National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport

baua: Bundesanstalt für Arbeitsschutz und Arbeitsmedizin

KEMI Swedish Chemicals Agency

NORWEGIAN ENVIRONMENT AGENCY

Ministry of Environment and Food of Denmark
Environmental Protection Agency

2nd Stakeholder Consultation on a Restriction for PFAS

I. Reasons and aims of this analysis

Update: The submission period was extended from the 19th of September to the 17th of October 2021!

The competent authorities for REACH of the Netherlands, Germany, Denmark, Sweden and Norway are currently preparing a REACH Annex XV Restriction Dossier for the group of PFAS (per- and polyfluoroalkyl substances) described below (as defined under Section II. Substances) since all these substances are considered to be persistent.

The consequences of this persistence include that the presence of these substances in the environment is practically irreversible, and pose an unacceptable risk to the environment and humans. All uses of PFAS (professional and industrial uses, consumer uses of mixtures and articles) result in emissions into the environment and contribute to the overall concentrations of PFAS in the environment. Many members of this group already occur ubiquitously in the environment and contaminate the ground- and untreated water due to their high mobility. In addition, some of these substances accumulate in biota and/or are suspected to be toxic.

In view of these properties, the above mentioned competent authorities for REACH are considering proposing EU-wide measures covering all PFAS (as defined under Section II. Substances) to reduce those risks.

This questionnaire is intended to provide you/the respondents with the current overview the five authorities have on the different uses of PFAS. By checking the presented data and providing feedback you/the respondents can ensure that the correct information is used for the assessment and preparation of a REACH Annex XV Restriction Dossier. Furthermore, you/the respondents can provide the authorities with currently still lacking information. EEA tonnages & emissions presented depict the European perspective, which the authorities created from the gathered information. If tonnages or emissions are challenged, please do so at European level, not at individual company level. For alternatives (and transition costs) this is slightly different and individual companies likely have valuable information.

I. Reasons and aims of this analysis

General:
The purpose of the 'investigation report summaries' (download is possible on the next page) is to present our current knowledge and understanding regarding uses of PFAS with a focus on use tonnages, emissions, alternatives and substitution costs, etc. The data are important for both risk assessment and the socio economic analysis (SEA).
The investigation report summaries have been prepared based on more detailed PFAS use investigations. It should be noted that these investigation report summaries should not be considered to be equivalent to the Annex XV restriction report, which is in a preparation phase.
Presented data reflect the current knowledge and during the project new data might become available. It is not guaranteed that the information presented here will be used in the Annex XV restriction report or in the presented way. For instance: Presented quantities or costs could be higher or lower.
The information provided is largely of a general nature and is not intended to address the specific circumstances of any particular individual or entity. Further, the information is not professional or legal advice. In case respondents fill out the survey several times, only the latest entry will be considered.

Scope:
This survey is intended to provide an opportunity for stakeholders to confirm the understanding of the five countries prepararing the restriction proposal, or provide updated information, on PFAS uses, including tonnages, emissions, alternatives and transition costs. Information can also be valuable, if it confirms estimates that are currently marked as uncertain by the five countries.
This survey is not intended as an opportunity to provide feedback on the essential use concept.
This survey is not intended as an opportunity to provide feedback on the (chemical) scope of the proposed restriction.
The use of PFAS in fire fighting foams is not part of this call for evidence. ECHA is preparing a separate Annex XV restriction dossier on this use.
Stakeholders are invited to add information on uses not mentioned in the report summaries under section A (general questions).

Public sources / literature references:
Presented numbers (i.a. tonnages & emissions) represent the situation in the European Economic Area (EEA). If you have a different view, please provide this information on EEA level with reference to public sources.
In case transition times are applicable due to substitution, please refer to the respective legal text where possible. In instances where the information presented in the investigation report summaries is challenged, but no reference to literature or public sources are made to justify such challenges, we are unlikely to be able to take the comments into account.

Others:
PFAS tonnages for the described uses cannot be added up for a full tonnage overview as this might lead to double counting. In case no information is available, the authorities will follow a reasonable worst-case approach when estimating emissions to the environment. Concerning the presented summaries, the authorities from the five countries do not accept any liability with regard to the use that may be made of the information contained. Use of the information in these summaries remains the sole responsibility of the reader. Although, the information provided in the summaries has been prepared with the utmost care, possible errors or omissions cannot be excluded. The authorities from the five countries do not accept any liability with regards to any such errors or omissions.

II. PFAS in scope

As indicated by the name, per- and polyfluoroalkyl substances (PFASs) comprise a group of organic substances containing alkyl groups on which all or many of the hydrogen atoms have been replaced with fluorine as structural fragments.

PFAS in the scope of this call for evidence have the following structural formula:

X-(-CF_2-)n-X' with n ≥ 1 and X, X' not being H (thus including X-CF_3) meaning fluorinated substances that contain at least one aliphatic carbon atom that is both, saturated and fully fluorinated, i.e. any chemical with at least one perfluorinated methyl group (-CF_3) or at least one perfluorinated methylene group (-CF_2-), including branched fluoroalkyl groups and substances containing ether linkages, fluoropolymers and side chain fluorinated polymers.

Although all PFAS will be considered for regulation, a non-exhaustive list of the most frequently used substances and substance groups may be found in the supplementary document accompanying this questionnaire and consultation which can be downloaded under the following link: Supplementary document.pdf

III. Target group of this questionnaire

Questions are addressed to the whole supply chain including **industry associations, manufacturers, importers, distributors and downstream users**.

Of interest is information on **PFAS** and **alternatives to PFAS.** Both, PFAS as such and PFAS contained in mixtures and articles are of relevance. Alternatives include chemical (non-fluorinated) as well as technical replacements for PFAS.

Please note that this questionnaire consists of 66 pages in total. It will, however, allow you to navigate through blocks of questions depending on your type of information or data. Hence, you will be able to specifically respond to the questions relevant to you. There will be max. 4 pages of questions per use ticked in Section A (general questions).

In the table below, the hyperlinks on the right side will allow you to download summary reports for the different uses for which further information is requested. In some cases a second hyperlink is available. In these cases the lead authority assessing the use already published a summary report on their website.

Use	Hyperlinks to report summaries
Cleaning agents, polishes and waxes (non-industrial uses)	Report summary cleaning agents polishes waxes july 2021.pdf
Cosmetics	Report summary cosmetics july 2021.pdf

Food contact materials & packaging	Report summary food contact materials and packaging july 2021.pdf
Lubricants	Report summary lubricants july 2021.pdf
Construction products	Report summary construction july 2021.pdf
Medical devices	Report summary medical devices july 2021.pdf
Medicinal products	Report summary medicinal products july 2021.pdf
Metal plating & manufacturing of metal products	Report summary metal plating and manufacturing of metal products july 2021.pdf
PFAS production (manufacturing)	Report summary PFAS and PFAS polymer production july 2021.pdf
Ski treatment	Report summary ski treatment july 2021.pdf PFAS in the treatment of skis - use, emissions and alternatives
TULAC (textiles, upholstery, leather, apparel and carpets)	Report summary TULAC july 2021.pdf
Petroleum & mining	Report summary petroleum and mining july 2021.pdf PFAS in mining and petroleum industry – use, emissions and alternatives
F-gas uses	Report summary F gas uses july 2021.pdf Application of Fluorinated Gases (F-Gases) in the European Economic Area
Electronics & energy	Report summary electronics and energy july 2021.pdf
Transportation	Report summary transportation july 2021.pdf
Waste	Report summary waste july 2021.pdf

IV. Information on institute/organisation/person & data protection rights

Information on institute/organisation/person & data protection rights can be downloaded via the following link: GDPR.pdf

Fields marked with * on this page are mandatory fields.

PERMISSION FOR INFORMATION PURPOSES: I agree to the personal data I provide in the present survey, including my name and my e-mail address, to be collected, processed and stored for potential follow-up questions regarding this survey by the service provider of the Federal Institute for Occupational Safety and Health (BAuA), namely Webropol Deutschland GmbH, and to these being subsequently stored in the database of the Federal Office for

Chemicals.
*

- (●) Yes
- ( ) No

Information on institute/organisation/person

Name *

Surname *

Name of institute/organisation *

E-Mail *

Can we contact you with follow-up questions? *

- ( ) Yes
- ( ) No

Note on Confidentiality of information and data

I understand that it is my responsibility not to include confidential information in responses to general comments and in any responses to requests for specific information (e.g. company name, properties, assets, costs etc.). The competent authorities for REACH will not be held liable for any damages caused.
*

- ( ) Yes

I understand that it is my responsibility to mark confidential data and attachments as confidential. *

- ( ) Yes

V. Questions - Section A - General questions

For which use would you like to submit information? Please select all uses on which you would like to provide information.

