
Svenskt Vatten

Swedish Water & Wastewater Association

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PFAS

- the poison on everyone's lips

Svenskt Vatten

Swedish Water & Wastewater Association

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Foreword

The treatment plants in Sweden work hard to treat wastewater. They work to achieve a functioning cycle of nutrients and thus a better environment. This means, among other things, great efforts to phase out toxic and harmful substances that could end up in the sewers and in the environment. We call this upstream work. In this report, we focus on the large group of environmentally harmful chemicals called PFAS.

Cleaner wastewater being sent to treatment plants is a prerequisite for a sustainable society. With cleaner wastewater, we get cleaner lakes, watercourses and seas – and better eco-cycles.

In recent decades, upstream work has intensified. It is cheapest, most efficient and best to fix the problems at the source, instead of trying to clean up where the pipes run out into treatment plants or watercourses.

The upstream work has been successful. Emissions of many harmful substances have decreased in recent decades. Examples of this include cadmium, mercury and lead.

The success is due to legislation in the EU and in Sweden, to the efforts of commerce to voluntarily remove environmentally harmful products from their ranges, to consumers' choices of environmentally friendly products and to the upstream work of the treatment plants.

At the same time, new problems are arising. In recent years, for example, Svenskt Vatten (the Swedish Water and Wastewater Association) has turned its attention to pharmaceutical residues, microplastics – and now the extremely problematic PFAS chemicals.

Over the years, the upstream work has been sharpened and improved through the certification work of Revaq. With Revaq, we have increasingly improving control of wastewater quality. The certified wastewater treatment plants work more systematically on improvements and an increasing proportion of the sludge produced in the wastewater treatment plants is of such good quality that it can be spread as plant nutrition on arable land. This is how functioning cycles are built.

But not everything is going in the right direction. Seven years ago, Svenskt Vatten published the report "Phase out Pfas!". We wrote in the 2015 report about the EU ban on PFOS, one of the thousands of PFAS variants, that has been introduced. And we were then able to state that:

"Many manufacturers of products that have previously contained PFOS have tried to find alternatives. The solution has been to use other types of PFAS. But all highly fluorinated substances have one thing in common: they are dangerous to both the environment and health.... Many products do not contain PFOS, according to the label. Instead, in many cases, they contain other highly fluorinated substances. We see this as a form of misleading marketing. Consumers are led to believe that they are buying products that are environmentally friendly. In fact, they are bringing home very environmentally hazardous products. It is very much a form of 'Green Wash'."

The main demands we made in the report "Phase Pfas!" read:

"Manufacturers must find other substances that can replace PFAS. The use of highly fluorinated substances should be completely banned. Swedish politicians should be pushing for a so-called group prohibition to be introduced within the EU."

- So why another report?

For the most part, it is impossible to know where PFAS are found. These are chemicals we can't smell, can't taste and can't see. Ordinary people can hardly pronounce the name of them.

Knowledge about PFAS has increased. We know that these substances are massively spreading all over the planet. More and more PFAS variants are emerging and the truth is that no one knows how many there are today. Commercially, there are around 4,700 different PFAS. Some argue that there may be twice as many.

When any country, or the EU, puts an end to one PFAS variant, it has quickly been replaced by another equally dangerous one. People talk about regrettable substitution.

The research tells us that these substances are dangerous to both humans and the environment and has warned that we may be dealing with the DDT and PCBs of our time.

Politicians have so far failed to limit the spread of PFAS. These chemicals are found everywhere, in living plants and animals, in watercourses and agricultural land. In our bodies. On everyone's lips.

PFAS are extremely resistant to degradation, which means that their prevalence increases and will continue to increase as long as we manufacture and use these chemicals. It's time to get a ban on PFAS. In Sweden, in the EU and globally.

PFAS need to be known. They are already physically in everyone's blood and on everyone's lips. We want to contribute to the demands for a ban being as widespread as the poison that penetrates us.

The main author of the report is Lars Jederlund, Kommunikera AB. In addition to those quoted in the text or stated under the sources, Anders Finnson, Dan Löfgren and other employees at Svenskt Vatten have also been involved in the report.

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Summary

We have been living with PFAS since the 1930s. And we have had problems with this growing group of chemicals ever since. The risks were unknown to the public for decades. Warnings of health and environmental problems began to appear at increasingly frequent intervals only in the 1970s.

The first attempts at control and restriction came around the turn of the millennium. Work against harmful chemicals has intensified since the EU adopted its new chemicals legislation in 2006, which also affected the PFAS group.

First in the United States and later Europe, consumer and environmental organisations began pushing the issue. Increasing amounts of research have been carried out and knowledge of PFAS has increased sharply in recent years, as has concerns about it. As awareness increases, many companies selling products containing PFAS have begun to look around for alternatives.

In the report, a survey of 46 Swedish retail companies shows how much has actually been done among them. Some have already single-handedly phased out PFAS; others are well on their way. Many companies are ahead of the regulatory requirements but the survey responses also show how difficult it is to know for certain whether imported products actually contain PFAS.

A small study in the report examined how easily consumers can, in practice, obtain information as to whether a product contains PFAS. In general, correct information was given within the time limit set by the legislation.

Consequently, much has been moving in the right direction. Legislation has become stricter, new laws are in the works. Certain companies have been making a great effort to stop the sale of PFAS products. Consumers are starting to wake up. Nevertheless, much remains to be done.

There is a process ongoing in the EU to introduce a group ban on all PFAS – this will cover at least 4700 different variants. This will be a new approach to addressing the problem that chemical companies, through small changes to a PFAS that has been banned (e.g. PFOS), can create a new one just as dangerous that has not been regulated. This is called false substitution. The EU remains open to continuing to allow PFAS where it is deemed “essential”. There is now growing contention in the EU concerning group bans and necessity. The chemical industry is lobbying hard.

They are “eternity chemicals” that are very hard to degrade and can be found everywhere. In everything that grows and lives. In animals and people, in flowers and bees. Most PFAS that has been spread into the nature will remain. There will have to be a cleanup in some places with high concentrations, in agricultural land or groundwater, and in areas where many people have been exposed to it. The PFAS must be collected and destroyed. This is done by combustion at a thousand degrees in heating plants or in special destruction plants. This will be expensive. A study referred to in this report shows that the future necessary PFAS cleanup may cost one billion Euros in the Nordic countries alone.

The report concludes with proposals for some measures that Swedish Water (Svensk Vatten) believes will be crucial to addressing the PFAS problem in future. Upstream work is the key, that is to say ensure that PFAS does not end up in our sewage systems, in soil and water. The only way to achieve this is to ban PFAS. International work is absolutely crucial. The EU must define PFAS as a group and introduce a group ban. A ban with very restrictive exceptions in the case of “essential use”.

The companies that sell goods containing PFAS have a great responsibility and we call on them to voluntarily restrict, in the long term cease, the sale of such goods. Swedish Water wants products with PFAS to be provided with warning signs, something like the requirements for labelling tobacco and alcohol.

Finally, the report points out that we ourselves as an organisation together with our own members must accept responsibility, just as every consumer has the opportunity to turn away from PFAS and in such a way influence the market players.

1 PFAS – everywhere, forever

PFAS are highly fluorinated substances and the abbreviation stands for *per- and poly-fluorinated alkyl substances*. They come in several thousand variants, in fact no one knows exactly how many. They hardly occur at all naturally. Virtually everything we find is man-made.

They are grease, dirt and water repellent and are used for coating or impregnation of various materials such as metal, paper, textile and leather. They create smooth surfaces and are therefore widely used in, for example, food packaging, hoses, detergents, paint and cosmetics.

PFAS are now almost everywhere. Go out and measure and you will find PFAS chemicals in soil and water and in the bodies of birds, fish and people. In wells and drinking water supplies, in arable soils and on cloudberry bogs. In the air we breathe.

Researchers on Spitsbergen have found PFAS in the blood of polar bears. Something that illustrates that the spread of these chemicals has now become truly global. The PFAS contamination has been going on for over 70 years.

It all started in a lab in the United States in the 1930s.

PFAS timeline	
1930s	Highly fluorinated substances, per- and polyfluorinated alkyl substances (PFAS), were invented.
1940s-50s	PFAS have been produced commercially since the 1940s and over the decades a number of new variants (PTFE, PFOA, PFOS, PFNA and others) have gradually been added to the world market. The company DuPont was first when in 1944 it launched nonstick cookware with Teflon®. The American company 3M was the world's largest producer of PFOS and PFOA from 1949 to the early 2000s, with manufacturing in the United States and Belgium.
1950s-60s	3M and Dupont already knew that PFAS were dangerous for both the environment and people. During the 1960s, animal experiments conducted by the companies showed that PFAS were hazardous to health, which was kept secret. Several companies began to manufacture different PFAS. Other companies to manufacture these chemicals include Miteni, Dalkin, Clariant, Asahi Glass and Atofina.
1970s	As early as 1974, PFOS was found in blood samples from people. But then people didn't know what they had found. When they later started searching for residues of PFOS in the environment, basically they found it "everywhere".
1980s	China began manufacturing PFOS at the end of the decade. Production in China rose rapidly after the American 3M company halted its production around the turn of the millennium.

PFAS timeline	
<p>2000s</p>	<p>3M, the world's largest manufacturer of PFOS, decides to voluntarily phase out "perfluorooctanyl chemistries" which included PFOS, PFHxS and PFOA, among others, but not all PFAS.</p> <p>In 2001 PFAS was measured in polar bears in Spitsbergen.</p> <p>After several alarms about health and environmental risks in scientific reports from 2001 onwards, including from the US Environment Protection Agency, 3M decided to completely phase out manufacturing during the period 2000 to 2008.</p> <p>In 2001 The Stockholm Convention on Persistent Organic Pollutants (POPS), a global agreement to protect health and the environment from hazardous and persistent chemicals, was signed. It entered into force in 2004. So far, only a few PFAS are on the list, including PFOA and PFOS. Today, 152 countries have signed. The Convention cooperates with industries, NGOs and a range of international organisations.</p> <p>In 2006 the EU Chemicals Regulation, REACH (Registration, Evaluation, Authorisation and restriction of Chemicals), was adopted.</p> <p>In 2008 an EU directive that, with some exceptions, bans PFOS and substances that can be degraded into PFOS, came into force.</p>
<p>2010s</p>	<p>The number of producers is decreasing. PFOS and various derivatives were still produced in Germany, Italy and China. The idea of a group ban was put forward by the Swedish Chemicals Agency.</p> <p>In 2012 four different PFAS were added to the Rotterdam Convention (PIC) list. This is a UN convention with a regulatory framework that is designed to try to limit the use and spread of certain hazardous chemicals. The convention has a list of chemicals that are subject to the requirement for prior information and prior examination and the right of importing countries to control imports or stop them.</p> <p>In 2013 the Swedish Chemicals Agency was commissioned by the Swedish government to develop proposals on how the EU's chemicals legislation REACH could be developed.</p> <p>In 2015 The Madrid Statement was published, a petition signed by 200 scientists from around the world demanding that governments worldwide must legislate against all PFAS.</p> <p>In the same year, Svenskt Vatten published the acclaimed report "Phase out Pfas!" – a report on highly fluorinated substances in consumer products. The organisation demanded in a statement on Swedish television that the government should work to ensure that PFAS are banned at group level within the EU.</p> <p>In 2016 a PFAS substance, PFDA (perfluorodecanoic acid) with its sodium and ammonium salts, was classified by the EU as a particularly hazardous substance and presented on the candidate list at the suggestion of Sweden.</p> <p>In January, Swedish parliamentarian Kristina Yngwe (Centre Party) asked the Minister for the Environment a question in the Riksdag about being able to ban substances in a group within REACH in the EU. In the government declaration, the Prime Minister said that phasing out hazardous chemicals was important and that "when the EU's regulatory framework is not enough, Sweden takes the lead". In that year, the Swedish Chemicals Agency submitted a strategy to limit the use of PFAS to the government.</p> <p>In 2017 China was probably the only country in the world still manufacturing PFOS, which is now banned in most parts of the world. An endless variety of other PFAS variants, on the other hand, are still manufactured in many countries such as China, India, Russia and Brazil. Production also occurs in the USA and Europe.</p> <p>In 2019 the Nordic Council wrote in a report that nearly 20 companies in the EU manufacture PFAS. These companies were located in Belgium, the Czech Republic, France, Germany, Italy, the Netherlands, Poland and the United Kingdom.</p>

PFAS timeline

2020s

The Nordic Council of Ministers published a report on how people and the environment are exposed to PFAS, as well as what this exposure can cost society. It is established that PFAS cause negative effects to the environment and health – an exposure that results in large, and difficult to assess, costs for society.

For the Nordic countries, the annual economic health costs resulting from the use of PFAS are estimated at EUR 2.8–4.6 billion per year. As regards the environment, the total costs of environmental screening, monitoring when pollutants are detected, water purification, soil remediation and health assessments are estimated to amount to EUR 1 billion for the Nordic countries. But the costs are difficult to assess "because of the limited information available", and they could amount to as much as EUR 11 billion.

Overall, the necessary efforts for environmental studies for Sweden alone are estimated to amount to over SEK 4 billion.

In 2020 the Swedish Chemicals Agency and authorities in three other EU countries as well as Norway initiated work to ban PFAS chemicals in the EU, for all uses that are not essential for society.

In 2020 the European Commission presented its new progressive chemicals strategy and a ban within the EU on the substance PFOA and the PFAS that can be degraded into PFOA came into force.

In 2021 the Swedish Chemicals Agency wrote on its website about PFAS: "This is a large and complex group of more than 4,700 identified substances... Common to all PFAS is that they are very difficult to break down and some PFAS can have harmful effects, for both people and the environment."

At the same time, others report that the number of PFAS is out of control. Some say there could be up to 9,000 different PFAS. One thing is certain – no one knows exactly how many variants there are today. Nor what the spread looks like and how big it is.

The Swedish Chemicals Agency describes how difficult it is to keep track of PFAS in society. It writes in a report (2019) that there is "a large number of unrecorded PFAS because the targeted analyses have only been able to identify a few substances... There is a clear need to develop targeted analysis methods for individual PFAS. We believe this is a prerequisite for supervisory authorities to be able to conduct effective supervision and for companies to be able to work proactively to phase out PFAS."

In July 2021 the Swedish Chemicals Agency, together with four other European authorities, submitted a letter of intent to the European Chemicals Agency ECHA to ban PFAS chemicals in the EU. This applies to all uses that are not essential for society. The European Commission has explicitly stated that it wants to get rid of PFAS in uses that are not essential for society. If the ban passes, it is expected to take effect in 2025.

In August 2021 the EU decided to ban around 200 PFAS as of February 2023. The decision comes after work initiated by Germany and Sweden back in 2017. The substances covered by the EU Decision are: perfluorononanoic acid (PFNA), perfluorodecanoic acid (PFDA), perfluorodecanoic acid (PFUnDA), perfluorododecanoic acid (PFDoDA), perfluorotridecanoic acid (PFTrDA) and perfluorotetra decanoic acid (PFTeDA). The restriction also covers other PFAS that can be broken down into any of these six, which means that the restriction applies in total to around 200 highly fluorinated substances.

This was the first time that the EU has introduced a ban on several chemicals of a similar structure at the same time, which may be the beginning of more and more extensive group bans.

2 Why worry about PFAS?

Sometimes PFAS are described as “forever chemicals”. This a good term that refers to their extreme stability. Some PFAS do not break down at all while others break down extremely slowly. No studies have been able to show that there is complete degradation in the environment, which means that PFAS remain in some form forever.

PFAS are very persistent highly fluorinated substances. They are mobile and easily dispersed by water. Such substances are sometimes referred to in chemistry or technical language as PMT, which stands for "*persistent, mobile and toxic*". That means that they are defined as non-degradable, bioaccumulative and toxic.

