.org/smash/get/diva2:1295959/FULLTEXT01.pdf
https://norden.diva-portal.org/smash/get/diva2:1118439/FULLTEXT01.pdf
https://chemsec.org/the-netherlands-has-had-enough-wants-to-restrict-all-pfas-chemicals/

Read also:

EurEau position paper: Addressing micropollutants: a holistic approach
http://www.eureau.org/resources/position-papers/3828-the-holistic-approach-to-addressing-micropollutants-2019-update-of-source-control/file.

EurEau Briefing Note on PFAS and Drinking Water
https://www.eureau.org/resources/briefing-notes/5236-briefing-note-on-pfas-and-drinking-water/file

EurEau Briefing Note on PFAS and Waste Water
https://www.eureau.org/resources/briefing-notes/5612-briefing-note-on-pfas-and-waste-water/file

EurEau briefing note: Moving Forward on PMT and vPvM Substances
http://www.eureau.org/resources/briefing-notes/3934-briefing-note-on-moving-forward-on-pmt-and-vpvm-substances/file.

About EurEau

EurEau is the voice of Europe's water sector. We represent drinking water and waste water operators from 29 countries in Europe, from both the private and the public sectors.

Our members are 34 national associations of water services. At EurEau, we bring national water professionals together to agree European water sector positions regarding the management of water quality, resource efficiency and access to water for Europe's citizens and businesses. The EurEau secretariat is based in Brussels.

With a direct employment of around 476,000 people, the European water sector makes a significant contribution to the European economy.

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