- [ ] Cleaning agents, polishes, waxes (non-industrial uses)
- [ ] Cosmetics
- [ ] Food contact materials & packaging
- [ ] Lubricants
- [ ] Construction products
- [ ] Medical devices
- [ ] Medicinal products
- [ ] Metal plating & manufacturing of metal products
- [ ] PFAS production (manufacturing)
- [ ] Ski treatment
- [ ] TULAC (textiles, upholstery, leather, apparel and carpets)
- [ ] Petroleum & mining
- [ ] F-gases
- [ ] Electronics & energy
- [ ] Transportation
- [ ] Waste

If relevant, please further specify your use (e.g. textiles used in personal protective equipment).

200 characters left

Are certain uses of PFAS missing in the categories above?

200 characters left

V. Questions - Section B - Cleaning agents, polishes & waxes (non-industrial uses)
Questions in relation to the use (mainly for industry associations)

The following linked information presents the current picture: Report summary cleaning agents polishes waxes july 2021.pdf

In the tables presented on this page and the following, '?' in the cells show that the authorities do not have any information available. Input to fill these gaps is highly appreciated.

Sub-Use	Tonnage (tonnes/PFAS) per year in the EEA	Expected trend (--/-/0/+/++)[1]	Emissions/year in EEA[2] (tonnes/PFAS)
Cleaners (for glass, metal, ceramic, carpet and upholstery)	?	?	?
Aftermarket carpet care	?	?	?
Dishwashing products (rinse aids)	?	?	?
Dry cleaning products	?	?	?
Waxes and polishes (for i.e. furniture, floors and cars)	?	?	?
Windshield wiper fluids	?	?	?
Windshield treatments (for automobiles)	?	?	?
Rain-repellent fluids	?	?	?

[1] -- = strong decrease, - = decrease, + = increase, ++ = strong increase, 0 = neutral

[2] Emissions relate to mixture/article production and mixture/article use. They do not include PFAS production and the
waste stage of the articles. These emissions are covered in a separate section.

How much PFAS do you use anually? If the exact amount is not known, estimates can be provided.

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Do you have information on the percentage of PFAS outlined in the question above that is released into the environment?

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The environmental release category (ERC) is a key REACH use descriptor to define the release factors of a chemical substance in a specific use exposure scenario. It is used in various modelling tools to derive environmental exposure estimates. ERC default factors are used to estimate emissions of PFAS in three major life-cycle stages, namely the production stage including manufacture of substances, formulation of mixtures and production of articles, the 'in-use' stage, and the waste stage.

Please indicate if you have information on specific emission values (SPERCs) for (groups of) PFAS, based on measurements and / or model calculations.

1000 characters left

Please indicate qualitatively or quantitatively, whether the use of PFAS in cleaning agents, polishes and waxes will increase, decrease or remain constant.

	strong increase	increase	constant	decrease	strong decrease	no information
Cleaning agents	◯	◯	◯	◯	◯	◯
Polishes	◯	◯	◯	◯	◯	◯
Waxes	◯	◯	◯	◯	◯	◯

V. Questions - Section C - Cleaning agents, polishes & waxes (non-industrial uses)

Questions in relation to alternatives (mainly for individual companies)

Sub-Use	Non-PFAS alternatives
Cleaners (for glass, metal, ceramic, carpet and upholstery)	- hydrocarbon or silicone based surfactants - siloxane gemini surfactants
Aftermarket carpet care	- silicone dioxide
Dishwashing products (rinse aids)	?
Dry cleaning products	?
Waxes and polishes (for i.e. furniture, floors and cars)	- carnauba wax - nonfluorinated non-ionic or anionic surfactants
Windshield wiper fluids	- non fluorinated surfactants (e.g. sodium dioctyl sulfosuccinate)
Windshield treatments (for automobiles)	- polydimethylsiloxane
Rain-repellent fluids	?

What is the specific application/functionality of PFAS in your product(s)/processes?

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Are in your view the listed non-PFAS alternatives technically feasible in your product(s)/processes?

◯ Yes

- ◯ No

Please specify why.

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Are in your view the listed non-PFAS alternatives economically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Do you have information on the alternatives' risk profile?

- ◯ Yes
- ◯ No

Please describe.

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Are there legal approval schemes for your product(s)/processes, which have to be taken into account in case PFAS alternatives will be used?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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What is the average approval time?

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Do you actively work on finding alternatives?

- ◯ Yes
- ◯ No

Please specify.

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If alternatives have been identified as potentially suitable, which timescale do you foresee for a complete transition to those? Please explain.

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Do you have information on additional alternatives for any of the described applications that have not been disclosed in the attached information?

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V. Questions - Section D - Cleaning agents, polishes & waxes (non-industrial uses)
Questions in relation to impact of legislative measures (for companies and industry associations)

What is the economic impact (in euro) and social impact (e.g. jobs) on your business/company if the use of PFAS is prohibited?

a) In 3 years.

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b) In 10 years.

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c) Please explain by providing your calculations.

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What is the economic impact (euro) on your business/company, if the following measures will become mandatory? Please make your (indicative) calculations transparent.

a) A maximum concentration of e.g. 0.1% (or less) PFAS is set in mixtures and/or articles.

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b) Obligation to label your products visibly with "Contains PFAS".

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c) Obligation to report amount of PFAS in use and respective emissions.

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d) Specific waste management requirements with the obligation to collect, treat or recycle PFAS containing waste separately.

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e) In case you are using PFAS polymers: no PFAS processing aids are allowed during polymer production

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V. Questions - Section B - Cosmetics

Questions in relation to the use (mainly for industry associations)

The following linked information presents the current picture: Report summary cosmetics july 2021.pdf

In the tables presented on this page and the following, '?' in the cells show that the authorities do not

have any information available. Input to fill these gaps is highly appreciated.

Sub-Use	Tonnage (tonnes F) per year in the EEA[1]	Expected trend (--/-/0/+/++)[2]	TF Emission[3]/year EEA (tonnes F)	EOF Emissions[4]/year in EEA[5] (tonnes F)
Skin Care	8.2	0	6.2	0.009
Toiletries	0.6	0	0.5	0.3
Hair Care	1	0	0.9	0.5
Perfumes and Fragrances	0	0	0	0
Decorative Cosmetics	1.2	0	0.7	0.2

[1] Based on the total fluorine (TF) measurements. Quantities PFAS/year are obtained by using a conversion factor of
1.4-2.0.

[2] -- = strong decrease, - = decrease, + = increase, ++ = strong increase, 0 = neutral

[3] Emissions to wastewater based on the total fluorine (TF) measurements.

[4] Emissions to wastewater based on total extractable organic fluorine (EOF) measurements.

[5] Emissions relate to mixture/article use. They do not include PFAS production and the waste stage of the articles. These emissions are covered in a separate section. Also note that emissions do not include mixture/article production..

Do you have information that indicates that the information provided on the tonnage should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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Do you have information that indicates that the information provided on the emissions should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information that indicates that the information provided on the expected trend should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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Do you have information on risk management measures to minimize the use, human exposure and emissions to the environment for your application of PFAS?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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V. Questions - Section C - Cosmetics

Questions in relation to alternatives (mainly for individual companies)

Sub-Use	Non-PFAS alternatives[1]
Skin care	?
Toiletries	?
Hair Care	?
Perfumes and fragrances	?
Decorative cosmetics	?

[1] Based on the information gathered so far, the authorities conclude that PFAS can be replaced by other ingredients and do not have unique functions. One reason is that there are far more non-PFAS cosmetic products within the same product categories as the PFAS containing products.

What is the specific application/functionality of PFAS in your product(s)/processes?

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Are in your view the listed non-PFAS alternatives technically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Are in your view the listed non-PFAS alternatives economically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Do you have information on the alternatives' risk profile?

- ◯ Yes
- ◯ No

Please describe.

1000 characters left

Are there legal approval schemes for your product(s)/processes, which have to be taken into account in case PFAS alternatives will be used?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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What is the average approval time?