Toxic is a tough word. In Swedish, the word is "giftig" and it is easy to shy away from using such a harsh word. But when it comes to PFAS, it is entirely relevant. PFAS are a group of toxic substances: we already know that many are toxic, for others we lack information. But we know that they all spread and build up gradually in the environment – that is warning signal enough.

They move around easily. They are spread in water, soil and air. They can be measured in everything that lives. All over the world.

We know that these substances lead to increased incidence of, among other things, testicular cancer and kidney cancer, as well as to poorer fertility and hormonal disruptions.

The threat is long-lasting. Even if we manage to put an end to PFAS in the EU within a few years, they will continue to spread globally. PFAS are transported worldwide, and emissions from production and products containing PFAS will continue. Imported PFAS products will continue to be sold everywhere in Europe for a long time to come. Many landfills contain PFAS that leach into water and can spread into the air with incineration. The journal Elsevier/Chemosphere, published an interesting scientific article (2020) on PFAS problems in waste management and incineration. The study describes the problems as major over time. PFAS leak into a perpetual cycle from landfills and from filling materials. Wastewater and leachate carry PFAS and lead to increased concentrations in soil and water over time, while the incineration of waste containing PFAS leads to the toxin being spread in the air.

This continued PFAS contamination will lead to scattered, prolonged and irreversible contamination. Which means that the likelihood of serious effects on human health and negative impacts on water, soil and food chains will gradually increase.

PFAS are not natural substances, the majority have been created in chemistry labs by humans. They come in thousands of variants and are used daily in billions of products manufactured, sold and used everywhere on Earth. In each individual product, the amounts involved are very small, but overall the spread becomes extensive, global and environmentally damaging.

We have known for decades that PFAS are dangerous. The producers of PFAS saw warning signs as early as the 1950s. In the 70s, the substances were detected in the blood of the general public, in the 1980s there was a link between occupational exposure and cancer and in the late 1990s there was information about global spread and serious health risks. Despite this, production has continued.

An EU ban on the use of firefighting foam containing PFOS, one of the PFAS most documented as harmful, came as recently as 2011.

The EU Council of Ministers has, in a very clear paper from 2019, put its foot down. The council writes that the growing evidence of serious consequences of PFAS, of their wide spread in water, soil products and waste and the threat this poses to our drinking water require action. In light of this, it turned to the European Commission and asked it to develop an action plan to "*eliminate any use of PFAS that is not considered absolutely essential*".

The European Parliament latched on and called for a "*very speedy phase-out of all non-essential use of PFAS*".

What are the feared risks?

A wide range of research reports has been published over many decades. Despite the fact that the accumulated knowledge today is quite extensive, mainly in terms of health risks, it is still obvious that the state of knowledge is not fully adequate. What makes it all difficult to assess is that PFAS are so extremely resistant to degradation. We know that PFAS levels in soil, water, animals, plants and people will increase over many years. So while safety has increased in the overall studies, uncertainty has increased about what this can lead to in the end.

Briefly, we can point out the following main risks of PFAS in our bodies and in our environment:

Human health

More and more research suggests that PFAS cause testicular and kidney cancer, damage to the liver, an impaired immune system and hormonal disorders in humans. Studies also show poorer fertility.

For the majority of PFAS, there is a lack of knowledge about their impact on health. No one has been able to investigate all the thousands of different PFAS variants. The precautionary principle means that this group of chemicals should be considered as harmful to health.

In studies on animals, it is common to see effects on the liver, blood lipids, thyroid hormone, immune system, reproduction and cholesterol levels. Karolinska Institutet writes that "*liver, fat metabolism, thyroid hormones and the immune system are affected by exposure to PFAS*".

Furthermore, "*studies of population groups with exposure to, in particular, PFOS and PFOA via contaminated environments have shown associations between elevated serum levels of PFAS and increased cholesterol, fatty acid and uric acid levels in the blood in humans. Other population studies have shown an association between PFAS levels in the blood of mothers and decreased birth weight or an impaired immune system in the baby.*"

The International Agency for Research on Cancer (IARC) believes that certain PFAS can increase the risk of several different tumour diseases.

The environment

All PFAS are extremely resistant to degradation and remain in the environment. The quantity of PFAS in the environment will therefore increase over time. PFAS are spread throughout the world via air and water, via migratory birds and merchant shipping. PFAS accumulate in living organisms and are enriched upwards in the food chains.

Since PFAS are found in such small quantities in products we buy and use, it is very rarely stated on ingredients lists and product declarations whether a product contains PFAS or not. Emissions to our environment thus come mainly from countless diffuse sources. Firefighting foam that has already been spread at fire drill sites and is now leaking into the environment is, according to the Swedish Environmental Protection Agency, the largest direct point source of PFAS in the environment today.

But in laboratories, we can examine goods and see what chemicals they contain. A long series of such studies have been done around the world over the past 20 years.

The Nordic Council of Ministers' study "PFAS in the Nordic environment" analysed 102 samples from seabird eggs, fish, marine mammals, terrestrial mammals, surface water, wastewater, sludge, water and air. Samples were collected in 2017 in Denmark, the Faroe Islands, Finland, Greenland, Iceland, Norway and Sweden. And the conclusion was, just a little simplified: there were PFAS in all samples, everywhere!

Anyone who has followed the discussion only in recent years has been able to read about elevated levels of PFAS being measured in several locations around Sweden. The

Swedish Armed Forces have contaminated drinking water with PFAS in Botkyrka, Båstad, Halmstad, Uppsala, Ängelholm, Östersund and Ronneby. From civil airports such as Landvetter and Arlanda, PFAS have leaked into lakes and streams in large quantities.

In 2021, two high-profile judgments were made in PFAS cases. Both were ultimately about the Armed Forces' environmental degradation. Both judgments have been appealed.

High levels of PFAS in residents of Kallinge and Ronneby

It was in 2016 that 165 members of a local association for victims in the municipality filed a lawsuit for damages. They considered that the company Ronneby Miljö och Teknik, by releasing drinking water with high levels of PFAS, has caused personal injury to its members.

The water company admitted that the drinking water contained high levels of PFAS and that this caused the high levels of PFAS in the bodies of the complainants. On the other hand, the company did not consider that it is liable to pay compensation.

The PFAS contamination came originally from the Swedish Armed Forces' operations in Kallinge. But here, the liability of the original polluter was not tested.

Ronneby Miljö och Teknik was sentenced by Blekinge District Court in March 2021 to pay damages to the 165 people who sued the company. The company must also pay these persons for their legal costs. However, there is no need to pay compensation for the worry and anxiety of those affected.

“The ruling has major implications for the water and wastewater industry. The fact that a municipal company is considered liable for supplying unfit drinking water caused by another party, in this case the Armed Forces, is problematic. This will probably lead to increased claims for damages and additional work for the water and wastewater industry, but also that water and wastewater tariffs will need to be increased to meet the requirements,” says Aurora Svallbring, environmental lawyer at Svenskt Vatten.

The amount of damages to be paid was not decided at the trial.

In April 2021, Ronneby Miljö och Teknik AB decided to appeal the district court's ruling. According to the ruling in the district court, the high levels themselves, and the increased risk of future health effects they bring, represent a personal injury. The water company now wants the case to be heard in a higher court.

High PFAS levels in the groundwater in Uppsala

In Uppsala, it was not the water company that sat on the accused's bench but the polluter, i.e. the Swedish Armed Forces.

It was in 2012 that the municipal water company Uppsala Vatten discovered elevated PFAS levels in the city's groundwater. Through a series of samplings, it was considered to be clear that it was the Armed Forces' activities at Ärna Airport that had caused the PFAS contamination in the groundwater reservoir in the Uppsala hills and in the source of water supply Stadsträdgården.

Uppsala Vatten therefore demanded in court damages from the Swedish Armed Forces that would cover the large costs of purification that Uppsala Vatten has had and will continue to have due to the contamination. They sued the Armed Forces for SEK 252 million.

The ruling that was given in the Land and Environment Court in October 2021 was that the Armed Forces could not be considered guilty. Uppsala Vatten thus lost the case and was ordered to pay SEK eight million in legal costs to the Swedish Armed Forces.

The Swedish Armed Forces claim that it is not possible to prove that the toxic chemicals come from their activities, but blame others.

The court writes that there is "*compensatable environmental damage in the form of PFAS contamination*", but that there is no support for the fact that the contamination, other than to a very small degree, comes from Ärna airfield.

Uppsala Vatten appealed the judgment in November 2021. In the appeal, the ruling is harshly criticised. Reference is made to the knowledge from many other places of how the Swedish Armed Forces contaminated drinking water with PFAS, for example in Botkyrka, Båstad, Halmstad, Ängelholm, Östersund and Ronneby. Uppsala Vatten rejects the conclusion that it is not the Swedish Armed Forces that contaminated the drinking water. They argue that the court "*failed to consider or even account for a large number of facts put forward by Uppsala Vatten in the case and which were substantiated by extensive evidence*". They write that the Armed Forces have not been able - or willing - to indicate how much firefighting foam they spread over the years at Ärna. Uppsala Vatten has attempted to calculate this itself. In addition, the Swedish Armed Forces have also not allowed Uppsala Vatten to make its own measurements from the groundwater inside Ärna.

It is not acceptable for water and wastewater principals to be forced to pay for society's inability to handle pollution. If the verdict in Uppsala stands, it will lead to the legal costs ending up with the water and wastewater collective, those who pay for municipal water and wastewater in Uppsala. And not only that, the very high costs of remediation of a polluter's toxins will burden water and wastewater subscribers and perhaps taxpayers for years.

That Uppsala residents today - and others around the country in the future - should be forced to pay to clean up after someone else's pollution of our common groundwater is not reasonable.

Uppsala Vatten's CEO Sigrid de Geyter commented on the verdict in a press release on 28 October 2021:

"Neither the legal nor the technical evaluation in the judgment is convincing. The principle that those who pollute should also pay for their pollution is an issue that is an important principle for the entire water and wastewater industry, so we feel a responsibility to take this matter further."

It is thus, among other things, the polluter pays principle (PPP) that they wanted to see tested.

Now it looks to be the other way around, it is the polluted who are forced to pay. That is hardly the legislator's intention.

The polluter pays

It is an accepted principle in environmental work that the polluter pays. It is one of the most important cornerstones of environmental law.

This principle, commonly referred to as the polluter pays principle (PPP), is central to the Swedish Environmental Code and is included among the general regulations in its chapter 2.

The principle is also among the 27 principles adopted in the Rio Declaration on Environment and Development at a UN conference in 1992. The principle is strongly supported in EU environmental policy and also in most OECD countries.

The concept that the polluter pays is also enshrined in the Treaty on the Functioning of the European Union Article 191(2): "*Union policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the Union. It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay.*"

The principle means that the one who causes damage to the environment must pay the costs that arise. Often the PPP comes up in connection with various environment-related accidents or other more long-term or diffuse pollution of soil or water. For example, the PPP has been highlighted in discussions about who is responsible for pharmaceutical residues in wastewater. Is it the manufacturers of the pharmaceutical substances, often a company in India or China, or the pharmaceutical companies that market the pills themselves, those that approve their use, or even those that dispense/sell the pharmaceuticals?

Another relevant comparison is with the release of microplastics into stormwater and wastewater. The Swedish Environmental Protection Agency wrote in a report (2017) that the unclear regulation and

division of responsibilities that currently prevails in terms of responsibility for this type of pollution makes it more difficult to reduce the spread of microplastics and other pollutants via stormwater. The agency writes:

"If the sources of the proliferation of microplastics are identified and action is focused on measures close to the source, the overall need to purify stormwater can be limited to the water where the concentrations and needs are greatest... The total need for purification can then be reduced while a reduced proliferation can be achieved... In order to achieve the necessary but also effective and reasonable measures to reduce the spread of microplastics and other pollutants via stormwater, it is important that the responsibility is clear and follows the readiness to be able to take action. The polluter pays principle is central here. The unclear regulation and division of responsibilities make it more difficult to achieve this."

Producer responsibility is also a form of using the PPP, in that the producer is responsible for certain products when they become waste (collection of paper, plastics, metals, batteries). Here, the responsibility, and thus the requirement to be involved and pay, rests with the entire chain from manufacturer of, for example, a battery through importers and distributors to the retail sector.

The EU directive talks about whether the polluter must pay for environmental damage caused by various types of activities such as metal production and processing, chemical industry, waste management, paper and board manufacturing, textile dyeing and food production.

The principle could be applied when it comes to accountability for the spread of PFAS in society. But a key question will be how to define who it is that "releases" PFAS on the market, or in nature. Who is the polluter who must pay? Is it the company that makes a cutting board, a car wax or a pizza box? That is, often a foreign industrial enterprise. Or is it the importer, the one who takes the goods to Sweden, or is it the shop, the retailer who sells the goods to the final consumers?

The Armed Forces' use of firefighting foam illustrates the problem. Is it the one who manufactures the foam who is the polluter, the one who sells it, or the Armed Forces who spray it into nature?

The concept that the polluter pays has therefore been developed in recent years and clarified as extended producer responsibility (EPR). Then it is clear that it is the producer of a pharmaceutical or PFAS who will bear all possible purification and cleaning-up costs.

Responsibility must be placed somewhere, both to be able to demand compliance with legislation and restrictions as well as to be able to charge for what is required to remove PFAS from the environment, not least from groundwater and drinking water.

The reasonable and most successful thing must be, in addition to the ultimate goal of globally banning the entire product group PFAS, to consider the person who puts the product on the market to the final consumer as the one who is to be considered to be the polluter.

Anyone who introduces different goods bears a responsibility for what happens to them. Producer responsibility covers, for example, all imported batteries or plastic packaging sold on the Swedish market.

It is on these companies that states can place responsibility that they follow the rules that exist regarding chemicals in the products, in terms of labelling the products and in terms of marketing. In addition, individual countries can tax these companies or otherwise force them to pay for the PFAS pollution they produce.

3 The shops and gadgets

Products with PFAS can be found in every home. In all garages and storage rooms, in bathrooms and kitchens. They can be found in shops and restaurants, in kindergartens and hospitals, in schools and in gyms.

PFAS are basically everywhere. But with one exception. They are usually notable by their absence from the lists of contents of the products we buy.

The list of product groups that may contain PFAS is very long. The list below, which is not comprehensive, gives an indication of how widespread PFAS-treated products may be in society:

PFAS-treated products on general sale are found in the following product groups, among others:

- Work clothes
- Baking tins
- Baking paper
- Coating material
- Car wax
- Car wash products
- Tablecloths
- Firefighting foam
- Car liner
- Countertops
- Bicycle care products
- Shower curtains
- Disposable mugs/glasses
- Electrical cables
- Outdoor clothing
- Printer ink
- Photo material
- Paint
- Window cleaner
- Floor polish
- Pot holders
- Gloves
- Home electronics
- Skin cream
- Insecticide
- Impregnating agents for shoes and textiles
- Cardboard
- Envelopes
- Cookware
- Play mats
- Play equipment
- Toys
- Food packaging
- Masking paper
- Carpets
- Mobile phones
- Face masks

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- Furniture
 - Gaskets
 - Cardboard plates
 - Umbrellas
 - Pizza boxes
 - Popcorn bags
 - Bags
 - Rain covers
 - Cleansing creams
 - Backpacks
 - Sails
 - Shampoo
 - Ski wax
 - Shoes
 - Cutting boards
 - Makeup
 - Sandwich paper
 - Lubricant
 - Beauty products
 - Hoses
 - Rinse aids
 - Solar cells
 - Sunscreen
 - Frying pans
 - Dental filler
 - Dental floss
 - Textiles
 - Tumble driers
 - Tents
 - Oven plates
 - Hi-vis garments
 - Windscreen wipers
 - Handbags
 - Surface treatment materials

The list says it all – PFAS are everywhere. But the total quantities circulating in society are almost impossible to measure. We know they're increasing. We also know that a lot comes via imported goods. We know that some PFAS are still manufactured within the EU's borders.