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Do you actively work on finding alternatives?

- ◯ Yes
- ◯ No

Please specify.

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If alternatives have been identified as potentially suitable, which timescale do you foresee for a complete transition to those? Please explain.

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Do you have information on additional alternatives for any of the described applications that have not been disclosed in the attached information?

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V. Questions - Section D - Cosmetics

Questions in relation to impact of legislative measures (for companies and industry associations)

What is the economic impact (in euro) and social impact (e.g. jobs) on your business/company if the use of PFAS is prohibited?

a) In 3 years.

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b) In 10 years.

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c) Please explain by providing your calculations.

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What is the economic impact (euro) on your business/company, if the following measures will become mandatory? Please make your (indicative) calculations transparent.

a) A maximum concentration of e.g. 0.1% (or less) PFAS is set in mixtures and/or articles.

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b) Obligation to label your products visibly with "Contains PFAS".

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c) Obligation to report amount of PFAS in use and respective emissions.

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d) Specific waste management requirements with the obligation to collect, treat or recycle PFAS containing waste separately.

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e) In case you are using PFAS polymers: no PFAS processing aids are allowed during polymer production.

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V. Questions - Section E - Cosmetics
Specific questions for the use

Do you have information on emissions from production of cosmetic products? Where possible, refer to literature/public sources.

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The current estimate for the total quantity of cosmetic products on the EEA market is approximately 2.3 Mtonnes/year. Is this a reasonable estimate? If not, please provide more relevant data. Where possible, refer to literature/public sources.

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V. Questions - Section B - Food contact materials & packaging
Questions in relation to the use (mainly for industry associations)

The following linked information presents the current picture: Report summary food contact materials and packaging july 2021.pdf

In the tables presented on this page and the following, '?' in the cells show that the authorities do not have any information available. Input to fill these gaps is highly appreciated.

Sub-Use	**Tonnage (tonnes/PFAS) per year in the EEA** **PFAS solely polymers in table**	**Expected trend (--/-/0/+/++)[1]**	**Emissions/year in EEA[2] (tonnes/PFAS)**

Packaging	Product: 41,351,000 (paper and board) Product: 20,500,000 (plastic packaging) PFAS: 827 - 4,962 (in paper and board) PFAS: ? (for plastic packaging)	+ (3%)	124 - 871
Cookware	Product: ? PFAS: 3,500 (Plastic Europe, AFW, 2017)	+ (5%)	1,633 - 4,716 (mainly recoating emissions)
Industrial applications	Product: ? PFAS: 3,000[3] (Plastic Europe, AFW, 2017)	++ (10 - 20%)	

[1] -- = strong decrease, - = decrease, + = increase, ++ = strong increase, 0 = neutral

[2] Emissions relate to mixture/article production and mixture/article use. They do not include PFAS production and the waste
stage of the articles. These emissions are covered in a separate section.

[3] Including pharmaceuticals (could not be disaggregated).

Do you have information that indicates that the information provided on the tonnage should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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Do you have information that indicates that the information provided on the emissions should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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The environmental release category (ERC) is a key REACH use descriptor to define the release factors of a chemical substance in a specific use exposure scenario. It is used in various modelling tools to derive environmental exposure estimates. ERC default factors are used to estimate emissions of PFAS in three major life-cycle stages, namely the production stage including manufacture of substances, formulation of mixtures and production of articles, the 'in-use' stage, and the waste stage.

Please indicate if you have information on specific emission values (SPERCs) for (groups of) PFAS, based on measurements and / or model calculations.

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Do you have information that indicates that the information provided on the expected trend should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information on risk management measures to minimize the use, human exposure and emissions to the environment for your application of PFAS?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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V. Questions - Section C - Food contact material & packaging
Questions in relation to alternatives (mainly for individual companies)

Sub-Use	Non-PFAS alternatives
Packaging	- natural greaseproof paper - vegetable parchment - clay coatings - silicone - biopolymers (e.g. chitosan, starch, cellulose, polyvinyl alcohol, bioplastics such as polylactic acid (PLA), biowaxes) - synthesis plastics (e.g. low-density polyethylene (LDPE), linear low-density polyethylene (LLDPE),

	high density polyethylene (HDPE), polypropylene (PE), ethylene vinyl alcohol (EVOH), polyvinyl alcohol (PVOH), polyvinylidene chloride (PVDC), polyethylene terephthalate (PET)) - microfibrillar cellulose (MFC), cellulose nanofibrils (CNFs), cellulose nanocrystals (CNCs) - aqueous dispersions of co-polymers (e.g. styrene acrylic emulsion (SAE)) - aqueous dispersions of waxes (e.g. TopScreen) - water soluble hydroxyethylcellulose (HEC) - alkyl succinic anhydride (ASA), alkyl ketene dimer (AKD) - aluminium foil - lamination using impermeable barriers - other plant fibres (miscanthus, etc.) - bitumen coating - re-usable materials
Consumer cookware	- 'ceramic' coatings (sol-gel) as replacement of coating material - silicone coatings as replacement of coating material - silicone cookware (not coated metal) as alternative base material, uncoated - superhydrophobic coatings and hydrophobic coatings as replacement of coating material (Nanoscopic layer which is able to resist water. They are made from different materials like zinc oxide polystyrene, precipitated calcium carbonate, carbon nano-tube substances, manganese oxide polystyrene.) - enamelled cast iron / seasoned cast iron as alternative base material and non-stick coating - full ceramic cookware (not just coated) as alternative base material - carbon steel as alternative base material, uncoated - anodized aluminium coating as alternative base material, may be coated - stainless steel as alternative base material, uncoated - copper as alternative base material, uncoated
Industrial applications	- stainless steel - ceramic coatings - silicone and silicone coatings - synthetic rubbers and similar compounds (nitrile rubber, ethylene propylene rubber, neoprene, PES (polyethersulfone))

What is the specific application/functionality of PFAS in your product(s)/processes?

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Are in your view the listed non-PFAS alternatives technically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Are in your view the listed non-PFAS alternatives economically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

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Do you have information on the alternatives' risk profile?

- ◯ Yes
- ◯ No

Please describe.

1000 characters left

Are there legal approval schemes for your product(s)/processes, which have to be taken into account in case PFAS alternatives will be used?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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What is the average approval time?

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Do you actively work on finding alternatives?

- ◯ Yes
- ◯ No

Please specify.

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If alternatives have been identified as potentially suitable, which timescale do you foresee for a complete transition to those? Please explain.

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Do you have information on additional alternatives for any of the described applications that have not been disclosed in the attached information?

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V. Questions - Section D - Food contact material & packaging Questions in relation to impact of legislative measures (for companies and industry associations)

What is the economic impact (in euro) and social impact (e.g. jobs) on your business/company if the use of PFAS is prohibited?

a) In 3 years.

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b) In 10 years.

1000 characters left

c) Please explain by providing your calculations.

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What is the economic impact (euro) on your business/company, if the following measures will become mandatory? Please make your (indicative) calculations transparent.

a) A maximum concentration of e.g. 0.1% (or less) PFAS is set in mixtures and/or articles.

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b) Obligation to label your products visibly with "Contains PFAS".

1000 characters left

c) Obligation to report amount of PFAS in use and respective emissions.

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d) Specific waste management requirements with the obligation to collect, treat or recycle PFAS containing waste separately.

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e) In case you are using PFAS polymers: no PFAS processing aids are allowed during polymer production.

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V. Questions - Section E - Food contact material & packaging
Specific questions for the use

If available, please provide information that allows a quantitative estimation of PFAS emissions during the manufacture of consumer and industrial applications as well as food packaging material.

1000 characters left

If available, please proivde data on (PFAS impurities in) polymer production aids emission during the production of consumer cookware & industrial applications.

1000 characters left

If available, please provide information on the use of fluorinated gas or fluorinated processing aids in plastic packaging production (food as well as non-food packaging).

1000 characters left

V. Questions - Section B - Lubricants
Questions in relation to the use (mainly for industry associations)

The following linked information presents the current picture: Report summary lubricants july 2021.pdf

In the tables presented on this page and the following, '?' in the cells show that the authorities do not have any information available. Input to fill these gaps is highly appreciated.