A report by ECHA, the European Chemicals Agency (June 2021) describes the quantities of a single PFAS dispersed within the EU. The report is about "PFHxA, its salts and related substances".

ECHA writes that most PFHxA and its related salts and substances are used to make fluoropolymers, chemicals used in industry and in the manufacture of a wide variety of products. It is estimated that around 51,000 tonnes of fluoropolymers are used in Europe each year. More than 75% of these are found in common consumer goods such as paper, textiles and leather.

ECHA estimates that imports of clothing into the EU amount to 17 million tonnes each year and 75% of all clothing is imported. In clothing alone, it is estimated that 65,000 tons of PFHxA related substances are found in the EU. ECHA estimates that 64% of all PFHxA placed on the European market each year comes from paper and cardboard of various kinds, 26% comes from imported clothing and about 6% from clothing made in the EU.

The report cited here is one of many. As an illustrative example. The quantities are of course only about a limited group of PFAS, in one study. There are thousands more.

No PFAS are manufactured in Sweden. However, different types of products containing PFAS are also manufactured here. For example, there are companies that manufacture or apply so-called "non stick coating" containing PFAS. Two of these companies are Aalberts Process Technologies AB in Löddeköpinge (formerly Impreglon AB), and Bakers Coating in Lessebo. Bakers AB describes itself as *"the Nordic region's leading supplier of equipment for bakeries. A strategically important product group is treated moulds and baking sheets."*

At least one company, Dafo Fomtec in Helsingborg, manufactures fire extinguishing equipment with PFAS, foam with designations such as AFFF and FFFP. Historically, AFFF and FFFP have contained common PFAS such as PFOS, PFHxS and PFOA. Modern firefighting foams in most cases contain more advanced molecules, where careful analysis is required to show which PFAS are involved. The Swedish Chemicals Agency and the Swedish Civil Contingencies Agency (MSB) have conducted several such studies.

Svenskt Vatten has twice asked the company if their firefighting foam contains PFAS, but has not received a response.

A side note in this context: Dafo Fomtec says on its website that it supports the Swedish Childhood Cancer Foundation and has a link to the organisation's website. The company writes:

"By supporting the research, we can help saving lives and create better treatments. Also it can give the affected children and their families a better quality of life".

It may seem somewhat distasteful that a company that sells products that have a high risk of including carcinogenic PFAS chemicals sponsors an organisation that fights cancer.

4 The merchants

What companies sell all these PFAS gadgets? Most consumer products sold on the Swedish market are manufactured abroad, many within the EU, many others in countries outside the EU, mainly in China and other parts of Asia. How production is carried out there and what controls of chemicals there are is often difficult to keep track of, even for many serious importers and retailers.

We know within which product groups PFAS usually occur. The long list of goods above shows that these are very large product groups that are sold in very large quantities. Products that we buy for the home, for leisure activities, for home offices, for children.

We turned to Statistics Sweden for some statistics. What does sales turnover look like in some specialist shops? How much is sold each year, and what do the sales trends look like?

Sales (SEK million) in Sweden in some types of "specialist retailers" that sell products that often contain PFAS:

Shop	sales 2010	sales 2020
Home textile shops	3,714	5,317
Home interior shops, furnishings/household utensils	4,883	9,453
Sports shops	15,290	17,889
Perfume shops, makeup	2,367	5,216

The increase in sales in ten years is quite large. Home textile shops' sales rose by 43%, that of home interior shops by 94%, that of sports shops by 17%, while the turnover of perfume and makeup shops more than doubled with an increase of 120%.

These numbers, of course, say nothing specific about how much PFAS is put on the market from these stores. But it is reasonable to assume that this means that more and more products containing PFAS are sold in these sectors. More and more PFAS are spreading in society as the consumption of certain goods increases. The problem is, as previously stated, that even though each mitten, cutting board or skin cream contains very small amounts of PFAS, the total spread is extensive. Of a "forever chemical" that never breaks down but accumulates in greater and greater quantities in soil and water.

In practice, it is impossible for the consumer to know which goods contain PFAS, which is an argument that the trade has a responsibility here. In the market there are thousands of different shops and online retailers, but there are some that are larger than others. Some are very dominant in their sectors. An extra great responsibility lies with these retail giants.

Survey of companies

On 15 November 2021, we sent out a survey to 46 companies (list in the list of sources) asking them to answer the following questions:

1. Are you currently selling any products that contain PFAS?
2. A few PFAS are regulated in the European Chemicals Regulation REACH. Nine of them are on the "candidate list" of Substances of Very High Concern. Are there products in your range that contain PFAS that are on the candidate list? If so, which products?
3. Do you raise the issue of PFAS in your sustainability plans, your sustainability work or equivalent? If so, how? (feel free to attach a link or document).
4. Do you have plans to remove products containing PFAS from your range in the near future (before legislation could be in place in a few years)?

The companies were asked to answer the questions by 7 December. On 26 November, a reminder was sent to those companies that had not responded. In total, we received 29 responses, giving a response rate of 63%.

In the table below, we present the answers¹:

Company	Answer question 1	Answer question 2	Answer question 3	Answer question 4
Kappahl	<p>Kappahl has had a ban for many years and hasn't really had any major problems with PFAS. All products with WR treatment are tested by an external lab and on a couple of occasions we have found this. This has been contamination from machines. On those occasions, we have not approved those orders. So we are as PFAS-free as one can reasonably be.</p> <p>Hope this was an answer to your question and thank you for doing important work!</p>			
Clas Ohlson	<p>Yes, we have some kitchen products that contain PTFE. We endeavour to find alternatives, but the challenge is that in some cases there are no alternatives and in others it is difficult to get consumers to choose the alternative products.</p>	<p>No, we do not have products containing PFAS that are on the REACH candidate list.</p>	<p>Yes, we restrict the use of certain PFAS in our requirements documents. For example, we do not accept PFAS in textile materials where water resistance is desired. We will also tighten the requirements further in the next update of our requirements documents.</p>	<p>Yes, we have recently started a project where the purpose/goal is to remove all PFAS (PTFE) in kitchen products. A broader mapping and plan will also be carried out in 2022.</p>
H&M	No.	No.	Yes, see attached page 45.	We have already phased out PFAS.
Rusta	<p>Yes we do. We have, for example, some textile products with water-repellent ability, we also have some non-stick frying pans and other kitchen equipment with coatings that probably contain PFAS.</p>	<p>No, we do not have a product that contains any of these substances in the range at the moment. If/when we have it, we usually inform the customer by posting information about it on our website (where the product is also displayed). The customer can of course also ask in our shops and thus get information.</p>	<p>Yes, we include phasing out PFAS in our sustainability plans. Among other things, we mention this in our Sustainability Report, which you can find here.</p> <p>There we write, among other things, that we have joined Chemsec's commitment "No to PFAS". You can also read about it here.</p> <p>In the sustainability report, you can also read that we aim to phase out PFAS in all textiles by 2023. We have also started to develop alternatives for other product types such as non-stick frying pans. There we have not yet set a defined target for phasing out, as we have not come as far in this area.</p>	<p>See previous question. But absolutely, we aim to phase out PFAS in all product groups before legislation is in place.</p>

¹ The answers from Jysk, The Body Shop, Lumene and Eurosko were translated into Swedish in the Swedish version of this document.

Company	Answer question 1	Answer question 2	Answer question 3	Answer question 4
Lindex	Two cosmetic products from L'Oréal contain PERFLUOROOCTYL TRIETHOXYSILANE. Part of the raw material, colouring pigments are coated with the substance. Three shades of BBC'est Magic 3 shades and one shade of C'est magic.	No products contain PFAS that are on the Candidate List.	Yes. All Lindex outerwear with water-repellent impregnation is impregnated with Bionic Finish ECO. The impregnation is completely free of fluorine compounds and perfluorinated substances. Lindex has completely banned all forms of perfluorinated chemicals in our products. Lindex has also signed Chemsec's initiative PFAS Movement which is aimed from companies to legislators calling for stricter regulation of PFAS chemicals. Our commitment includes a serious pledge to end all non-essential use of PFAS in products and supply chains and work towards phasing out PFAS in all types of consumer products. A decision not to allow PFAS substances in cosmetic products was taken in early 2020 and we have been working with our suppliers to replace with products that do not contain these substances. During the pandemic, our phasing out of the substances that Lindex has chosen not to allow has unfortunately been slowed, due to prevailing global circumstances. The phasing out with replacement substances and products is a process that is now going at full speed again and our goal is to have phased out these substances by the summer of 2022. Lindex does not accept new products that are formulated with PFAS.	Yes, a decision not to allow PFAS in cosmetic products was taken in early 2020 and our goal is to phase out these substances by the summer of 2022.

Company	Answer question 1	Answer question 2	Answer question 3	Answer question 4
Jysk	<p>At JYSK, we follow the law, and we also have a strong focus on ensuring that our products are safe, and we are constantly working to reduce our environmental footprint. With regard to harmful chemicals, we have several initiatives.</p> <p>For several years, we have had a voluntary ban on all SVHCs on ECHA's candidate list. In addition, the vast majority of our textile products are certified according to STANDARD 100 by OEKO-TEX®, which also regulates some PFAS. We have a ban on the use of nano-particles in our products, and we also have a ban on new products with PVC from 1 January 2022. We have opted out of almost all products that require CLP labelling and have a very restrictive approach to biocides.</p> <p>Our range contains no or very few items where the use of PFAS would be relevant. We are attentive to the proposal from Germany, the Netherlands, Sweden, Norway and Denmark for a ban on a large quantity of PFAS. JYSK will consider an immediate ban if the proposed legislation passes. Based on the attention created, we will review our range again and assess whether we may have products with PFAS that can be phased out or changed to safer products.</p> <p>JYSK welcomes all bans on hazardous chemicals in products. Restrictions should always come from the EU, because the supply chain reacts with more force than if it came from a single company.</p>			
	In JYSK's range, there are only a few products where the use of PFAS is relevant. We currently have no knowledge that any products may contain PFAS.	As stated, we have a ban on all SVHCs on the candidate list in concentrations above 0.1%.	We have not specifically mentioned PFAS in our environmental and sustainability plans. But as hazardous substances, they are of course part of our consideration of general restrictions.	As mentioned, an immediate ban may come into question if the EU adopts the proposed legislation from Germany, the Netherlands, Sweden, Norway and Denmark.
Björn Axén	<p>We are members of Chem Sec and have never used PFAS in our products and will not.</p> <p>We work with Apoteket AB's hard list of approved ingredients and that is our lowest level.</p>			
NK	<p>As property owners, we actually place some basic demands on our tenants in the so-called NK standard. (see attached file) under Chapter 2, Cosmetics 3,3</p> <p>If PFAS is included in the candidate list or under other requirements, I unfortunately cannot accurately answer, as these are lists that are constantly updated.</p>			
Arla	<p>The dairy industry banned the spread of sewage sludge* on Swedish dairy farms as early as 1997. According to the dairy companies industry policy, sewage sludge should also not be spread on land where pasturage, grass, other coarse fodder or root vegetables are grown for feeding to cattle for milk production. In the first instance, sludge bans also apply to other domestic feed materials that are purchased.</p> <p>* Also includes sewage sludge from Revaq certified plant.</p> <p>The dairy industry regularly analyses the presence of contaminants in milk such as cadmium and other metals, pesticides, dioxins, PCBs and several other environmental toxins to ensure that the levels of undesirable substances in milk remain well below the legal limit values. The work is industry-wide and milk from north to south is collected from the largest dairy companies in Sweden. LRF Dairy Sweden has analysed for the presence of 22 PFAS in milk and found nothing. In its food basket survey, the Swedish Food Agency has concluded that the risk of ingesting PFAS via milk and dairy products is very small.</p> <p>Since we in the dairy industry act industry-wide on this, and many other issues, I refer further questions about our industry policy to LRF Dairy Sweden.</p>			
Apoteket	<p>PFAS are on our radar and we are in the process of looking at what exposure we might have (this is a complex area). In our latest company-wide sustainability forum, we specifically addressed PFAS, however we have yet to have a specific plan for this. We have started by stating that we first need to understand exposure, as we said, and we know that there may be products that we need to investigate (dental floss is one such example).</p>			

Company	Answer question 1	Answer question 2	Answer question 3	Answer question 4
Kicks	<p>At Kicks we sell both our own and external brands. In 2018, we put PFAS substances on our restriction list for substances we ban in products we develop under our own brands. Since 2018, products we have developed under our own brands do not contain any PFAS.</p> <p>For our external brands, we encourage our suppliers to avoid using PFAS in our sustainability instructions and we have a dialogue with them about the PFAS issue.</p>	<p>No products under our own brands contain any of the nine PFAS included in ECHA's candidate list.</p> <p>We require that all suppliers of external brands comply with REACH legislation and that they keep up to date with ECHA's candidate list. At the moment, unfortunately, we have no practical opportunity to follow up on the content of all external products we sell. We do spot checks and are working on developing a method to be able to monitor the content of all our external brands.</p>	<p>We address the issue of PFAS in our sustainability instructions to our external suppliers as well as in our list of restrictions on substances that we prohibit in the manufacture of our products that we have developed for our own brands.</p>	<p>Our goal is not to sell any products containing PFAS. When we have a clear method for monitoring the content of all our external products/brands, we will be able to more easily ensure that the products we sell do not contain problematic ingredients such as PFAS. KICKS welcomes a broad phase-out of PFAS as a group. Our next step is a survey to get a picture of how widespread the use is in products from external brands, and then make a decision on whether KICKS excludes products containing PFAS from the range. Our view is that PFAS are not used to any great extent in skin and hair care but mainly in make up, according to the Swedish Chemicals Agency's PM 9-21, PFAS in Cosmetics.</p>
Kronans Apotek	<p>Our intention is not to sell products with PFAS. Please see link below.</p>	<p>See response above.</p>	<p>Please see link.</p>	<p>Again refer to the link where we describe how we work.</p>
Cervera	<p>We sell nonstick products with PTFE coating, so yes. Our ambition is to phase these out before any PFAS regulation comes into force in 2025. In our own internal range, we have been phasing out and will be PFAS-free next year. For external brands, we actively try to limit the supply.</p>	<p>No, not that we know of. Most of these substances apply to textile and leather not really to nonstick.</p>	<p>Yes – please read under our sustainability pages about our PFAS work and our sustainability report. Found under Sustainability.</p> <p>We initiated an industry dialogue together with RISE to phase out PFAS in the kitchen industry.</p>	<p>Yes, we are actively working to find other options and to train our partners. Here we do some point efforts, some not official yet but I would dare say that we probably do more than most in our industry.</p>
Mio	<p>A small part of the range of household utensils consists of products with so-called non-stick functionality.</p>	<p>Mio has banned the REACH and POP restricted highly fluorinated substances from Mio's products.</p>	<p>No.</p>	<p>No.</p>

Company	Answer question 1	Answer question 2	Answer question 3	Answer question 4
Intersport	We are actively working to phase out harmful chemicals, and we have had no PFAS in our own textile production for several years. When it comes to brands, we do not buy new products that contain PFAS.	No.	Intersport has signed on to the environmental organisation Chemsec's initiative PFAS movement, a project that wants to emphasise and educate about the harmful impact of PFAS and fight to phase out PFAS from products and supply chains. In doing so, we support the banning of PFAS as a group and we are in favour of stricter regulation of PFAS chemicals and would like to urge the chemicals industry to develop safer alternatives. [Link]	We have made an active choice to phase out the products we have that contain PFAS.
Natur-kompaniet	Yes.	I'm unsure of the list you're referring to, could guess that what is called C6 is on the list. C6 is found in our range of shell jackets that are adapted for users who require high performance during long continuous use.	Yes, in our purchasing and range strategy, we have been working for a long time to completely phase out PFAS.	Yes, we will continue to phase out products with PFAS in favour of products that are free of PFAS.
Granit	<p>[ANSWER 1]</p> <p>At Granit, we try to do everything possible to avoid hazardous substances in our products.</p> <p>I called Anders Finnson, whom you referred to in the letter, to find out a little more about your investigation.</p> <p>Our ambition is to develop as sustainable and safe products as possible. In order to become a Granit supplier, all laws and regulations must be followed. Following RoHS and REACH, candidate list is a requirement we place on our suppliers.</p> <p>In Europe, we work directly with supplier contacts ourselves. In Asia, we enlist the help of partners in the form of purchasing offices which are in close contact with our suppliers and manufacturers to ensure and check compliance with all regulations and agreements. All our suppliers are under the control of independent organisations such as SEDEX and BSCI.</p> <p>All our textiles have GOTS and OEKO TEX certification.</p> <p>Wood only with FSC certificate.</p> <p>For recycled teak we work with FLEGT licenses from Indonesia.</p> <p>We have lighting approved by Intertek, which is independent.</p> <p>Hope the above provides a little introduction to how we think and work. Do not hesitate to contact us again if you want to know more.</p> <p>[ANSWER 2]</p> <p>No, I can't imagine we have any PFAS among our products.</p> <p>Can you draw my attention if there are any specific products to be extra vigilant about. For example, furniture, where could PFAS be included in wooden furniture? We have no chipboard, no composite, just wood, stone, metal!</p> <p>Tvål, my Swedish supplier complies with all laws and regulations, is there still a risk that I should check?</p> <p>Lighting, are there any risks there, I've never heard of any?</p> <p>I'll try to call you tomorrow.</p> <p>[ANSWER 3]</p> <p>Thank you for the list, we will make a thorough check and investigate extra carefully among our product groups.</p>			

Company	Answer question 1	Answer question 2	Answer question 3	Answer question 4
Hemtex	We have an impregnation spray for furniture left in the range that contains PFAS (but not PFOA or PFOS). We will not place any new orders for this. Other products that previously contained PFAS have been phased out and replaced with PFAS-free alternatives. For example, coated tablecloths, bibs and shower curtains.	No, we have strict chemical requirements for all products in the range and our RSL includes all candidate list substances with textile/product relevance. As members of the Chemicals Group at RISE, we constantly receive relevant and updated information.	Yes, we have had a total ban on PFAS in the range since the start of 2020. Individual products have not been sold out of the warehouse yet, but no new ones are brought in. In connection with the ban on PFAS, we also signed ChemSec's "No to PFAS". You can read more about our work in our sustainability report (attached, pages 31-32).	Yes, we have. We are phasing out all products containing PFAS as they are sold out in the shops.
Mekonomen	Yes, for example two types of lubricants.	Not to our knowledge.	We are constantly working to ensure the safe handling of chemical goods and products and that we comply with applicable legislation. We shall, as far as possible, sell chemical products and articles that have a less negative impact on the environment and people and therefore ensure processes and procedures based on current legislation. PFAS are not subject to any overall legislation as of today, but we welcome one that includes the entire substance group and that can make the work of phasing out more powerful. In order to work on the identification of goods containing PFAS and their phasing out, we also need to rely on information from our suppliers. When it comes to chemical products and goods, we require our suppliers to comply with national legislation in the country of manufacture and to carry out systematic environmental work to minimise negative environmental impact. Suppliers must exercise due diligence in the design, manufacture and testing of products in order to reduce the risk of adverse effects to life, health, safety or the environment.	At present, we are working systematically on the substitution of chemical products containing hazardous substances. The work is based on substances on the candidate list. We are constantly reviewing how we can improve our processes in terms of both chemical products and goods.
Elgiganten	We comply with the REACH Regulation.	We comply with the REACH Regulation.	No, PFAS are not part of our sustainability work.	No, we comply with the current REACH Regulation.

Company	Answer question 1	Answer question 2	Answer question 3	Answer question 4
Ikea	<p>IKEA currently has a ban on PFAS in textiles and paper, as well as in our chemical products (paints, oils, cleaning agents etc.). We know today that PFAS are present in some components of some of our electrical products. We also know that fluorinated polymers, such as PTFE, are classified as PFAS. As always when we identify substances or materials that may be problematic for humans and/or the environment, we try to substitute them with safer and more sustainable alternatives. Since PFAS represent such a large group of chemicals, which can have such a widespread use, we initiated a major investigation about a year ago to identify possible further use of PFAS. This is with the aim of identifying additional areas that need restrictions or prohibitions.</p>	<p>No, IKEA has a general ban on SVHCs in our products, so PFAS that are on the candidate list should not be present in our products.</p>	<p>The PFAS issue is indirectly included in our chemicals strategy, which is a sub-strategy to our sustainability strategy, where we talk about, among other things, phasing out chemical groups that can be problematic for humans and/or the environment. Work is underway to update this chemicals strategy and PFAS will be specifically mentioned there.</p>	<p>At IKEA, we have been actively working on the PFAS issue for several years and we have already developed a lot of restrictions for our supply chain. Based on the results of the investigation that is ongoing, it is likely that we will introduce additional restrictions, which will lead to the phasing out of substances, materials and possibly in some cases products.</p>

Company	Answer question 1	Answer question 2	Answer question 3	Answer question 4
The Body Shop	In the spring of 2018, following feedback from our customers and other key stakeholders, we removed all PFAS from our new product formulations. We are also committed to discontinuing or reformulating existing products containing PFAS before they are regulated. We are pleased to confirm that production of our Fresh Nude Foundation containing Ammonium C6-16 Perfluoroalkylethyl Phosphate has stopped, with very little stock remaining. Due to supply issues linked to the global pandemic, we had to extend our initial phase-out target at the end of 2020, but we expect the full phase-out to be completed by early 2022 and the revised PFA-free formula for Fresh Nude Foundation will be on sale very soon.	At IKEA, we have been actively working on the PFAS issue for several years and we have already developed a lot of restrictions for our supply chain. Based on the results of the investigation that is ongoing, it is likely that we will introduce additional restrictions, which will lead to the phasing out of substances, materials and possibly in some cases products.	Under våren 2018, efter feedback från våra kunder och andra nyckelin-tressenter, tog vi bort alla PFAS från våra nya produktformuleringar. Vi har också åtagit oss att upphöra med eller omformulera befintliga produkter som innehåller PFA före reglering. Du kan läsa mer om vår allmänna ingrediensstrategi här.	In the spring of 2018, following feedback from our customers and other key stakeholders, we removed all PFAS from our new product formulations. We are also committed to phasing out or reformulating existing products containing PFAS before they are regulated. We are pleased to confirm that production of our Fresh Nude Foundation formula containing Ammonium C6-16 Perfluoroalkylethyl Phosphate has stopped, with very little stock remaining. Due to supply issues linked to the global pandemic, we had to extend our initial phase-out target of the end of 2020, but we expect the full phase-out to be completed by early 2022 and the revised PFA-free formula for Fresh Nude Foundation will be on sale very soon.
Glitter	We require suppliers not to use these substances.	No, see above.	Yes, we continuously ensure that we and the suppliers are up to date on chemical regulations according to EU standards and try to stay ahead.	See above.
City Gross	EMV (own brand) items in nonfood and packaging materials (that come into contact with food) used in its own consumption by City Gross are free of PFAS. In addition to this, we sell a wide range of goods from different suppliers, where there may be PFAS.	We have a policy of not purchasing articles containing substances that are on the candidate list and we also require all our suppliers to certify this in writing through a REACH declaration.	The board of the Swedish Food Retailers Federation has recently decided on a chemical roadmap, developed in collaboration with Svenskt Vatten, attached*. City Gross is a member of the Swedish Food Retailers Federation.	All EMV items in nonfood and packaging materials that are used in its own consumption by City Gross are free of PFAS. We will continue our work in accordance with the chemical roadmap that has been developed and in consultation with Dagab, which has delivered all goods to City Gross since 1 October 2021.
Apoteket Hjärtat	During 2018 and 2019, we worked intensively to phase out PFAS from cosmetic products. From 1 January 2020, we have had a total ban on cosmetic products containing PFAS. And they are included in our "Restricted Ingredients Cosmetic Products".	According to Apotek Hjärtat and ICA Gruppen's Sustainability Appendix, articles may not contain substances included on the candidate list.	We attach our "Restricted Ingredients for Cosmetic Products".	We have already done this.

Company	Answer question 1	Answer question 2	Answer question 3	Answer question 4
Lidl	<p>Between 2014 and 2020, Lidl has been working to remove potentially harmful substances from the production of textiles and footwear under its own brand as part of the Greenpeace Detox campaign. As part of our Detox commitment, we are committed to removing 11 priority groups of hazardous chemicals from our supply chain, one group of which was poly- and perfluorinated chemicals (PFAS). The goal of Lidl's commitment was to completely remove the chemicals deemed hazardous in the production of textiles and footwear from Lidl's own textile brands by 2020, or to replace them with safe substances. In 2020, Lidl has been able to avoid using environmentally hazardous chemicals in its textile production as far as possible, thereby reducing the negative impact on people and the environment. The following report explains Lidl's strategy, provides an overview of the milestones Lidl has achieved between 2015 and 2020 and summarises actions and results from 2019. The document also provides an overview of what goals Lidl continues to strive for in terms of achieving a more environmentally friendly textile and shoe production. Read the report on our website here: link.</p>	<p>Lidl is a global player and through our parent company Lidl stiftung imports are made into Europe; thus the registration and notification of goods to ECHA is handled by our international organisation Lidl stiftung. This is done on a European basis and it is probably not so easy to get data specifically for Sweden out of it.</p>	<p>Yes, through Lidl's detox commitment we address the issue of PFAS in textile and shoe production. Please see question 1 to know more. In addition, Lidl has a global goal to continuously phase out chemicals that are hazardous to health and the environment in the production of its own brands. We will endeavour to use chemicals in the production of our own brands that are safe for health and the environment by the end of 2030. Lidl internationally follows the research in the field and draws up requirements specifications for our own brands.</p>	<p>In the Lidl detox commitment, we focused on textile and shoe production; in addition to this we have jointly developed the roadmap for chemicals* in the Swedish Food Retailers Federation together with Svenskt Vatten. Going forward, we will focus on mapping the presence of PFAS in, among other things, packaging for our own branded products and phasing out those substances that have not been proven to be essential for society.</p>
Lumene	<p>PFAS are no longer used in the manufacture of Lumene products. Do not hesitate to contact us if you need more detailed information.</p>			
Eurosko	<p>Our clear goal is that PFAS should not be in our collections. You can find our RSL (Restricted Substance List) here. We collaborate with Stefan Posner who you may know. He has very long experience of chemicals and helps us in our continued work</p>			

Company	Answer question 1	Answer question 2	Answer question 3	Answer question 4
Stadium	Virtually our entire range is free of PFAS as we say no to this overall. In 2022, we will phase out the few items we have left in our range with PFAS when it comes to external brands with high function in Ski Clothing.	Some laminate and outdoor materials, in external brands, still contain PFAS, but everything should become PFAS-free by 2023. We have chosen to say no to PFAS when we buy in for 2023 and there are only a few products left for what is being delivered in 2022.	In 2015, the Stadium Group began work on creating a Restricted Substance List (RSL), a list of chemicals and substances that we wish to limit and phase out in production from 2016 onwards. Our list has higher requirements than what is generally required. Some of the substances that have been a great challenge in production and that we are very keen to avoid are those products that contain PFAS or phthalates and that are antibacterially treated. We have governing documents internally that apply to the purchase of products for our shops and our online sales. There we say no to PFAS completely.	During 2022 and 2023, we will phase out PFAS completely from our range.

*) The roadmap states: "In the years 2022-2024, the focus of the chemicals roadmap will be to phase out PFAS from nonfood products and packaging."

The responses from the 29 companies can be summarised as follows:

	The company has products that contain PFAS in its range.	The company has products containing PFAS included on REACH's candidate list in its range.	PFAS are part of the company's sustainability work.	The company aims to phase out PFAS before any legislation is put in place.
Yes	10	1	20	12
No	6	14	3	3
Uncertain/ Unspecified	13	10	6	10
Total number	29	25*	29	25*

*) Four companies state that they have already banned/phased out PFAS.

Many of the responses we have received are serious and well-formulated. The companies that have chosen to respond are clearly aware of the PFAS issue. And a majority take the issue very seriously. Considerable time has been spent answering our questions. The fact that twelve of the companies aim to phase out PFAS before any legislation is put in place is positive and shows that the market can play a major role in environmental work.

Of the companies that responded, four - Kappahl, H&M, Apoteket Hjärtat and Lumene - state that they have already banned/phased out PFAS from their ranges. Two more companies, Glitter and Björn Axén, state that they do not have PFAS in their ranges. Glitter writes that "We require suppliers not to use these substances" and that "we continuously ensure that we and the suppliers are up to date on chemical regulations according to EU standards and try to stay ahead."

Björn Axén writes: "We are members of Chem Sec and have never used PFAS in our products and will not. We work with Apoteket AB's hard list of approved ingredients and that is our lowest level".

The answers from Glitter and Björn Axén should be regarded as doubtful. Membership of Chemsec, Apoteket AB's list or EU chemical regulations does not guarantee that you are free of PFAS.

The survey responses show that ten companies stated that they have goods containing PFAS in their range. Cosmetics, non-stick materials in frying pans, impregnation sprays, textile products with water-repellent ability and electrical products were some product groups specifically mentioned. Another 13 companies were unsure, or did not comment on, whether their range contains PFAS.

The companies that responded that they have products with PFAS are usually conducting active work on these substances. For example, Lindex states that it has two cosmetic products in its range, but that *"a decision not to allow, among other things, PFAS substances in cosmetic products was taken at the beginning of 2020 and our goal is to phase out these substances by the summer of 2022"*. Furthermore, Lindex writes that it does not accept *"new products that are formulated with PFAS"*.

Another example is Hemtex, which has introduced a total PFAS ban and does not bring in any new products containing PFAS, but where *"individual products have not been sold out of the warehouse yet"*. They further write that *"we have an impregnation spray for furniture left in the range that contains PFAS (but not PFOA or PFOS). We will not place any new orders for this. Other products that previously contained PFAS have been phased out and replaced with PFAS-free alternatives."*

Hemtex is a company that obviously keeps a good check.

Clas Ohlson writes that *"we have recently started a project where the purpose/goal is to remove all PFAS (PTFE) in kitchen products"*. Clas Ohlson endeavours to find alternative products but writes that *"the challenge is that in some cases there are no alternatives and in others it is difficult to get consumers to choose the alternative products"*.

Apoteket writes that they *"have started by stating that we first need to understand exposure, as we said, and we know that there may be products that we need to investigate"*.

Several companies describe that it is difficult to keep track of whether there are PFAS in products from external suppliers. A number of companies have therefore chosen to start by phasing out PFAS from their own brand range.

One such example is KICKS, which writes: *"Since 2018, products we have developed under our own brands do not contain any PFAS"*. KICKS further writes that they *"encourage [their] suppliers to avoid using PFAS substances ... and is in dialogue with them about the PFAS issue"*, but points out that it lacks *"practical opportunity to follow up on the content of all external products we sell"*.

A similar strategy is found at Cervera which writes: *"We sell nonstick products with PTFE coating so yes. Our ambition is to phase these out before any PFAS regulation comes into force in 2025. In our own internal range, we have been phasing out and will be PFAS-free next year. For external brands, we actively try to limit the supply."*

Thus, it is difficult for many companies to obtain reliable knowledge of the PFAS content of products from external suppliers. Mekonomen pointed out: *"In order to work on the identification of goods containing PFAS and their phasing out, we also need to rely on information from our suppliers"*.