Sub-Use	Tonnage (tonnes/PFAS) per year in the EEA	Expected trend (--/-/0/+/++)[1]	Emissions/year in EEA[2] (tonnes/PFAS)
Formulation of lubricants	< 3,000	+ (5% up to 2030)	in soil, surface water and air: 50 in waste stage: 40
In-use stage (sealed articles)	< 3,000	+	80
In-use stage (open applications)	100	+	90

[1] -- = strong decrease, - = decrease, + = increase, ++ = strong increase, 0 = neutral

[2] Emissions relate to mixture/article production and mixture/article use. They do not include PFAS production and only for
the formulation of lubricants also the waste stage of the articles. The emissions for PFAS production and the waste stage
are also covered in a separate section.

Do you have information that indicates that the information provided on the tonnage should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information that indicates that the information provided on the emissions should be

adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

The environmental release category (ERC) is a key REACH use descriptor to define the release factors of a chemical substance in a specific use exposure scenario. It is used in various modelling tools to derive environmental exposure estimates. ERC default factors are used to estimate emissions of PFAS in three major life-cycle stages, namely the production stage including manufacture of substances, formulation of mixtures and production of articles, the 'in-use' stage, and the waste stage.

Please indicate if you have information on specific emission values (SPERCs) for (groups of) PFAS, based on measurements and / or model calculations.

1000 characters left

Do you have information that indicates that the information provided on the expected trend should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information on risk management measures to minimize the use, human exposure and emissions to the environment for your application of PFAS?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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V. Questions - Section C - Lubricants

Questions in relation to alternatives (mainly for individual companies)

Sub-Use	Non-PFAS alternatives
PTFE (micropowder)	- graphite - amorphous silica - molybdenum disulphide - boron nitride, other inorganics (e.g. layer building zinc phosphates) - water-based phenolic-melamine gold lacquer' alternative (still in R&D phase)
PTFE-thickened silicone oil for specific applications	- polyurea
High-bearing aromatic thermosetting polyester (ATSP) coating	- graphene

What is the specific application/functionality of PFAS in your product(s)/processes?

1000 characters left

Are in your view the listed non-PFAS alternatives technically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Are in your view the listed non-PFAS alternatives economically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Do you have information on the alternatives' risk profile?

- ◯ Yes
- ◯ No

Please describe.

1000 characters left

Are there legal approval schemes for your product(s)/processes, which have to be taken into account in case PFAS alternatives will be used?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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What is the average approval time?

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Do you actively work on finding alternatives?

- ◯ Yes
- ◯ No

Please specify.

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If alternatives have been identified as potentially suitable, which timescale do you foresee for a complete transition to those? Please explain.

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Do you have information on additional alternatives for any of the described applications that have not been disclosed in the attached information?

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V. Questions - Section D - Lubricants

Questions in relation to impact of legislative measures (for companies and industry associations)

What is the economic impact (in euro) and social impact (e.g. jobs) on your business/company if the use of PFAS is prohibited?

a) In 3 years.

1000 characters left

b) In 10 years.

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c) Please explain by providing your calculations.

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What is the economic impact (euro) on your business/company, if the following measures will become mandatory? Please make your (indicative) calculations transparent.

a) A maximum concentration of e.g. 0.1% (or less) PFAS is set in mixtures and/or articles.

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b) Obligation to label your products visibly with "Contains PFAS".

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c) Obligation to report amount of PFAS in use and respective emissions.

1000 characters left

d) Specific waste management requirements with the obligation to collect, treat or recycle PFAS containing waste separately.

1000 characters left

e) In case you are using PFAS polymers: no PFAS processing aids are allowed during polymer production.

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V. Questions - Section B - Construction products

Questions in relation to the use (mainly for industry associations)

The following linked information presents the current picture: Report summary construction products july 2021.pdf

In the tables presented on this page and the following, '?' in the cells show that the authorities do not have any information available. Input to fill these gaps is highly appreciated.

Sub-Use		Tonnage (tonnes/PFAS) per year in the EEA	Expected trend (--/-/0/+/++)[1]	Emissions/year in EEA[2] (tonnes/PFAS)
Polymeric PFAS	Formulation of articles and commercial construction mixtures	7,390	++ (5 - 8% for PTFE, PVDF, EFTE until 2030)	in soil, surface water and air: 330 in waste stage: 170
	In-use stage (outdoor articles)	3,270		in soil, surface water and air: 212
	In-use stage (indoor applications)	3,270		in soil, surface water and air: 2
	In-use stage (outdoor mixtures)	164		in soil, surface water and air: 9
	In-use stage (indoor mixtures)	150		in soil, surface water and air: 0.1
Non-polymeric PFAS	Formulation of articles and commercial construction mixtures	10,900	+ (1% for 2020 -2050)	in soil, surface water and air: 273 in waste stage: 163
	Use of processing aids	3,700		in soil, surface water and air: 5 in waste stage: 3,695
	In-use stage (outdoor articles)	1,712		in soil, surface water and air: 110
	In-use stage (indoor applications)	1,712		in soil, surface water and air: 1
	In-use stage (outdoor mixtures)	1,420		in soil, surface water and air: 91

	In-use stage (indoor mixtures)	1,502		in soil, surface water and air: 0.75

[1] -- = strong decrease, - = decrease, + = increase, ++ = strong increase, 0 = neutral

[2] Emissions relate to mixture/article production and mixture/article use. They do not include PFAS production and only in some cases the waste stage of the articles. The emissions for PFAS production and the waste stage are also covered in a separate section.

Do you have information that indicates that the information provided on the tonnage should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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Do you have information that indicates that the information provided on the emissions should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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The environmental release category (ERC) is a key REACH use descriptor to define the release factors of a chemical substance in a specific use exposure scenario. It is used in various modelling tools to derive environmental exposure estimates. ERC default factors are used to estimate emissions of PFAS in three major life-cycle stages, namely the production stage including manufacture of substances, formulation of mixtures and production of articles, the 'in-use' stage, and the waste stage.

Please indicate if you have information on specific emission values (SPERCs) for (groups of) PFAS, based on measurements and / or model calculations.

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Do you have information that indicates that the information provided on the expected trend should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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Do you have information on risk management measures to minimize the use, human exposure and emissions to the environment for your application of PFAS?

- ◯ Yes

◯ No

Please specify and/or refer to literature/public sources.

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V. Questions - Section C - Construction products
Questions in relation to alternatives (mainly for individual companies)

Sub-Use	Non-PFAS alternatives
Thermal insultation applications	- polyisocyanurate - phenolic thermal product
Processing aids in the production of construction products	? (only confidential information)
Architectural fabrics	- cotton and other natural fibres - polyamid (nylon) - polyester - fiberglass - aramid (Kevlar, Twaron) - carbon fibres
Fluoropolymer tube lining	- polypropylene - silicone - PVC
Paints and coatings	- polyurethane - polyester powder - wax emulsions - silicones/silanes/polysiloxanes - hydrocarbon polymer technologies
Coating additives	- hydrocarbon and silicone-based surfactants - short chain, polyether-modified siloxanes - low molecular weight polyether-modified siloxanes - siloxane multi-functional surfactants - alkoxylates (silicone and solvent-free)
Superhydrophobic coatings	- polymeric matrix (the binder) added to hydrophobic nanoparticles (the filler)

Wood primer and inks	- sulfosuccinates (e.g. sodium salt of di-(2-ethylhexyl) sulfosuccinate
Rust protection systems, marine paints,resins, printing inks and coatings in electrical applications	- propylated napthalenes - propylated biphenyls

What is the specific application/functionality of PFAS in your product(s)/processes?

1000 characters left

Are in your view the listed non-PFAS alternatives technically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Are in your view the listed non-PFAS alternatives economically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Do you have information on the alternatives' risk profile?

- ◯ Yes
- ◯ No

Please describe.

1000 characters left

Are there legal approval schemes for your product(s)/processes, which have to be taken into account in case PFAS alternatives will be used?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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What is the average approval time?

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Do you actively work on finding alternatives?

- Yes
- No

Please specify.

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If alternatives have been identified as potentially suitable, which timescale do you foresee for a complete transition to those? Please explain.

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Do you have information on additional alternatives for any of the described applications that have not been disclosed in the attached information?

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V. Questions - Section D - Construction products
Questions in relation to impact of legislative measures (for companies and industry associations)

What is the economic impact (in euro) and social impact (e.g. jobs) on your business/company if the use of PFAS is prohibited?

a) In 3 years.