It is also in light of this that Mekonomen welcomes stronger legislation in this area: *"PFAS substances are not subject to any overall legislation as of today, but we welcome one that includes the entire substance group and that can make the work of phasing out more powerful"*.

Some companies, such as Elgiganten, choose the easy way: not to take responsibility for themselves, but to just *"follow the law"*. Elgiganten states that it *"complies with the REACH Regulation"*, without otherwise addressing the issue in its sustainability work, and without the goal of phasing out PFAS.

Several of the companies that had strategic work on PFAS stated that they were a member of Chemsec's "No to PFAS" initiative. Chemsec is an independent organisation for conversion from harmful chemicals.

As Intersport puts it, this is a project "*that wants to emphasise and educate about the harmful impact of PFAS and fight to phase out PFAS from products and supply chains*".

The Body Shop also states that feedback from consumers and other stakeholders played an important role in phasing out PFAS from their range: "*In the spring of 2018, following feedback from our customers and other key stakeholders, we removed all PFAS from our new product formulations. We are also committed to discontinuing or reformulating existing products containing PFAS before they are regulated*".

To sum up: Many companies want to phase out products containing PFAS. The knowledge that the chemical is environmentally harmful exists. Several companies have their own plans to phase out PFAS before any legislation is put in place. Some companies say they have already completely phased out PFAS from their ranges.

However, for many it is difficult to know in which goods PFAS are present. In the absence of knowledge and difficulties in acting, many companies are still content to comply with existing legislation, although many welcome a tougher one. Many companies do a lot on their own, but legislation on a group ban on PFAS must be in place for us to successfully get rid of PFAS in our environment.

Investigation of information from shops to consumers

When you buy a product, you have the right as a consumer to receive information about hazardous substances that may be present in products you want to buy. This is regulated within the EU as part of the Union's chemicals legislation, REACH (Article 33 of the REACH regulation).

Among other things, you have the right to know if the product contains any "Substances of Very High Concern" that are on the EU's so-called candidate list of about 200 such substances. You have the right to receive this information from the person selling the product, if the amount of particularly hazardous substance in the product exceeds 0.1 per cent of the weight of the product. As a consumer, you shall receive such information free of charge and within 45 days of requesting the information.

Nine different PFAS are currently on the so-called candidate list. You also have the right to receive information about everyday goods that are treated with substances in order to obtain a certain function. For example, this may be sportswear that has been treated with antibacterial substances in order to counteract bad odours, see Svenskt Vatten's report *Silverläckan*, 2018), or about impregnations for moisture and dirt protection, in which PFAS are common.

It can be difficult to determine whether an article contains PFAS because they rarely appear on the product's labeling. There is no requirement in the rules that it must always be clear whether a product contains PFAS. But even if that information is available, it can be difficult to determine from the chemical name whether it is PFAS. It is a jungle of strange and, for an ordinary consumer difficult to understand, names for these chemicals.

If you want to avoid buying products that contain PFAS, there are a few things you can consider. It is wise to start from the properties of the material; for example, it is not unlikely that a water, dirt or grease-repellent textile contains PFAS.

A good way to avoid PFAS is to ask for PFAS-free alternatives and eco-labelled goods.

The Swedish Society for Nature Conservation writes:

"PFAS are a relatively new concept and you can still find words from the past, such 'fluorocarbons' and 'PFCs', when companies talk about PFAS. For example, 'fluorocarbon

free" is still a common term in the clothing industry. These old words do not always include the whole group of PFAS, so it is good to ask in the shop if the product you want to buy is really PFAS-free".

Investigation of information for consumers

During November 2021, we visited 11 shops in Umeå and Stockholm where we identified products of a kind that often contain PFAS. We selected products from the following product categories: ski waxes, backpacks, floor varnishes, foam extinguishers, jackets and tents.

After visiting the shops, we contacted them as a consumer and asked if the selected products contained PFAS.

Shop, product, response time and response are shown in the table below:

Shop	Product	Product category	Response time (number of days)	Response (does the product contain PFAS?)
Stadium Umeå City	Swix F4 Liquid All Temperature Universal Glide Wax	Ski wax	0	No
Naturkompaniet Umeå	Osprey Tempest 30			
	Backpack	0	No	
Byggmax Nacka-Lännersta	Midun Parquet Varnish 40	Floor varnish	0	No
Bauhaus Sickla	Housegard Foam Extinguisher 6 kg FE6TG	Foam extinguisher	0	No
Haglöfs Brand Store Stockholm	Haglöfs Rubus GTX Jacket Men	Jacket	0	Yes
XXL Stockholm City	Bergans Trysil 2-Pers	Tent	3*	Yes
The North Face Store	The North Face Men's Carto Triclimate Jacket	Jacket	2*	No
Intersport Drottninggatan Sergels Torg	Salomon XA Sierra GTXW	Shoes	8*	No
Helly Hansen Hamngatan	Helly Hansen Crew Midlayer Jacket	Jacket	0	Yes
Naturkompaniet Kungsgatan	Patagonia Black Hole Pack 25L	Backpack	0	No
Alewalds Stockholm	Osprey Arcane Day Large	Backpack	0	No

* Response time from customer service after referral from the shop, or because the shops could not provide answers.

The question was asked by e-mail, in some cases we called up the shop and asked. In cases where contact information for the individual store was missing, we turned directly to customer service. On three occasions, the shops could not answer the question and we turned to customer service instead.

The table below sets out the answers in more detail:

Shop	1st contact	Answer 1	2nd contact	Answer 2
Stadium Umeå City	Customer service	Couldn't answer straight off. Case established.		<i>"The purchasing department informs that SWIX F4 Glide Fluorfree does not contain PFAS."</i>
Naturkompaniet Umeå	Shop	<i>"it should be free of this substance."</i>		
Byggmax Nacka-Lännersta	Customer service	<i>The product does not contain PFAS according to the product's safety sheet.</i>		
Bauhaus Sickla	Customer service	<i>"I tried to call the warehouse to check if they knew but got no answer. I also contacted Housegard but they didn't have an immediate answer either. Was also connected to their production specialist but he was unfortunately busy."</i>		<i>"We have been in contact with our supplier regarding your question about the foam extinguisher from Housegard. [...] They advised that this foam extinguisher does not contain PFAS."</i>
Haglöfs Brand Store Stockholm	Shop	<i>"Unfortunately, Gore-tex is not completely free of PFAS. Instead of Rubus, we would recommend to you a model with our own membrane called Proof that is completely free of PFAS [...]"</i>		
XXL Stockholm City	Shop	Couldn't answer the question.	Customer service	<i>"None of our tents are fully PFAS-free [sic], but we use C6 imp which is within the environmental targets. We're working on getting it over to C0 but it needs to be tested first."</i>
The North Face Store	Shop	Couldn't answer the question. Referred to online customer service.	Customer service	<i>"I fully understand your concern about the PFAS chemicals and our brand strives to produce the most sustainable products with the most clear chemicals using the modern technologies. [...] I checked the Men's Carto Triclimate Jacket and in the details is written that the materials used for this jacket are Non-PFC. [...]"</i>
Intersport Drottninggatan Sergels Torg	Shop	Couldn't answer the question. Referred to the manufacturer of the shoes.	Customer service	<i>"Now the product manager has found the information about the shoes! They're completely free of PFAS."</i>
Helly Hansen Hamngatan	Shop	<i>Couldn't answer straight off. Asked to be allowed to get back.</i>		<i>One of the few jackets in the range that contains PFAS. The substance is being phased out and will be removed from production in 2022. From 2023, the Crew jackets will be completely free of PFAS. Recommended similar product that is already PFAS-free.</i>
Naturkompaniet Kungsgatan	Shop	<i>"We have received confirmation from our purchasing department that this backpack is completely free of PFAS substances."</i>		
Alewalds Stockholm	Shop	Couldn't answer straight off. Asked to be allowed to get back.		<i>The product does not contain PFAS.</i>

The table shows how the contact with the shops went and what they answered. Direct quotations are in italics.

As can be seen from the tables, on four occasions we received answers immediately (Byggmax, Haglöfs, Naturkompaniet Umeå and Naturkompaniet Stockholm). Four more gave a reply on the same day (Stadium, Bauhaus, Helly Hansen and Alewalds). After turning to customer service for those shops that did not answer the question, we eventually received an answer regarding all products.

Of the three occasions where the products contained PFAS, on two of the occasions (Haglöfs and Helly Hansen) we received quick feedback from the shops (same day response) and suggestions for equivalent products free of PFAS. Helly Hansen also advised that they were in the process of phasing out PFAS completely from production and that the product will be PFAS-free in the future.

In three cases, the answers can be questioned. In contact with Byggmax customer service, we were informed that the product, a floor varnish, does not contain PFAS, with reference to the product's safety sheet. But we know that there is often a lack of information in safety data sheets if products contain PFAS. This answer cannot be taken as certain.

At Intersport, the shop staff could not give clear information about a pair of shoes. We therefore turned to customer service who after eight days advised "*Now the product manager has found the information about the shoes! They're completely free of PFAS.*"

However, we do know that the shoes contain Gore-tex, a material that is probably not completely free of PFAS. Gore Fabrics, which manufactures Gore-tex, has announced that by 2023 the company will be PFAS-free.

At Bauhaus, we were informed that they had contacted the supplier who informed that the foam extinguisher from Housegard that they sell does not contain PFAS.

We wondered about that answer and after being in contact with Housegard, they confirmed that the extinguisher contains fluorocarbons, as well as that it may contain small amounts of unspecified PFAS. Bauhaus in this case gave incorrect information to the consumer.

This demonstrates the limited knowledge of retailers about the presence of PFAS in the products they sell. It underscores the importance for retailers to require suppliers to ensure that PFAS are not present in products they put on the market.

A reflection is that the companies that responded that they have certain products in their ranges that contain PFAS do not have to be "worse" than the others. It may well be the other way around. It is those who have the best control and the highest ambitions who actually know what they are selling – and thus may have come the furthest in phasing out products with PFAS.

One conclusion is that all eleven shops get good marks in terms of the time it took to give an answer to the consumer. Overall, there were quick and serious responses. It is not reasonable to expect individual shop employees to be able to answer these kinds of questions. What is required for quick and accurate answers is that companies have the knowledge and systems centrally to provide answers to consumers' questions. In this small survey, the companies largely get approved.

5 Good examples

A wide range of work is underway to reduce the use of PFAS. Both organisations and companies are actively working on the issue. We have compiled some good examples of efforts that have been made or that are ongoing. These are things that happen more or less on a voluntary basis and in parallel with the political process towards tougher legislation. It is clear that progress can be made even without legislation. At the same time, several stakeholders testify to the difficulty of getting rid of all PFAS. For some products, it is simply difficult to find functional alternative solutions.

Chemsec/PFAS Movement

Chemsec is an independent organisation for conversion from harmful chemicals. PFAS Movement was started by ChemSec in 2020 with a focus on Swedish companies. The overall goal is to influence legislation.

“We want PFAS to be regulated as a group and not one at a time as it stands now, as this is incredibly ineffective. By joining the initiative, companies are showing their support for a group ban,” says Joséphine Källström of ChemSec.

Every company must sign up to the fact that they are aware of the health and environmental hazards of PFAS, and that they encourage the chemical industry to develop safer alternatives. The idea is that companies investigate the presence of PFAS in their products and discuss with their suppliers how they can be phased out. It is not a requirement that the companies participating in the PFAS Movement do not use PFAS, the goal is rather to work to get rid of PFAS.

“The reason why we do not require companies not to use PFAS is mainly because we are a small organisation with limited resources, but also because if we influence the legislation for the better so that companies are forced to comply with the law, then the change drives itself,” says Joséphine Källström.

“We have succeeded very well in getting companies from many different industries involved in the initiative. We have reached companies in everything from textiles to cosmetics and kitchen equipment. We are proud of this as we need companies from all industries to work on phasing out PFAS.”

At present, the initiative is aimed at Swedish companies. One reason is that it is usually easy to get Swedish companies involved. There is general awareness of chemicals and the organisational structure is often relatively flat. There is also a willingness to move towards sustainability.

ChemSec also works on PFAS in several other contexts. Among other things, they support the work on the broad restriction of PFAS as a group that is currently being prepared in the EU by five countries: Sweden, Germany, Denmark, Norway and the Netherlands.

Surfejs

Surfejs is a campaign run by the Swedish Society for Nature Conservation and which is mainly visible on Instagram. The campaign is aimed at young people and focuses primarily on makeup and skin care products. Surfejs draws attention to companies that use PFAS in their products and urges them to phase out hazardous substances. Surfejs has published a list of nine companies with 57 makeup brands that have said they will stop using PFAS. The following companies are on the list: L'Oréal, Akademikliniken, Bodyshop, H&M, Isadora, Linda Hallberg, Lumene, L'Oréal Paris and L'Oréal Professionnel.

Stadium

Stadium has been working for a long time on phasing out PFAS. All in house produced clothes and shoes have been completely PFAS-free since 2018. By the end of 2019, tents and bags were also completely free of PFAS.

"We have bans on all PFAS for all our own production," says Catrine Marchall, Sustainability Manager at Stadium.

"Our goal is that our entire range of external brands should be one hundred percent free of PFAS, phthalates and antibacterial substances in textile materials," says Catrine Marchall.

In connection with Vasaloppet 2019, Stadium challenged the industry to opt out of using ski wax with highly fluorinated substances. As of 2020, the company only sells fluoride-free ski wax in all its sales channels.

Still some work remains. Some laminate and outdoor materials, in a few products of external brands, still contain PFAS. But everything should become PFAS-free by 2023.

Phasing out PFAS and finding alternative treatments hasn't been straightforward. In its own production, Stadium did a number of user tests, in which one of the PFAS-free treatments did not work as effectively. Instead of PFAS, Stadium now uses a non-fluorinated, bio-based, durable water-repellent finish.

"Since 2018, we have had to opt out of some of our range in certain brands from our external suppliers as the pace of phasing out PFAS has been much slower in some markets and many of our Outdoor brands working with laminated materials have also had issues with finding PFAS-free alternatives."

Catrine Marchall believes that the work of individual companies like Stadium to reduce hazardous substances in the environment is significant. Collaboration is crucial and a major challenge lies in being able to challenge both chemical producers in the supply chain and external brands.

"It is important to dare to take certain risks when it comes to opting out of parts of our range that do not meet our requirements; customers can of course buy these elsewhere, but we hope that our clear message to the customer will provide a safe buying experience and that they return to Stadium every season," says Catrine Marchall.

H&M

H&M has not sold clothes and shoes with PFAS since 2013, nor in self-produced cosmetics since 2018. The company was one of the first in the industry to establish a list of substances that are assessed to be hazardous substances in the production process, the Manufacturing Restricted Substance List. H&M is also one of the companies that are part of ChemSec's PFAS Movement.

Adidas

Adidas phased almost all PFAS out of its products between 2013 and 2017. The company today states that 99 per cent of the range is completely PFAS-free.

Gore-Tex

Gore Fabrics, which manufactures Gore-tex, announced in 2017 that PFAS would be removed from their products by 2020 for environmental reasons. This did not quite succeed, but in 2021 the company announced that by 2023 it will be PFAS-free. This means that the first products with completely PFAS-free materials will be on the market from 2022.

6 PFAS in the public sector – about procurement as an unused opportunity

Every year, public procurements worth almost SEK 800 billion are carried out in Sweden. This corresponds to almost a fifth of GDP or SEK 80,000 per inhabitant. These purchases are governed by strict regulations, for example through the Public Procurement Act. Municipalities, regions and authorities are not only obliged to comply with certain laws and regulations. They also have the power and ability to make demands on suppliers, including environmental requirements.