1000 characters left

b) In 10 years.

1000 characters left

c) Please explain by providing your calculations.

1000 characters left

What is the economic impact (euro) on your business/company, if the following measures will become mandatory? Please make your (indicative) calculations transparent.

a) A maximum concentration of e.g. 0.1% (or less) PFAS is set in mixtures and/or articles.

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b) Obligation to label your products visibly with "Contains PFAS".

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c) Obligation to report amount of PFAS in use and respective emissions.

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d) Specific waste management requirements with the obligation to collect, treat or recycle PFAS containing waste separately.

1000 characters left

e) In case you are using PFAS polymers: no PFAS processing aids are allowed during polymer production.

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V. Questions - Section B - Medical devices

Questions in relation to the use (mainly for industry associations)

The following linked information presents the current picture: Report summary medical devices july 2021.pdf

In the tables presented on this page and the following, '?' in the cells show that the authorities do not have any information available. Input to fill these gaps is highly appreciated.

Sub-Use[1]	Tonnage (tonnes/PFAS) per year in the EEA	Expected trend (--/-/0/+/++)[2]	Emissions/year in EEA[3] (tonnes/PFAS)
Anesthetics	2 - 1,000	+	~ 2 - 1,000
Contrast media	2 - 100	?	~ 2 - 100
Propellants	160 - 400	?	~ 160 - 400
MDI incl. F-gases	24,000 - 43,000	?	~ 4,200
Medical devices incl. packaging (mainly polymers)	3,700 - 14,000	?	90

[1] Contrast media, propellants and F-gases are mentioned here as medical devices.

[2] -- = strong decrease, - = decrease, + = increase, ++ = strong increase, 0 = neutral

[3] Emissions relate to mixture/article production and mixture/article use. They do not include PFAS production and the waste
stage of the articles. These emissions are covered in a separate section.

Do you have information that indicates that the information provided on the tonnage should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information that indicates that the information provided on the emissions should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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The environmental release category (ERC) is a key REACH use descriptor to define the release factors of a chemical substance in a specific use exposure scenario. It is used in various modelling tools to derive environmental exposure estimates. ERC default factors are used to estimate emissions of PFAS in three major life-cycle stages, namely the production stage including manufacture of substances, formulation of mixtures and production of articles, the 'in-use' stage, and the waste stage.

Please indicate if you have information on specific emission values (SPERCs) for (groups of) PFAS, based on measurements and / or model calculations.

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Do you have information that indicates that the information provided on the expected trend should be adjusted?

- Yes
- No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information on risk management measures to minimize the use, human exposure and emissions to the environment for your application of PFAS?

- Yes
- No

Please specify and/or refer to literature/public sources.

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V. Questions - Section C - Medical devices
Questions in relation to alternatives (mainly for individual companies)

What is the specific application/functionality of PFAS in your product(s)/processes?

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Are in your view non-PFAS alternatives technically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Are in your view non-PFAS alternatives economically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Do you have information on the alternatives' risk profile?

- ◯ Yes
- ◯ No

Please describe.

1000 characters left

Are there legal approval schemes for your product(s)/processes, which have to be taken into account in case PFAS alternatives will be used?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

What is the average approval time?

1000 characters left

Do you actively work on finding alternatives?

- ◯ Yes
- ◯ No

Please specify.

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If alternatives have been identified as potentially suitable, which timescale do you foresee for a complete transition to those? Please explain.

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Do you have information on alternatives for any of the described applications in the attached information?

1000 characters left

V. Questions - Section D - Medical devices
Questions in relation to impact of legislative measures (for companies and industry associations)

What is the economic impact (in euro) and social impact (e.g. jobs) on your business/company if the use of PFAS is prohibited?

a) In 3 years.

1000 characters left

b) In 10 years.

1000 characters left

c) Please explain by providing your calculations.

1000 characters left

What is the economic impact (euro) on your business/company, if the following measures will become mandatory? Please make your (indicative) calculations transparent.

a) A maximum concentration of e.g. 0.1% (or less) PFAS is set in mixtures and/or articles.

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b) Obligation to label your products visibly with "Contains PFAS".

1000 characters left

c) Obligation to report amount of PFAS in use and respective emissions.

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d) Specific waste management requirements with the obligation to collect, treat or recycle PFAS containing waste separately.

1000 characters left

e) In case you are using PFAS polymers: no PFAS processing aids are allowed during polymer production.

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V. Questions - Section E - Medical devices

Specific questions for the use

If available, please provide information on PFAS emissions during medical device production.

1000 characters left

If available, please provide information on market trends for contrast media, propellants, F-gases and/or medical devices.

1000 characters left

If available, please provide information on fluorine-free alternatives for medical devices.

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V. Questions - Section B - Medicinal Products
Questions in relation to the use (mainly for industry associations)

The following linked information presents the current picture: Report summary medicinal products july 2021.pdf

In the tables presented on this page and the following, '?' in the cells show that the authorities do not have any information available. Input to fill these gaps is highly appreciated.

Sub-Use	Tonnage (tonnes/PFAS) per year in the EEA	Expected trend (--/-/0/+/++)[1]	Emissions/year in EEA[2] (tonnes/PFAS)
Medicines (human pharmaceuticals)	> 500[3]	+	> 500[3]
Medicines (veterinary pharmaceuticals)	?	?	?
Pharmaceutical intermediates[3]	8,200 (ECHA)	?	?

[1] -- = strong decrease, - = decrease, + = increase, ++ = strong increase, 0 = neutral

[2] Emissions relate to mixture/article production and mixture/article use. They do not include PFAS production and the waste
stage of the articles. These emissions are covered in a separate section.

[3] The whole molecule/API is counted in this calculation.

Do you have information that indicates that the information provided on the tonnage should be adjusted?

◯ Yes

- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information that indicates that the information provided on the emissions should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

The environmental release category (ERC) is a key REACH use descriptor to define the release factors of a chemical substance in a specific use exposure scenario. It is used in various modelling tools to derive environmental exposure estimates. ERC default factors are used to estimate emissions of PFAS in three major life-cycle stages, namely the production stage including manufacture of substances, formulation of mixtures and production of articles, the 'in-use' stage, and the waste stage.

Please indicate if you have information on specific emission values (SPERCs) for (groups of) PFAS, based on measurements and / or model calculations.

1000 characters left

Do you have information that indicates that the information provided on the expected trend should be adjusted?

- Yes
- No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information on risk management measures to minimize the use, human exposure and emissions to the environment for your application of PFAS?

- Yes
- No

Please specify and/or refer to literature/public sources.

1000 characters left

V. Questions - Section C - Medicinal Products

Questions in relation to alternatives (mainly for individual companies)

What is the specific application/functionality of PFAS in your product(s)/processes?

1000 characters left

Are in your view non-PFAS alternatives technically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Are in your view non-PFAS alternatives economically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Do you have information on the alternatives' risk profile?

- ◯ Yes
- ◯ No

Please describe.

1000 characters left

Are there legal approval schemes for your product(s)/processes, which have to be taken into account in case PFAS alternatives will be used?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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What is the average approval time?

1000 characters left

Do you actively work on finding alternatives?

- ◯ Yes
- ◯ No

Please specify.

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If alternatives have been identified as potentially suitable, which timescale do you foresee for a complete transition to those? Please explain.

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Do you have information on alternatives for any of the described applications in the attached information?

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V. Questions - Section D - Medicinal Products
Questions in relation to impact of legislative measures (for companies and industry associations)

What is the economic impact (in euro) and social impact (e.g. jobs) on your business/company if the use of PFAS is prohibited?

a) In 3 years.

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b) In 10 years.

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c) Please explain by providing your calculations.

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What is the economic impact (euro) on your business/company, if the following measures will become mandatory? Please make your (indicative) calculations transparent.

a) A maximum concentration of e.g. 0.1% (or less) PFAS is set in mixtures and/or articles.

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b) Obligation to label your products visibly with "Contains PFAS".

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c) Obligation to report amount of PFAS in use and respective emissions.

1000 characters left

d) Specific waste management requirements with the obligation to collect, treat or recycle PFAS containing waste separately.

1000 characters left

e) In case you are using PFAS polymers: no PFAS processing aids are allowed during polymer production

1000 characters left

V. Questions - Section E - Medicinal Products

Specific questions for the use

If available, please provide information that allows a quantitative estimation of tonnages of PFAS veterinary medicines and a trend in these tonnages.