The Swedish National Agency for Public Procurement believes that procurement is an important instrument for achieving socio-political goals: *“By procuring sustainably, you can ensure good business in terms of the entire life cycle. You also contribute to sustainable development and to the achievement of the national environmental quality goals.”*

The country's municipalities, regions and authorities are major consumers of a wide range of products that could potentially contain PFAS. The public sector thus procures products containing PFAS, but exactly how much is impossible to determine. Every single authority is confronted every day with difficulties in conducting PFAS-safe procurements. They cannot possibly analyse every product to be procured themselves. However, they can set requirements for their suppliers.

The National Agency for Public Procurement’s requirements

The National Agency for Public Procurement, which among other things provides support to procuring entities, has developed a number of criteria that can be used in public procurement. These make it easier for the procuring entity to set different types of requirements for suppliers.

The National Agency for Public Procurement has a model based on sustainability criteria at three different levels:

- Basic level: The goal of the basic level is to reduce most of the environmental/sustainability impact associated with the specific product area.
- Advanced level: The advanced level goes beyond the basic level and may require greater effort in following up and reviewing evidence.
- Spearhead level: At this level, the best available alternative on the market from an environmental and sustainability perspective is demanded.

For PFAS, as Substances of Very High Concern, the National Agency for Public Procurement has specific criteria for the following product groups:

- Medical consumables (advanced level)
- Dirt and oil-repellent textiles (advanced level)
- Water-repellent or waterproof textiles (basic level)
- Laundry and textile service (advanced level)
- Professional hygiene, cleaning and maintenance products – chemical products (advanced level)
- Professional hygiene, cleaning and maintenance products – cosmetic products (advanced level)

Some PFAS are also identified as “Substances of Very High Concern” (SVHCs) and are listed on the so-called Candidate List in the EU (Article 59 of the REACH Regulation). The procuring authority may require that PFAS on the candidate list should not be present.

The present requirement (requirement ID 11037) means that substances on the candidate list may not be included in products that are procured in concentrations above 0.1 per cent by weight (1000 mg/kg). This requirement has been tightened by the National Agency for Public Procurement. Previously, there was a requirement at the basics level, which meant that suppliers were "only" obliged to inform about the content of substances on the candidate list.

The agency itself has carried out a follow-up of the use of requirements where substances on the EU candidate list are to be limited to a certain level. According to the follow-up, few authorities used the National Agency for Public Procurement criteria:

Medical gloves	2 out of 21 procurements
Toys and hobby materials	4 out of 15 procurements
Textiles	3 out of 16 procurements

The reasons why so few use the requirements set by the agency are unclear.

About ecolabelling in public procurement

One possibility for a procuring authority is to require a certain labelling of a product. According to the National Agency for Public Procurement, a label can be the European ecolabel, national or multinational eco-labels or other serious labels. This means that a municipality, region or authority can require a supplier to provide products labelled with, for example, the Nordic Swan Ecolabel or Bra Miljöval (Good Environmental Choice) in a certain procurement. So what do these labels say about PFAS?

The Nordic Swan Ecolabel

This is what the Nordic Swan Ecolabel writes on its website: *“The Nordic Swan Ecolabel adheres to the precautionary principle. This means that, where there is not enough information about how a substance affects people and the environment, we would rather exclude it than allow it. Thus, the Nordic Swan Ecolabel prohibits PFAS in cosmetic products, furniture, textiles, ski wax, building materials for Nordic Ecolabelled buildings and packaging for liquid food.”*

Among other things, the Nordic Swan Ecolabel has specific requirements for outdoor furniture and park and playground equipment, with a ban on PFAS, halogenated flame retardants and nanoparticles.

In addition, the Nordic Swan Ecolabel has launched “Svanenmärkt njutning” (Nordic Swan Ecolabelled enjoyment). This includes Nordic Swan Ecolabelled lubricants, massage oil and intimate soap. Own manufacture products in the Kaerlig series are free of PFAS.

Bra Miljöval (good environmental choice)

The Swedish Society for Nature Conservation's good environmental choice label prohibits any content of PFAS in, among other things, chemical products for impregnation and cleaning, textiles and clothing and cosmetic products.

A municipality can thus require the Nordic Swan Ecolabel in, for example, a procurement of playground equipment for a preschool, or require Bra Miljöval when purchasing textiles and workwear. The procurement tool could be used more aggressively by large parts of the public sector.

Swedish municipalities and regions – Adda

The Swedish Association of Local Authorities and Regions, SKR, annually purchases products in areas where PFAS may occur. Adda, formerly Kommentus, is owned by the Swedish Association of Local Authorities and Regions and a majority of Sweden's municipalities. Adda's purchasing centre offers framework agreements that municipalities and regions can join. This makes Adda a power factor with great influence and the opportunity to make tough demands on suppliers. Increasingly, these public buyers impose environmental requirements when products are procured and this includes direct or indirect requirements for PFAS.

Adda's framework agreement for work clothing

In this report, we have chosen to take a closer look at the procurement of work clothing with a dirt, oil and water repellent and waterproof function. That is, a product type where the National Agency for Public Procurement offers criteria with specific requirements for PFAS.

During the autumn of 2021, the Adda purchasing centre procured work clothing with a framework agreement starting in March 2022. In this procurement, Adda used the National Agency for Public Procurement's requirements with limit values for PFAS. "Most suppliers have verified the limit values with OEKO-TEX certification," says Adda purchasing centre's sustainability strategist Anna Löfström to Svenskt Vatten.

OEKO-TEX is a global testing and certification system for textiles that guarantees that the textile in the finished product is free of unhealthy chemicals, i.e. a form of independent eco-labeling.

In addition, the latest procurement of work clothing requires that substances on the EU candidate list may not be included in the clothing. Exactly how many municipalities and regions will join this new framework agreement remains to be seen. The previous agreement, which was procured in 2016, was joined by 150 authorities, municipalities and regions. In Stockholm County these included Nacka, Järfälla, Nykvarn, Sigtuna, Sollentuna, Österåker, Värmdö, Upplands-Väsby and Tyresö. This shows that the National Agency for Public Procurement's requirements for suppliers can have a major impact in practice.

The fire service and PFAS

One of the major sources of PFAS emissions has been firefighting foam. A product that is widely used in both fire drills and fires. Usage by the armed forces has been very large and has caused environmental and groundwater damage in many places around the country.

We asked ourselves whether the procurement and use of foam in the fire service has decreased after recent years of debate about the environmental problems of PFAS.

The answer is yes. Municipal emergency services' use of foam increased until a peak in 2014, after which its use declined sharply, by over 70%.

Here the Swedish Civil Contingencies Agency (MSB) reports the number of operations where municipal rescue services reported that they used foam concentrate (not hand fire extinguishers) on fires in buildings, regardless of type of foam liquid, degree of expansion or method of application:

Year	Number of actions
1998	152
1999	132
2000	172
2001	155
2002	160
2003	172
2004	145
2005	165
2006	145
2007	175
2008	145
2009	202
2010	193
2011	229
2012	295
2013	282
2014	298
2015	247
2016	260
2017	239
2018	249
2019	160
2020	84

Whether or not the foam liquid contained PFAS is not clear. Starting in 2022, MSB will collect more data on the foam liquids used.

We also turned to Sten Andersson, strategist at the Attunda Fire Brigade, one of the largest rescue services in the country, with some questions about how the fire brigade now relates to the problems with PFAS in firefighting foam and whether PFAS is taken into account in procurement.

The firefighting foam is procured according to the Public Procurements Act. Attunda Fire Brigade procures a framework agreement with a supplier of fire equipment and demands foam without PFAS. But they are *“forced to choose from what is available. We choose the option that has the least environmental impact.”*

Sten tells us in an e-mail that there are different types of foam liquids and PFAS are not present in all types. It is so-called B-foam that contains PFAS. Such foam has not been used for the past five years. Attunda Fire Brigade has a guideline for foam where *“the mandate to make decisions about foam use is regulated, with the aim of using the extinguishing agent only when the purpose exists and consequences have been taken into account”*.

Attunda Fire Brigade has reduced the use of foam as an extinguishing agent in recent years. Out of about 3,000 actions annually, A-foam (without PFAS) is used as an extinguishing agent on fewer than 10 occasions per year.

Sometimes they refrain from extinguishing a burning car, for example, for environmental reasons and let the fire burn out. Sten writes: *“We are extra careful in case of accidents in water protection areas and then make assessments of whether an extinguishing effort is necessary. Often there is a reason for extinguishing the fire. Then measures such as sealing stormwater wells can be taken.”*

IVL and Swedavia previously conducted a project called Re-Path that studied the consequences of the spread of highly fluorinated substances from Arlanda and Landvetter airports, where these substances had previously been used in firefighting foam. The project started in 2009 after elevated levels of PFAS were found at both airports. Over five years, about 700 samples were collected. The samples have mainly been taken in water, sediment and fish, where factors such as reproduction, hatching and mobility have been studied in species living in the nearby lakes.

The results showed that fire drill sites are important point sources of PFAS leakage to the environment. Fish and water in the vicinity could contain up to 100 times higher levels of PFOS compared to reference areas. The scientists calculated that in 2014 Stockholm Arlanda leaked 2.4 kilograms of PFAS each year to the drinking water source Mälaren.

7 Substitution – phasing out PFAS

Substitution is about removing PFAS, or replacing them with substances that are less dangerous or harmless. Substitution can also involve using completely different materials, non-chemical alternatives, new technologies or other processes in the manufacture of various products. Important concepts in substitution are chemical or technical function, which deal with the function of the substance in the material, product or in the process. It will be easier to find workable alternatives if the function of the substance in a specific use can be defined.

The knowledge - and debate - about how dangerous PFAS are for both the environment and people has made many companies on their own initiative choose to work on substitution despite the fact that there have been no laws regulating the substance group.

Work is now underway within the EU and several member states to try to put an end to PFAS. A complicated process that has been going on for many years (see more in section 7). If the aim is reached, new legislation could mean banning PFAS as a group. At best, such a law could come into force in 2025.

The most important reason why PFAS as a group should be banned is that there are several thousands of different PFAS variants, and new ones are being added on an ongoing basis. The legislation simply cannot deal with banning molecule by molecule. If one type of PFAS is banned, it will soon be replaced by another with a similar chemical structure and with similar harmful effects. In Sweden, this phenomenon is called false substitution and is very common. Banning the whole group is a way to put an end to false substitution and thereby succeed in solving the problem.

If this becomes a reality, it would mean an end to PFAS in both products and processes in the future. Which makes it necessary for companies to find alternatives to the toxic chemicals.

But pressure on businesses has also increased from the public as awareness of how harmful PFAS are has increased. The demand for alternatives that are environmentally safe has increased rapidly in recent years, mainly in the United States, but also in Europe.

Companies can no longer turn a blind eye to this. Those who do not work on the substitution of PFAS now risk losing competitiveness both nationally and internationally tomorrow. As we have shown in this report, several Swedish companies have been trying on their own initiatives to get rid of PFAS in different product groups for many years.

Right now, there is a great demand for products that can replace PFAS functions. The challenge in substitution is not only to remove PFAS, but also to manage to provide new products and materials with the same functions, to repel water, grease and dirt. In some cases, substitution is very difficult, in other cases easier. Different industries have also come to different lengths in phasing out PFAS. On the positive side, there is potential for innovation in the work to develop new PFAS-free products and to commercialise the alternatives.

The textile industry has come quite far in phasing out PFAS, while the kitchen equipment industry, for example, has not come as far. The reasons why some industries have progressed further in the phase-out work are different. One may be that for some it is more difficult to find replacement chemicals, but it is also about who has prioritised the phase-out work and started collaboration within their industries.

The Swedish Centre for Chemical Substitution

Because of the enormously demanding work of chemical substitution, not only of PFAS, an independent knowledge partner, the Swedish Centre for Chemical Substitution, was established by the Government in 2017.

The Swedish Centre for Chemical Substitution, hosted by RISE (Research Institutes of Sweden), is tasked with making it easier for businesses to phase out hazardous chemicals from society. The Swedish Centre for Chemical Substitution acts as a support with advice, training, materials and other tools to simplify the process of chemical substitution.

Many companies have already phased out PFAS while others have set a goal of being fully PFAS-free by 2025 when new EU rules could come into force at the earliest. In Sweden and Europe, companies are now hard at work on this time-consuming process, as it is very difficult and costly to analyse thousands of products, parts of products or processes. Although companies require their suppliers to supply products that are free of PFAS, this requires checks on subcontractors and on a plethora of products imported from many different countries. Even companies with aspirations to become PFAS-free can have big problems really being one hundred per cent. The Swedish Centre for Chemical Substitution plays an important role in making it easier for businesses to phase out hazardous chemicals such as PFAS as quickly as possible.

POPFREE - an innovation project for the transition to PFAS-free products

The POPFREE project started in 2016, financed by Vinnova and hosted by RISE, and aims to support and promote the use of products without PFAS. POPFREE aims to contribute to the transition towards a society free from the non-essential use of PFAS through both product development and communication.

Interviews with some key players

In January 2022, Svenskt Vatten had an interesting interview on Zoom with Tonie Wickman, advisor at the Swedish Centre for Chemical Substitution and Lisa Skedung, project manager at POPFREE about these issues. Here's what parts of the discussion sounded like:

How was the idea born for POPFREE Industri, which starts in 2022?

“There is great interest in phasing out PFAS, which is very positive, and the idea for POPFREE Industri was born in 2021 as we saw that it would be a huge challenge for industry to structure its phase-out work. PFAS are used in so many contexts and we saw the need for a centre of excellence for collaboration with scientists and industry. It was not difficult to get companies to want to be part of this project, which will now run for a couple of years.”

Who is in it?

All project partners were gathered at the POPFREE Industri project's digital kick-off: Apoteket AB, Bagaren och Kocken AB, Biltema Nordic Services AB, BRAV Norway AS, Cervera AB, ChemSec, ClasOhlson AB, Houdini Sportswear AB, IKEA of Sweden AB, iPinium AB, Kemikalieinspektionen, Nordic Paper Seffle AB, Order Nordic AB, Ragn-Sellsföretagen AB, RISE AB, Rusta AB, Stena Recycling International AB, Stockholm University, the Swedish Centre for Chemical Substitution, Umeå University, Volvo Car Corporation and Zound Industries International AB.

What is the main reason companies join POPFREE Industri?

“Companies want to be prepared for broader regulation and at the same time understand where they have PFAS. It is not certain that you have control over it if you have suppliers and if you do not have a system to manage your chemicals work. Many companies know about PFOA legislation but not what it means for those with a group ban on all PFAS chemicals! Companies considering phasing out PFAS can do so for environmental and ethical reasons or as a preventive measure for future regulations. It can take time to find alternatives with a better environmental profile and that work in terms of performance.”

What do you help them with?

“It’s a complicated job and many people point out that chemical analyses are expensive, but companies are used to this with other chemicals and very humble about it being needed. We try to get them to communicate with their suppliers. It is up to the suppliers to produce the information. The lab analyses are to see if the suppliers respond correctly and it should not only be the companies’ own chemical analyses that provide information. It is very important that suppliers are involved in the phase-out process.”

What is the biggest challenge facing industry?

“The biggest challenge is finding and implementing alternatives. But one thing is chemical alternatives. After all, it is not the case that you replace a concentration of PFAS that you have used before with the same concentration of an alternative. This won’t work because the PFAS are so effective. There may need to be completely new formulation and a bit of starting from scratch. It may also be the case that you wonder – do we even need this or can we change the usage? They simply have to think a little bit outside the box to find other solutions.”

Is Sweden far ahead in the PFAS phase-out?