1000 characters left

If available, please provide information on alternatives for (main) PFAS veterinary medicines.

1000 characters left

If available, please provide information on the EEA dependency on pharmaceutical import.

1000 characters left

If available, please provide information on PFAS emissions during pharmaceutical production.

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V. Questions - Section B - Metal plating & manufacturing of metal products
Questions in relation to the use (mainly for industry associations)

The following linked information presents the current picture: Report summary metal plating and manufacturing of metal products july 2021.pdf

In the tables presented on this page and the following, '?' in the cells show that the authorities do not have any information available. Input to fill these gaps is highly appreciated.

Sub-Use	Tonnage (tonnes/PFAS) per year in the EEA	Expected trend (--/-/0/+/++)[1]	Emissions/year in EEA[2] (tonnes/PFAS)
Metal plating	2 - 57 (6:2 FTS in chrome plating)	-	11.4 (6:2 FTS in chrome plating)
Manufacture of metal products	960 (fluoropolymers)	0	?

[1] -- = strong decrease, - = decrease, + = increase, ++ = strong increase, 0 = neutral

[2] Emissions relate to mixture/article production and mixture/article use. They do not include PFAS production and the waste
stage of the articles. These emissions are covered in a separate section.

Do you have information that indicates that the information provided on the tonnage should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information that indicates that the information provided on the emissions should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

The environmental release category (ERC) is a key REACH use descriptor to define the release factors of a chemical substance in a specific use exposure scenario. It is used in various modelling tools to derive environmental exposure estimates. ERC default factors are used to estimate emissions of PFAS in three major life-cycle stages, namely the production stage including manufacture of substances, formulation of mixtures and production of articles, the 'in-use' stage, and the waste stage.

Please indicate if you have information on specific emission values (SPERCs) for (groups of) PFAS, based on measurements and / or model calculations.

1000 characters left

Do you have information that indicates that the information provided on the expected trend should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information on risk management measures to minimize the use, human exposure and emissions to the environment for your application of PFAS?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

V. Questions - Section C - Metal plating & manufacturing of metal products

Questions in relation to alternatives (mainly for individual companies)

Sub-Use	Non-PFAS alternatives
Metal plating (here specifically chrome plating)	- alkane sulfonates - amines, C12-C14 alkyl, ethoxylated - oleo amine ethoxylates (e.g. mixtures with (Z)-octadec-9-enylamine, ethoxylated) - 3-[dodecyl(dimethyl) ammonio]propan-1-sulfonate (mixture with 3-hydroxypropane-1- sulfonic acid and amines, coco alkyldimethyl, N-oxides) - paraffin oils, sulfochlorinated, saponified - isodecanol, ethoxylated - chromium (III) plating - add-on air pollution control devices (e.g. packed bed scrubbers) - thermal spraying (e.g. high velocity oxygen fuel process) - physical vapour deposition - case hardening process (e.g. plasma nitriding) - laser metal deposition - anhydrous ionic liquids based on chromium (III)salts - closed coating reactors - nickel-based coatings - sulfonation of plastics with sulfur trioxide in the gas phase - acidic permanganate solutions, nitric acid and trichloroacetic acid mixtures
Manufacture of metal products	?

What is the specific application/functionality of PFAS in your product(s)/processes?

1000 characters left

Are in your view the listed non-PFAS alternatives technically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Are in your view the listed non-PFAS alternatives economically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Do you have information on the alternatives' risk profile?

- ◯ Yes
- ◯ No

Please describe.

1000 characters left

Are there legal approval schemes for your product(s)/processes, which have to be taken into account in case PFAS alternatives will be used?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

What is the average approval time?

1000 characters left

Do you actively work on finding alternatives?

- ◯ Yes
- ◯ No

Please specify.

1000 characters left

If alternatives have been identified as potentially suitable, which timescale do you foresee for a complete transition to those? Please explain.

1000 characters left

Do you have information on additional alternatives for any of the described applications that have not been disclosed in the attached information?

1000 characters left

V. Questions - Section D - Metal plating & manufacturing of metal products

Questions in relation to impact of legislative measures (for companies and industry associations)

What is the economic impact (in euro) and social impact (e.g. jobs) on your business/company if the use of PFAS is prohibited?

a) In 3 years.

1000 characters left

b) In 10 years.

1000 characters left

c) Please explain by providing your calculations.

1000 characters left

What is the economic impact (euro) on your business/company, if the following measures will become mandatory? Please make your (indicative) calculations transparent.

a) A maximum concentration of e.g. 0.1% (or less) PFAS is set in mixtures and/or articles.

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b) Obligation to label your products visibly with "Contains PFAS".

1000 characters left

c) Obligation to report amount of PFAS in use and respective emissions.

1000 characters left

d) Specific waste management requirements with the obligation to collect, treat or recycle PFAS containing waste separately.

1000 characters left

e) In case you are using PFAS polymers: no PFAS processing aids are allowed during polymer production

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V. Questions - Section E - Metal plating & manufacturing of metal products
Specific questions for the use

Do you use other PFAS than so-called C6 fluorinated substances (e.g. 6:2 fluorotelomer sulfonate) for metal plating processes? If so, please name them.

1000 characters left

Which PFAS (incl. tonnage and emissions) do you use for the manufacture of metal products?

1000 characters left

Please describe the function of the use of PFAS in the manufacture of metal products and the impact (functional losses, economic impacts) when a use of PFAS is no longer possible.

1000 characters left

V. Questions - Section B - PFAS production (manufacturing)
Questions in relation to the use (mainly for industry associations)

The following linked information presents the current picture: Report summary production july 2021.pdf

In the tables presented on this page and the following, '?' in the cells show that the authorities do not have any information available. Input to fill these gaps is highly appreciated.

Sub-Use	Tonnage (tonnes/PFAS) per year in the EEA	Expected trend (--/-/0/+/++)[1]	Emissions/year in EEA[2] (tonnes/PFAS)
Fluoropolymers	Produced: 49,458 - 101,763 Imported: 36,148 (Eurostat) Exported: 28,718 (Eurostat)	+ (stakeholder)	in air: 10 - 20 in water: 3 - 6
F-gas	Produced: 13,600 - 52,800 Imported: 84,284 (Literature) Exported: 10,371 (Eurostat)	0 (stakeholder)	in air: 280 - 1,086 in water: 0.6 - 2.3
Remaining PFAS	Produced: 53,902 - 118,051 Imported: 103,586 (Eurostat) Exported: 131,866 (Eurostat)	+ (stakeholder)	in air: 11 - 24 in water: 3 - 7

[1] -- = strong decrease, - = decrease, + = increase, ++ = strong increase, 0 = neutral

[2] Emissions only relate to PFAS production. They do not include mixture/article production, mixture/article use and the
waste stage of the articles. These emissions are covered in the other sections of this survey.

Do you have information that indicates that the information provided on the tonnage should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information that indicates that the information provided on the emissions should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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The environmental release category (ERC) is a key REACH use descriptor to define the release factors of a chemical substance in a specific use exposure scenario. It is used in various modelling tools to derive environmental exposure estimates. ERC default factors are used to estimate emissions of PFAS in three major life-cycle stages, namely the production stage including manufacture of substances, formulation of mixtures and production of articles, the 'in-use' stage, and the waste stage.

Please indicate if you have information on specific emission values (SPERCs) for (groups of) PFAS, based on measurements and / or model calculations.

1000 characters left

Do you have information that indicates that the information provided on the expected trend should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information on risk management measures to minimize the use, human exposure and emissions to the environment?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

V. Questions - Section C - PFAS production (manufacturing)
Questions in relation to alternatives (mainly for individual companies)

Do you have the possibility to produce fluorinated polymers without fluorinated processing aids?

- ◯ Yes
- ◯ No

Please explain:

1000 characters left

V. Questions - Section D - PFAS production (manufacturing) Questions in relation to impact of legislative measures (for companies and industry associations)

What is the economic impact (in euro) and social impact (e.g. jobs) on your business/company if the use of PFAS is prohibited?

a) In 3 years.

1000 characters left

b) In 10 years.

1000 characters left

c) Please explain by providing your calculations.

1000 characters left

What is the economic impact (euro) on your business/company, if the following measures will become mandatory? Please make your (indicative) calculations transparent.

a) A maximum concentration of e.g. 0.1% (or less) PFAS is set in mixtures and/or articles.

1000 characters left

b) Obligation to label your products visibly with "Contains PFAS".

1000 characters left

c) Obligation to report amount of PFAS in use and respective emissions.

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d) Specific waste management requirements with the obligation to collect, treat or recycle PFAS containing waste separately.

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e) In case you are using PFAS polymers: no PFAS processing aids are allowed during polymer production.

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V. Questions - Section E - PFAS production (manufacturing)
Specific questions for the use

If available, please provide data on the amount of fluorinated additives used in fluoropolymer production (kg/ton).

1000 characters left

If available, please provide data on the tonnages used (yearly EEA) and applications of PTFE and PVDF micropowders.

1000 characters left

If available, please provide information on the production of PFAS alternatives.

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V. Questions - Section B - Ski treatment

Questions in relation to the use (mainly for industry associations)

The following linked information presents the current picture: Report summary ski treatment july 2021.pdf

Additionally, the Norwegian Environment Agency also published a short version of the report. This version can be accessed via the following link: PFAS in the treatment of skis - Use, Emissions and Alternatives

In the tables presented on this page and the following, '?' in the cells show that the authorities do not have any information available. Input to fill these gaps is highly appreciated.

Sub-Use	Tonnage (tonnes/PFAS) per year in the EEA	Expected trend (--/-/0/+/++)[1]	Emissions/year in EEA[2] (tonnes/PFAS)
Ski wax	1.64	-	in soil: 0.452 in surface water: 0.452 in air: 0.041 in waste stage: 0.695

[1] -- = strong decrease, - = decrease, + = increase, ++ = strong increase, 0 = neutral

[2] Emissions relate to mixture/article production and mixture/article use. They do not include PFAS production. The
emissions for PFAS production and the waste stage are also covered in a separate section.

Do you have information that indicates that the information provided on the tonnage should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information that indicates that the information provided on the emissions should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

The environmental release category (ERC) is a key REACH use descriptor to define the release factors of a chemical substance in a specific use exposure scenario. It is used in various modelling tools to derive environmental exposure estimates. ERC default factors are used to estimate emissions of PFAS in three major life-cycle stages, namely the production stage including manufacture of substances, formulation of mixtures and production of articles, the 'in-use' stage, and the waste stage.

Please indicate if you have information on specific emission values (SPERCs) for (groups of) PFAS, based on measurements and / or model calculations.

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Do you have information that indicates that the information provided on the expected trend should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information on risk management measures to minimize the use, human exposure and emissions to the environment for your application of PFAS?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

V. Questions - Section C - Ski treatment

Questions in relation to alternatives (mainly for individual companies)

Sub-Use		Non-PFAS alternatives
Ski wax	Fluorine-free waxes	- hydrocarbon and paraffin waxes - siloxanes (but they are subject to environmental concerns) - nanoparticle-based waxes are being developed.

	Alterations to the ski itself	- a modified microstructure of the ski base - improved performance of the polyethylene of the ski - heating the base to obtain a better glide - controlling the vibrations of the ski

What is the specific application/functionality of PFAS in your product(s)/processes?

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Are in your view the listed non-PFAS alternatives technically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Are in your view the listed non-PFAS alternatives economically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Do you have information on the alternatives' risk profile?

- ◯ Yes
- ◯ No

Please describe.

1000 characters left

Are there legal approval schemes for your product(s)/processes, which have to be taken into account in case PFAS alternatives will be used?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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What is the average approval time?

1000 characters left

Do you actively work on finding alternatives?

- ◯ Yes
- ◯ No

Please specify.

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If alternatives have been identified as potentially suitable, which timescale do you foresee for a complete transition to those? Please explain.

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Do you have information on additional alternatives for any of the described applications that have not been disclosed in the attached information?

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V. Questions - Section D - Ski treatment
Questions in relation to impact of legislative measures (for companies and industry associations)

What is the economic impact (in euro) and social impact (e.g. jobs) on your business/company if the use of PFAS is prohibited?

a) In 3 years.

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b) In 10 years.

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c) Please explain by providing your calculations.

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What is the economic impact (euro) on your business/company, if the following measures will become mandatory? Please make your (indicative) calculations transparent.

a) A maximum concentration of e.g. 0.1% (or less) PFAS is set in mixtures and/or articles.

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b) Obligation to label your products visibly with "Contains PFAS".

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c) Obligation to report amount of PFAS in use and respective emissions.

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d) Specific waste management requirements with the obligation to collect, treat or recycle PFAS containing waste separately.

1000 characters left

e) In case you are using PFAS polymers: no PFAS processing aids are allowed during polymer production.

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V. Questions - Section E - Ski treatment
Specific questions for the use

Do you have additional information on substance ID, function, PFAS concentrations and market information for mixtures used for cleaning and treatment of skins on skin skis, including anti-ice mixtures? If so, please provide the information. Where possible, please refer to literature/public sources.

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V. Questions - Section B - TULAC (textiles, upholstery, leather, apparel and carpets)
Questions in relation to the use (mainly for industry associations)

The following linked information presents the current picture: Report summary TULAC july 2021.pdf

In the tables presented on this page and the following, '?' in the cells show that the authorities do not have any information available. Input to fill these gaps is highly appreciated.

Sub-Use	**Tonnage (tonnes/PFAS) per year in the EEA** Low/High	**Expected trend (--/-/0/+/++)[1]**	**Emissions/year in EEA[2] (tonnes/PFAS)** Low/High

Home textiles	6,230/27,368	++	?
Consumer apparel	8,161/47,148	++	?
Professional apparel	5,220/20,044	++	?
Technical textiles	6,201/26,541	++	?
Medical applications	331/1,095	++	?
Leather	?	++	?
Other	15,041/20,496	++	?
Total	**41,184/142,692**	**++**	**4,933/18,103**

[1] -- = strong decrease, - = decrease, + = increase, ++ = strong increase, 0 = neutral

[2] Emissions relate to mixture/article production and mixture/article use. They do not include PFAS production and the waste
stage of the articles. These emissions are covered in a separate section.

Do you have information that indicates that the information provided on the tonnage should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information that indicates that the information provided on the emissions should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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The environmental release category (ERC) is a key REACH use descriptor to define the release factors of a chemical substance in a specific use exposure scenario. It is used in various modelling tools to derive environmental exposure estimates. ERC default factors are used to estimate emissions of PFAS in three major life-cycle stages, namely the production stage including manufacture of substances, formulation of mixtures and production of articles, the 'in-use' stage, and the waste stage.

Please indicate if you have information on specific emission values (SPERCs) for (groups of) PFAS, based on measurements and / or model calculations.

1000 characters left

Do you have information that indicates that the information provided on the expected trend should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information on risk management measures to minimize the use, human exposure

and emissions to the environment for your application of PFAS?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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V. Questions - Section C - TULAC (textiles, upholstery, leather, apparel and carpets)

Questions in relation to alternatives (mainly for individual companies)

Sub-Use		Non-PFAS alternatives
Home textiles	Carpets and rugs	- non-ionic polymer - ester compounds - hydrocarbon compounds, - organic solvent and water
	Curtains	- no specific substances found, see general textile (FF)
	Upholstery (e.g. fabrics for soft-furnishings, including large furniture items)	- hydrotreated heavy naphtha (petroleum) - non-ionic polymer, ester compound, hydrocarbon compound, organic solvent and water
Consumer apparel	Outdoor wear	- non-ionic polymer - ester compounds - hydrocarbon compounds - organic solvent and water - mixture of linear and branched hydrocarbons
	Indoor wear	?
	Sports wear	?
	Footwear	?
Professional apparel	Professional sports wear and footwear	?