“The United States is ahead of us. Enormous consumer pressure and many environmental organisations pushing things along. Then the legislation is different there. Risks on consumer shelves and the like must be accounted for, quite different from the legislation in Europe.”

Svenskt Vatten also phoned Thérèse Kernén, sustainability manager at the kitchen equipment company Bakaren & Kocken for an interview:

Briefly describe your work on phasing out PFAS

“As part of gearing up our sustainability work, we have evaluated risks in and prioritised different areas, and phasing out chemicals is one of these areas. We have chosen to focus on PFAS because we apply the precautionary principle for environmental reasons and we want to be prepared for stricter regulation of PFAS as a group. The biggest challenge for us right now is to work with our brand suppliers to map out products and processes that may contain PFAS. The next step, which is also expected to be a major challenge but perhaps an industry-wide one, will be to find and implement suitable alternatives so as to phase out PFAS.”

Is it more difficult to phase out PFAS from frying pans than from textiles - after all, your industry lags behind the textile industry?

“Our industry has not made demands for PFAS-free products to the same extent as the textile industry, which may be partly due to a lack of knowledge among both buying companies and consumers. As well as frying pans, which may be the first thing that comes to mind when talking about PFAS, we sell other products with nonstick coating such as waffle irons and sandwich grills that are also included in our mapping out.”

What have you received help with from the Swedish Centre for Chemical Substitution?

“We have received good advice and tips on how we can start our mapping of PFAS in the products we sell and how we can then set requirements and follow up with our suppliers and partners. We have also had the opportunity to collaborate with other companies on the phasing out of PFAS in kitchen equipment, which has also resulted in us now being a partner company in POPFREE.”

8 Labs

Can you prove that a product does not contain PFAS?

All the companies that want to get rid of PFAS, all these companies that want to know if their products are free of PFAS, all the merchants who wonder if the subcontractors can be trusted - how are they really supposed to know that a product is free of PFAS?

Well, they need to be able to use the lab. There would have to be a huge amount of lab work if all the companies that sell products that could possibly contain PFAS are to check them themselves.

Are there labs? How do the investigations work and what do they cost?

In a report from the Swedish Chemicals Agency (May 2021) that checked 36 different PFAS, you can read:

“Many commercial laboratories today have analysis packages with quantitative analyses of about 30 individual PFAS, so-called targeted analyses. The most common packages include about twenty individual PFAAs (perfluorinated alkyl acids) as well as a number of PFAA precursors. However, the PFAS that are analysed commercially are only a fraction of those available on the market and in the environment.... In this project, quantification of the individual PFAS has been carried out by the Norwegian Institute for Air Research (NILU). NILU has been able to offer an analysis package consisting of a total of 36 substances. To obtain a measurement of the total presence of PFAS in a sample, extractable organic fluorine (EOF) was also analysed. An EOF analysis does not provide any information on which individual PFAS are included, but in combination with quantitative analyses it can provide an indication of whether there is a high proportion of non-identified PFAS in a sample.”

In this case, NILU checked 36 different substances and could also get signs of whether there were also a lot of other non-identified PFAS in the samples. That's good, of course, but there are around 4,700 more PFAS variants.

We contacted Linda Hanssen at NILU in Tromsø with some questions about how it works in practice.

The lab purchases reference materials (standards for the 36 substances analysed) from the company Greyhound Chromatography in England, which is the European distributor for Wellington Labs in Canada. Ready-made diluted standards are obtained that come in small ampoules.

The price of the standards varies, in these cases from SEK 1,750 up to SEK 9,300. So for those who are going to check many products for many substances, it will be expensive. It should also be mentioned that high requirements must be set for the lab environment.

In addition to the fact that the standards are expensive, there must be an instrument that meets the requirements for the correct sensitivity and specificity. Quite advanced equipment is required to obtain a secure identification of the substance, which is especially important when it comes to such analyses. You have to have an instrument that can handle low detection limits, and such equipment costs over NOK 2 million.

“It can be difficult because there are many pitfalls. Remember that PFAS, and especially PFOA, are found in many products, such as Teflon. Teflon is something that is often used in wiring and other laboratory equipment. You must also be sure that the solvents and water used in the analysis are free of PFAS contamination. It is not certain that water purchased from a supplier, such as Avantor Sciences, is good enough. It needs to be checked. We have our own water purification plant for this,” says Linda Hanssen.

Of course, it takes competent staff and the knowledge of an analytical chemist to be able to make safe analyses and get the procedures in place so that you do not get any cross-contamination between samples, or between equipment and samples.

Gunnar Thorsén is another researcher in this field. He works at IVL, among other things on measurements of PFAS. At a webinar at Chemsec, he talked about how to measure PFAS in different products and what difficulties you may encounter. The whole thing is not easy, and it is easy to miss a lot.

We asked Gunnar a few questions and he wrote a long answer (3/11/2021). Here is an excerpt from the e-mail:

Can a shop guarantee its customers that a product is completely free of PFAS? For example, companies that sell a backpack, a sofa, a mascara or a sunscreen? Many shops probably think that their gadgets do not contain PFAS - but do they know? What do you say? *“A shop probably has a hard time guaranteeing customers that an item or product is completely PFAS-free. On the one hand, the analysis lab should not specify a value as zero, but you usually report it as below a specified reporting limit. You can make an estimate about total organically bound fluorine, which I was talking about, where you burn a piece of sample and look at how much fluoride will form. You can also extract the PFAS and burn the extract. It is more common to do the latter, but then there is an uncertainty that comes from the fact that, for example, polymeric PFAS are difficult to extract. Somewhere, you have to give a company a star at the edge or a recognition if they go so far as to 1) check their production chains and processes, 2) measure total organic fluorine with one of the above measurement techniques and do this with a low reporting limit.”*

Can a company in practice go to a lab itself and analyse PFAS in its products? Are there labs? What does it cost to analyse a backpack, a shoe, a makeup? Can you get certain answers? Can you say, not a single one out of 4,700 PFAS?

“Companies can go to different commercial labs and analyse this. There is at least one that does CIC, in addition to IVL. We collaborate with a German institute for the analysis itself. The question of analysing a shoe or a backpack is difficult to answer. Generally speaking, the analysis is not very expensive, much like a regular analysis (SEK 3,000 perhaps?). However, it is difficult to get a representative sample. Several consulting companies can probably help with this, including us. Secure answers are also a matter of interpretation, if, for example, the product contains a variety of materials (e.g. a shoe). It is probably important to think about which question you want answered.”

In conclusion, it can be stated that there is a great need for laboratory investigations. For large retailers, it will be expensive to ensure that the products they sell are free of PFAS. For small traders, it is impossible.

One possibility would be to require guarantees and markings when importing into the EU, to place the burden of proof on those who manufacture the goods in a third country and on those who import the goods into the EU.

9 What's happening in politics

The PFAS problem is on the political agenda globally, within the EU and in Sweden. Many are now hoping for quick and decisive action. We can compare the challenge with the problems that were facing the world with regard to ozone. At that time, an agreement was reached to phase out the production of a number of substances that were leading to a very dangerous ozone hole in the atmosphere.

The agreement adopted in 1987 was named the Montreal Protocol. It has been revised and tightened several times and described as one of the most successful, and most quickly decided, of all environmental agreements. Former UN Secretary General Kofi Annan described it as perhaps the “*most successful international agreement to date... “*.

Now the world is faced with the task of creating some kind of PFAS protocol. It remains to be seen how fast and how successful that work will be.

Sweden is pushing the issue at home and within the EU. In the government declaration of 15 September 2015, then Prime Minister Stefan Löfven said in the Riksdag that phasing out hazardous chemicals is important and that “*when the EU regulations are not enough, Sweden takes the lead*”.

Of the 16 Swedish environmental quality goals decided by the Riksdag, five of them at least address the PFAS issues. These environmental goals will not be achievable as long as we don't get PFAS emissions right. The five environmental goals are:

- A toxin-free environment
- Living lakes and watercourses
- Groundwater of good quality
- The sea in balance and a living coast and archipelago
- A good built environment

During the current parliamentary session 2021/22, there will be nine motions in the Riksdag that address PFAS. Members from six different parties have put forward motions. All of them address PFAS in a broader environmental perspective related to water, chemicals policy and general environmental and nature conservation. The interpellations and written questions raised in the Riksdag in recent years largely concern the Armed Forces' responsibility for PFAS emissions and contamination of drinking water.

Jessica Rosencrantz (Moderate Party) et al., writes:

“It is important that Sweden continues to push within the EU to limit the use of PFAS and phase out hazardous substances. In concrete terms, the government should demand harmonised legislation with strict limit values for PFAS in cardboard, ink, adhesives and binders through a stronger link with the chemicals legislation REACH.... The government should also work to phase out PFAS from consumer products in the long term, as well as work for measures to be taken to gradually phase out PFAS in packaging materials intended for food purposes throughout the EU.”

Kjell-Arne Ottosson (Christian Democrats) et al. write that “*a ban should be introduced on all PFAS except those substances where it can be shown that the environmental and health properties of the substances are acceptable*”.

Magnus Ek (Centre Party) et al. write that they want to “*speed up the phase-out of the chemical group PFAS in more consumer products*”

15 motions have been submitted during the 2021/22 parliamentary session that speak in favour of the polluter pays principle.

Maria Gardfjell (Green Party) et al. write in a motion:

“Which activities cause pollution and where need to be better mapped, and we need updated risk analyses of water supply areas. Of particular importance is such systematised information on PFAS emissions, which is crucial for putting in place the right measures. The polluter pays principle shall be upheld”.

Johan Pehrson (Liberals) et al. write in a motion about their climate policy:

“Polluters must pay. This stimulates innovation and new technologies have the opportunity to make an impact. Pricing the damaging behaviour creates powerful and, above all, reliable governance. It provides stable rules of the game and companies dare to invest in the long term because it is more profitable to choose climate-friendly solutions.”

At the Social Democratic Party’s congress in November 2021, the Ronneby and Karlskrona workers' groups had written a motion calling for *“the Social Democrats to work to ensure that all use of highly fluorinating substances, PFAS, is immediately banned in both Sweden and the EU”.*

The party board replied under heading “179 Toxin-free environment”:

“The EU’s recently adopted chemicals strategy aims both to achieve a toxin-free environment with a higher level of protection for human health and the environment and to strengthen the competitiveness of the EU chemicals industry. The measures in the strategy include replacing and minimising substances of concern and phasing out the most harmful chemicals from uses that are not necessary for society. It also includes all uses of highly fluorinating substances, PFAS.”

A search for "PFAS" on the websites of the parliamentary parties reveals that the issue is discussed by the Centre Party (C) (25 hits) and the Green Party (MP) (10 hits). On the websites of the Social Democrats and the Left Party we find one hit, on the other parliamentary parties nothing.

In November 2019, MEP Jytte Guteland (Social Democratic Party) had blood samples taken to check if she had various chemicals in her blood. She had, including several different PFAS. She wrote an opinion piece about this and highlighted, among other things, demands for EU legislation that bans all endocrine disrupting chemicals and that is based on known, presumed and suspected effects individually and in mixtures. She called for an international expert panel on chemicals and a binding global agreement to reduce exposure to chemicals in nature. Guteland also noted in her article that current legislation only regulates known endocrine disruptors, while substances that are presumed or suspected of having endocrine disrupting effects are omitted entirely. This is contrary to the precautionary principle that should guide EU chemicals legislation.

Miljöorganisationer som Greenpeace, WWF och Svenska Naturskyddsföreningen bedriver arbete mot PFAS. Som ett litet exempel kan nämnas att under vintern 2021 skrev Svenskt Vatten och Naturskyddsföreningen ett öppet brev till Svenska Skidförbundet och Svenska Skidskytteförbundet - sluta med fluorvallorna! Vi fick ingen reaktion alls från skidförbunden – trots påminnelser.

The Swedish Chemicals Agency, on behalf of the government, is pushing the PFAS issue aggressively within the EU. In 2020, the Swedish Chemicals Agency and authorities in three other EU countries (the Netherlands, Germany and Denmark) started work to

bring about a group ban on PFAS in the EU. They wish to put an end to all uses with the exception of those that could be deemed “essential” for important functions in society. At present, a declaration of intent is on the table of the European Chemicals Agency (ECHA) to ban the group of PFAS chemicals in the EU.

Many Swedish authorities are affected by environmental and health issues and take various initiatives in the PFAS question at the request of the government.

In order to bring more clarity and overview of the PFAS problems, a number of authorities have joined forces and have been publishing a PFAS Guide for several years. The nine Swedish authorities behind the guide are the Swedish Chemicals Agency, the Swedish Food Agency, the Swedish Environmental Protection Agency, the Swedish Civil Contingencies Agency (MSB), the Geological Survey of Sweden (SGU), the Swedish Geotechnical Institute (SGI), the Swedish Agency for Marine and Water Management, the Swedish Defence Inspectorate for Health and the Environment and the County Administrative Boards.

The Swedish Food Agency writes on its website that there are currently no binding limit values for PFAS in drinking water. However, drinking water must not contain any substances in such concentrations that they may pose a risk to human health. The agency has therefore adopted an “action level” for when to take action with elevated PFAS levels in drinking water. The action level is 90 nanograms per litre. The Swedish Food Agency recommends that all drinking water producers take this limit into account until there are legally binding limit values.

In 2020, the European Food Safety Authority (EFSA) set out its assessment of how much PFAS can be ingested without risk to health. The newly established health-based guideline value is 4.4 nanograms per kilogram of body weight per week and applies to four PFAS: PFOA, PFOS, PFNA and PFHxS.

The Swedish Food Agency's goal is to introduce a national limit value for PFAS in drinking water in Sweden when the EU's new Drinking Water Directive comes into force in 2023. The proposal at the time of writing is 4 nanograms per litre.

In November 2021, the Swedish Food Agency came up with a new report on PFAS in drinking water. It has investigated whether and where there are PFAS in raw water and drinking water in the country's municipalities. The data in the report comes from 580 waterworks in 257 municipalities. It writes in a press release (15/11/2021):

“The majority of the waterworks that reported analysis results had concentrations below 10 nanograms per litre of water. The highest concentration, which was found in two waterworks on single testing occasions, was 40 nanograms per litre. In other measurements, the concentrations were lower. These are concentrations that are below the current Swedish action level of 90 nanograms per litre and the limit value in the new Drinking Water Directive, which is 100 nanograms per litre.”

In 2019, *the Swedish Environmental Protection Agency* in collaboration with the Swedish Geotechnical Institute, produced a joint guideline on how PFAS can be risk assessed and remedied in contaminated areas. The purpose of the guidance is to increase regulators' knowledge of the risks, sources and characteristics of PFAS, as well as methods for addressing PFAS-contaminated sites.

In 2016, a report from a screening for the presence of PFAS and plant protection products in surface and groundwater was presented. The results show that PFAS are present in concentrations that can pose a risk to human health and the environment in connection with confirmed point sources, mainly fire drill sites. Over 2,000 known or potential local sources of PFAS were identified. The use of firefighting foam is the largest direct point source while wastewater treatment plants and waste management are likely to be significant secondary emission points.

Furthermore, *the Swedish Environmental Protection Agency* has recently produced guidance regarding PFAS and landfilling of waste.

The Swedish Civil Contingencies Agency (MSB) is primarily affected by PFAS when it comes to firefighting foam. Together with the Swedish Chemicals Agency and the Swedish Environmental Protection Agency, MSB advises against the use of fluorine-based firefighting foams for the vast majority of types of fires. These foam liquids shall only be used in cases where no other alternative extinguishing methods are applicable, usually in the case of extensive liquid fires. MSB is also involved in funding research in the field.

In 2014, MSB produced a report on firefighting foam on the Swedish and European markets. Among other things, it describes companies that manufacture firefighting foam with – and without – PFAS. They wrote, among other things, that “In Sweden there are two producers of firefighting foam liquid/chemicals: Fomtec AB and Kempartner. Fomtec’s factory is located in Helsingborg. Fomtec distributes its products on the international market, and distribution to the Swedish market takes place via Dafo, which is also a part-owner of Fomtec. Kempartner has its manufacturing in Vadstena. It manufactures film-forming foams, both with and without fluorinated tensides. Its biggest customer is MSB.”

The Geological Survey of Sweden (SGU) monitors, among other things, PFAS in groundwater through continuous measurements at over 700 measuring stations around Sweden. Together with the Swedish Food Agency, measures are being taken against the spread of PFAS in surface water, groundwater and drinking water.

The Swedish Agency for Marine and Water Management monitors and documents hazardous substances and conditions in the sea, lakes and watercourses. It is working on developing limit values for various hazardous substances.

As stated in the report, *the Swedish Chemicals Agency* is very active when it comes to PFAS and is pushing the issue aggressively within the EU.

In the spring of 2022, new Swedish regulations are being developed that will implement the new Drinking Water Directive in Swedish law and in Swedish government regulations. The limit values in drinking water, and how these should be adapted to EFSA’s recommendations, are not clear at present.

PFAS in the EU

Since the adoption of REACH, the EU’s work on chemicals, including PFAS, has intensified. Today, the issue is highly topical within the EU. The dispute is about two main things. First, about successfully introducing a group ban for all PFAS variants. As it stands, such a ban should be within reach and could at best take effect in 2025.

The second point of contention is about deciding which exceptions to such a ban should be accepted, i.e. the use of which PFAS should be considered “essential use”?

A group ban is already on the way. As mentioned earlier in the report, PFAS have already been addressed as a group in part in the new Drinking Water Directive and also in the European Food Safety Authority’s proposed limit values for PFAS.

The EU has already decided on a form of group ban on flame retardants (SCPP).

A group ban on PFAS could pave the way for even more substance groups, such as phthalates.

In 2020, the European Commission decided on a new Chemicals Strategy for Sustainability. The strategy is part of a vision of a toxin-free environment announced in the European Commission’s political agenda *The Green Deal*.

The Commission writes about PFAS that there is currently a lack of information on production volumes, use, manufacture, toxicological profiles and environmental effects for a large number of these substances. The quantity of PFAS and lack of information make it impossible to assess all PFAS, substance by substance. The Commission writes that this *“leads to the conclusion that it would be desirable, as far as possible, in a future regulation of PFAS to treat them as a group”*.

The discussion of "essential use" is going to be a hot potato. It will be lobbied. Cefic, the European Chemical Industry Council, is an interest organisation for the chemical industry in Europe. The organisation spends considerable resources on influencing in Brussels and is reported to have an annual budget of at least €10 million. Cefic is lobbying to influence what will be classified as "essential use" for PFAS. They organise seminars, write reports and court the European Commission, MEPs and others.

They question the possibilities of drawing any boundaries: *“What may be essential in one region and country may not be essential in another and regulation should take into consideration different perspectives.”*

Cefic questions whether a group ban can be reconciled with current EU legislation and believes that these are difficult issues that will require lengthy and unclear decision-making processes.

The European Commission has formulated itself on the issue of "essential use" in various ways. One formulation being discussed is: *“PFAS should only be allowed for essential uses when it is necessary for health and safety or critical for society, but also in the absence of technically/economically available alternatives”*.

Preparation has taken many years. The issue of "essential use" actually had its breakthrough in the EU Chemicals Strategy in 2020 when the issue was raised in respect of several very harmful chemicals. Clarifications were made that the concept of "essential use" will play an increasing role in chemical work and that the legislation is moving towards a narrower interpretation where "essential use" means essential for health and safety and essential for society.

Once a proposal is made for a group ban on all PFAS, with the exception of certain essential uses, consultations between a range of interest groups and companies await. Risk assessments must be carried out, as well as socio-economic assessments by various experts within the European Chemicals Agency (ECHA). Finally, political negotiations must take place before the European Commission presents a proposal for member states to vote on.

The lengthy work of regulating PFAS as a group is being followed with great interest all over the world as it may pave the way for several group bans on other chemicals.

At present, the European Commission has initiated a study to investigate the legal possibilities surrounding the criteria in the "essential use" exemption. This proposal is expected to be finalised in early 2022. After this, the Commission will produce a proposal on how "essential use" can be formulated and included in REACH and other chemicals legislation.

But the questions are many. What are the objective parameters to be considered when assessing "essential use"? Is it possible to limit only to health and safety? Is it reasonable to weigh in economic arguments? In which products and processes is it justifiable to allow hazardous chemicals?

Many agree that the concept of "essential use" and what is included may change as the legislation comes into force. Hopefully, in the future more innovations and opportunities for chemical substitution with less harmful effects will limit the "essential use" concept even more.

Many critical voices have been raised that the concept of "essential use" is in danger of being watered down.

One of them is Chemsec's senior toxicologist Anna Lennquist. She emphasises the importance of the "essential use" exception being as detailed as possible, right from the start.

“It's also about making the process effective. As soon as something needs to be discussed

in an expert committee, it takes a lot of time and resources from everyone and the risk is that the system clogs up again and nothing happens. 'paralysis by analysis' we sometimes call it. Therefore, it is good if as much as possible can be predetermined (in law or guidelines) to be essential or not, so that only the cases that really need to be discussed are brought up for discussion," says Anna Lennquist.

In its fact sheet "Let's not mix apples and oranges when it comes to essential use", Chemsec has described a number of questions we should ask ourselves so as to arrive at the conclusion that the use of such dangerous chemicals as PFAS is justified. Chemsec points out that instead of asking about what "essential use" is, the discussion should instead be about which products can be considered so "essential" that they must be used even if they contain chemicals that harm both human health and the environment. Chemsec also believes that it is important to withdraw permits for "essential use" as soon as alternatives are available on the market.

A new Drinking Water Directive has been adopted and is to be introduced in the national drinking water regulations by January 2023. The directive contains limit values for PFAS which are binding on all countries within the EU. The Drinking Water Directive is a so-called minimum directive, which means that each member state can choose to introduce stricter legislation in its national rules if reasons are found.

The new Swedish legislation is now being developed that will implement the Drinking Water Directive in Swedish law. The limit value for drinking water has been proposed at 4 nanograms per litre (May 2022).

PFAS are also discussed in the European Parliament. In June 2021, two Christian Democratic MEPs, Esther de Lange from the Netherlands and Cindy Franssen from Belgium, asked Environment Commissioner Virginijus Sinkevičius what the EU is doing to tackle PFAS pollution within the EU.

In his response, the Environment Commissioner referred to the Chemicals Strategy, which proposes to tackle the use of PFAS and contamination with PFAS, created by a group approach to be widely used in a wide range of areas including drinking water, food and industrial emissions. The European Commission stresses the need to tackle PFAS pollution at source in order to reduce emissions from production, use and waste management.

Two German MEPs from the Greens, Jutta Paulus and Sven Giegold, also raised the PFAS issue in 2021 and asked about PFAS in food packaging. They referred to a survey in six EU countries that showed that PFAS were present in many such products in all countries. The questions to the Commission were:

- What does the Commission intend to do to prevent food from being contaminated by PFAS via different types of packaging?
- When will paper and cardboard be included in the EU regulation of food contact materials?
- When will it be announced that action will be taken against the entire PFAS group, as promised in the EU Chemicals Strategy?

In brief, the Commission replied that it is currently reviewing the need to set maximum levels for certain PFAS in food. That it is currently allowed to sell food packaging with PFAS, but that those who sell these are obliged to ensure that they are not dangerous. However, the rules on all types of food packaging in the EU, including paper and cardboard, are currently being reviewed.

The Commission committed in the Chemicals Strategy to ban PFAS as a group in all firefighting foams and other uses, and to only allow use where essential for society. The definition of PFAS as a group is expected in 2022.

10 What do we want to see?

Svenskt Vatten continues to work to remove PFAS from the environment. The most important work is the upstream work. That is, to ensure that PFAS do not end up in our sewage systems and thus eventually in soil and water. We can never treat wastewater and stormwater to be completely free of PFAS. Emissions must be reduced in order to be eliminated in the long term.

The only way to succeed in this is to ban PFAS, in Sweden, in the EU and internationally. Sweden has said it wants to and can "take the lead". Which is good, but in practice completely inadequate because most PFAS toxins come via imported products and spread via air and water.

International work is absolutely crucial.

Svenskt Vatten sees the following initiatives as priorities in the work to stop the spread of PFAS in our environment:

The EU

- That in 2022 the EU defines PFAS as a group. That a PFAS ban shall enter into force within the Union by 2025.
- That this decision becomes very restrictive as regards the exceptions, and that "essential use" is strictly restricted.
- The EU should impose import bans on goods with PFAS, and the evidentiary requirements shall be on those who manufacture the goods in third countries, and/or on importers.
- The polluter pays principle (PPP) needs to be clarified, not least as regards the definition of who is to be considered the "polluter".
- In the long term, as a matter of principle, require approval of chemicals before they are placed on the market in the EU (which applies to cars, medicines or pesticides, where they are first approved, and then allowed to be sold).

Trade

- Those who market products containing PFAS are encouraged to voluntarily limit their sales of these products, and in the long run stop selling them altogether.
- Requirements for the labelling of goods should be tightened. Products containing PFAS, albeit in very small quantities, should be labelled with some form of PFAS warning. We can make a comparison with the requirements for the labelling of tobacco and advertisements for alcohol.

Public procurement

- Swedish municipalities, regions and authorities must set stricter requirements for PFAS in procurements by following the National Agency for Public Procurement's recommendations and using approved environmental labels.

The government

- The Swedish government, and the EU, should push for the creation of a global expert panel on chemicals (like the UN Intergovernmental Panel on Climate Change - IPCC) that can work to reduce the environment's exposure to hazardous chemicals.

Swedish elite sports, outdoor pursuits and associations

- Swedish winter sports, including all clubs, national teams and all organisers of races, should prohibit the use of ski waxes with PFAS.

Svenskt Vatten

- Svenskt Vatten's own members must commit to ensuring in their procurement that products with PFAS are not purchased. Water and sewerage principals shall inform the public about the risks of PFAS and regularly measure and publish PFAS levels in groundwater and/or drinking water.

We consumers

- We urge the country's consumers not to buy products containing PFAS, as well as to make demands on the merchants to stop selling such products.

Links, sources and supporting materials

Apoteket AB
Apoteket Hjärtat
Arla
Axfood (Hemköp & Willys)
Bergendahls (City Gross & Glitter)
Björn Axén
Body Shop
Cervera
Clas Ohlson
Coca-Cola
COOP
Ecco
Elgiganten -
Eurosko
Granit
Hemtex
H&M
ICA
Ikea
Indiska
Intersport
Isadora
Jula
Jysk
Kappahl
Kicks
Kronans Apotek
Lagerhaus
Lekia
Lidl
Lindex
Lumene
Lyko
Mekonomen
Mio
Naturkompaniet
NK
Rusta
Santa Maria, Paulig
Scan
Scorett
Stadium
Twilfit
Unilever Norden
XXL
Åhléns

About PFAS history:

<https://www.ewg.org/pfaschemicals/what-are-forever-chemicals.html>

https://pfas-1.itrcweb.org/fact_sheets_page/PFAS_Fact_Sheet_History_and_Use_April2020.pdf

Press releases from the Swedish Chemicals Agency about Sweden's work against PFAS in the EU:

<https://news.cision.com/se/kemikalieinspektionen/r/eu-forbjuder-200-pfas-amnen-efter-svenskt-initiativ,c3403224>

<https://news.cision.com/se/kemikalieinspektionen/r/sverige-driver-pa-for-pfas-forbud-inom-eu,c3386374>

Report from the Swedish Chemicals Agency 2021:

<https://www.kemi.se/download/18.663e01517a129aa97fef3/1624543600780/Tillsyn-7-21-PFAS-i-kemiska-produkter-och-varor.pdf>

PFAS Guide

<https://www.kemi.se/kemiska-amnen-och-material/hogfluorerade-amnen---pfas/guide-om-pfas>

EU candidate list:

<https://www.kemi.se/lagar-och-regler/reach-forordningen/kandidatforteckningen>

Nordic Council of Ministers report on socio-economic costs due to PFAS:

<http://norden.diva-portal.org/smash/get/diva2:1295959/FULLTEXT01.pdf>

ECHA report, PFAS - Spread and risks in the EU:

<https://echa.europa.eu/documents/10162/7830b3db-f564-5f15-3507-e326168fccdd>

The National Agency for Public Procurement, on eco-labels:

<https://www.upphandlingsmyndigheten.se/frageportalen/1835210/stalla-krav-pa-svanenmarkt-tjanst/>

ADDA on procurement:

<https://www.adda.se/om-oss/vi-tar-ansvar-for-hallbarhet/kemkollen/>

Swedish Food Agency, press release on PFAS and drinking water:

<https://www.livsmedelsverket.se/om-oss/press/nyheter/pressmeddelanden/livsmedelsverkets-kommunenkat-inga-pfas-halter-over-atgardsgransen-men-fler-kommuner-behover-undersoka-sitt-dricksvatten>

PFAS in fire foam:

<https://www.sciencedirect.com/science/article/abs/pii/S0045653516303770>

<https://www.eurofins.se/tjaenster/miljoe-och-vatten/nyheter-miljo/top-analys-av-brandskum-moemlighet-att-synliggoera-pfas-innehaall/>

MSB on fire foam:

<https://www.msb.se/siteassets/dokument/amnesomraden/skydd-mot-olyckor-och-farliga-amnen/raddningstjanst/kartlaggningsrapport-over-skumvat-skor-pa-den-svenska-marknaden.pdf>

<https://www.msb.se/siteassets/dokument/amnesomraden/skydd-mot-olyckor-och-farliga-amnen/raddningstjanst/studie-av-brandslackningsmedel-ur-ett-miljoperspektiv.pdf>

<https://rib.msb.se/filer/pdf/6765.pdf>

EU candidate list + chemicals legislation on information requirements etc.:

<https://www.kemi.se/lagar-och-regler/reach-forordningen/kandidatforteckningen>

European Commission, Green Deal:

https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1839

On lobbying about PFAS in the EU:

<https://www.desmog.com/agribusiness-database-european-chemical-industry-council-cefic/>

<https://cefic.org/media-corner/newsroom/defining-essential-use-of-chemicals-what-is-at-stake/>

On "essential use" exceptions:

https://ec.europa.eu/environment/pdf/chemicals/2020/10/SWD_PFAS.pdf

Cefic on pfas:

<https://cefic.org/app/uploads/2021/06/Cefic-views-on-grouping-of-substances.pdf>

About substitution:

<https://www.kemi.se/vagledning-till-foretag/rad-och-tips-till-foretag/substitution-av-farliga-amnen>

<https://www.kemi.se/om-kemikalieinspektionen/vart-uppdrag/utbildningar-och-seminarier/forum-for-giftfri-miljo>

<https://www.ri.se>

<https://chemsec.org/pfas>

<https://www.industripress.se/industrin-satsar-pajpy-utfasning-av-pfas>

Open letter – stop with the fluoride waxes:

<https://www.svensktvatten.se/om-oss/nyheter-lista/oppet-brev-till-svenska-skidforbundet-och-svenska-skidskytteforbundet---sluta-med-fluorvallorna/>

IVL on the incineration of PFAS:

<https://www.ivl.se/toppmeny/press/pressmeddelanden-och-nyheter/nyheter/2021-11-10-ny-rapport-om-pfas-fran-avfallsforbranning.html>

Uppsala University on the incineration of PFAS:

<https://www.diva-portal.org/smash/get/diva2:1361658/FULLTEXT01.pdf>

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