	PPE for industrial applications e.g. for chemical workers, fire-fighters, O&G workers, law enforcement and military forces	
Technical textiles	Outdoor technical textiles e.g. canvas, awnings, tarps, tents, bags, sails, rope, umbrellas	?
	Medical applications "non-woven", e.g. surgical drapes, gowns, curtains	
	High performance membranes e.g. automotive and medical	
Textile in general (multiple sub-category uses)		- paraffin - non-ionic polymer - ester compounds - alcohols, C12-16, ethoxylated (>5-15 EO) - hydrocarbon polymer dispersion - aqueous preparation of polymer waxes - paraffin oils and a fat modified melamine resin - dispersion of paraffin wax and acrylic copolymer - paraffin oils and a fat modified melamine resin and blocked polyisocyanates - dispersion of paraffin oils and a fat modified melamine resin - naphtha (petroleum), hydrotreated heavy, - modified wax dispersion - (bee-) wax - carnauba wax - acrylate copolymer - dispersion of fat-modified chemicals and paraffin - plant seed oil, bio based product - acrylic polymer and paraffin dispersion - acrylic polymer and silicone reactive dispersion - acrylic polymer, reactive silicone and paraffin dispersion - functionalised polymers/waxes, cationic - emulsifier-free paraffin wax - emulsion containing aluminum - acrylic polymer and dispersion of fatty derivatives - polyethylene oxide mono-C12-16-alkyl ether - aminofunctional PDMS - sodium methylsiliconate water - potassium methylsiliconate - isobutyltrimethoxy silane - octylsilane - hexyltriethoxysilane - blend of n-octyltriethoxysilane and reactive silicone, octyltrimethoxysilane-based - methoxy terminated silsesquixanes

		- emulsion of polydimethylsiloxane - cationic polysiloxane and polyester - polysiloxane - mixtures of silicones and stearamidomethyl pyridine chloride, sometimes together with carbamide (urea) and melamine resins - aminofunctional polysiloxanes - water-based silicone emulsion - solvent-dilutable silicone solution - siloxane dispersion with modified polyamide, - acrylic polymer and silicone reactive dispersion - dodecamethyl pentasiloxane (PDMS) - aqueous, solvent free dendrimers - anionic dispersion of an aliphatic polyether urethane - polyurethane emulsion, water-based - anionic dispersion of a matt polyether polyurethane, water-based, solvent free - anionic dispersion of an aliphatic polycarbonate urethane - plasma based nano-coating, molecularly attached hydrophobic 'whiskers' attached to individual fibres, uses a hydrocarbon polymer
Leather	Leather in general	- hybrid (silicone/hydrocarbon) - solvent-dilutable silicone solution - water-based silicone emulsion
Other	Home fabric treatments (sprays)	- alkyl polysiloxane solution

What is the specific application/functionality of PFAS in your product(s)/processes?

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Are in your view the listed non-PFAS alternatives technically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Are in your view the listed non-PFAS alternatives economically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Do you have information on the alternatives' risk profile?

- ◯ Yes
- ◯ No

Please describe.

1000 characters left

Are there legal approval schemes for your product(s)/processes, which have to be taken into account in case PFAS alternatives will be used?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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What is the average approval time?

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Do you actively work on finding alternatives?

- ◯ Yes
- ◯ No

Please specify.

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If alternatives have been identified as potentially suitable, which timescale do you foresee for a complete transition to those? Please explain.

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Do you have information on additional alternatives for any of the described applications that have not been disclosed in the attached information?

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V. Questions - Section D - TULAC (textiles, upholstery, leather, apparel and carpets)

Questions in relation to impact of legislative measures (for companies and industry associations)

What is the economic impact (in euro) and social impact (e.g. jobs) on your business/company if the use of PFAS is prohibited?

a) In 3 years.

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b) In 10 years.

1000 characters left

c) Please explain by providing your calculations.

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What is the economic impact (euro) on your business/company, if the following measures will become mandatory? Please make your (indicative) calculations transparent.

a) A maximum concentration of e.g. 0.1% (or less) PFAS is set in mixtures and/or articles.

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b) Obligation to label your products visibly with "Contains PFAS".

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c) Obligation to report amount of PFAS in use and respective emissions.

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d) Specific waste management requirements with the obligation to collect, treat or recycle PFAS containing waste separately.

1000 characters left

e) In case you are using PFAS polymers: no PFAS processing aids are allowed during polymer production.

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V. Questions - Section E - TULAC (textiles, upholstery, leather, apparel and carpets)

Specific questions for the use

The calculations in the summary report are based on data from the previous Call for Evidence. Based on your expertise/knowledge, are also imported TULAC (textiles, upholstery, leather, apparel, carpets) articles covered sufficiently?

- ◯ Yes
- ◯ No

If not, please provide any data you might have on this.

1000 characters left

Do you see any uses and / or functions of PFAS in TULAC articles that are not reported in the summary report?

- ◯ Yes
- ◯ No

What is the specific application of PFAS in your product(-s)/process(-es)?

What is the functionality of PFAS in this specific application?

What quantities of PFAS do you use in this specific application?

What are the life-cycle emissions of PFAS from this specific application?

Do you have any further information on specific alternatives other than those described in the report?

- ◯ Yes
- ◯ No

What is the specific application of that alternative in your product(-s)/process(-es)?

What is the functionality of that alternative in this specific application?

What quantities of that alternative do you use in this specific application?

What are the life-cycle emissions of that alternative from this specific application?

V. Questions - Section B - Petroleum & mining

Questions in relation to the use (mainly for industry associations)

The following linked information presents the current picture: Report summary petroleum and mining july 2021.pdf

Additionally, the Norwegian Environment Agency also published a short version of the report. This version can be accessed via the following link:PFAS in mining and petroleum industry – use, emissions and alternatives

In the tables presented on this page and the following, '?' in the cells show that the authorities do not have any information available. Input to fill these gaps is highly appreciated.

Sub-Use	Quantity of product used (t)	Tonnage (tonnes/PFAS) per year in the EEA	Expected trend (--/-/0/+/++)[1]	Emissions/year in EEA[2] (tonnes/PFAS)
Water and gas traces	1	1	0[3]	in soil: 0 - 0.005 in water: 0.020 - 0.025 in marine water: 0 - 0.110 in air: 0.025 - 0.070 in waste stage: 0.020 - 0.145

Drilling/Production chemicals	170	3 - 8	0[3]	in soil: 0 - 0.045 in water: 0.070 - 0.210 in marine water: 0.020 - 0.760 in air: 0.085 - 0.635 in waste stage: 0.015 - 0.230
Fluoropolymers (all) Low scenario[4]	3,500 - 7,500.5	0.004 - 0.008 monomeric PFAS	0[3]	in soil: < 0.001 in water: < 0.001 in marine water: < 0.001 in air: 0.001 - 0.002 in waste stage: 0.001 - 0.003
Fluoropolymers (all) High scenario[5]	3,500 - 7,500.5	0,9 - 1,9 monomeric PFAS	0[3]	in soil: 0 .020 - 0.045 in water: 0.003 - 0.006 in marine water: 0.020 - 0.040 in air: 0.270 - 0.580 in waste stage: 0.310 - 0.670

[1] -- = strong decrease, - = decrease, + = increase, ++ = strong increase, 0 = neutral

[2] Emissions relate to mixture/article production and mixture/article use. They do not include PFAS production.

[3] Conservative annual growth of 1%.

[4] 1 ppm monomeric PFAS in fluoropolymers (Lohmann et al., 2020).

[5] 0-2000 ppm monomeric PFAS in fluoropolymers (Ökopol 2014 and used in PFOA restriction).

Do you have information that indicates that the information provided on the tonnage should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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Do you have information that indicates that the information provided on the emissions should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

The environmental release category (ERC) is a key REACH use descriptor to define the release factors of a chemical substance in a specific use exposure scenario. It is used in various modelling tools to derive environmental exposure estimates. ERC default factors are used to estimate emissions of PFAS in three major life-cycle stages, namely the production stage including manufacture of substances, formulation of mixtures and production of articles, the 'in-use' stage, and the waste stage.

Please indicate if you have information onspecific emission values (SPERCs) for (groups of) PFAS, based on measurements and / or model calculations.

1000 characters left

Do you have information that indicates that the information provided on the expected trend should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information on risk management measures to minimize the use, human exposure and emissions to the environment for your application of PFAS?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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V. Questions - Section C - Petroleum & mining

Questions in relation to alternatives (mainly for individual companies)

Sub-Use	Non-PFAS alternatives
Water and gas tracers	- radioactive tracers - noble gas isotopic tracer - xenon - radiolabelled compounds

Drilling and production (antifoaming)	- polydimethylsiloxane (PMDS) oils - ethyl siloxanes - polypropylene glycol - naphthalene/1,2,4-trimethylbenzene based products - dipropylene glycol monomethyl ether - 2,6-dimethylheptan-4-one.
Fluoropolymers	- steel - other metal alloys - non-metal materials (ceramic or epoxy based) - cross-linked polyethylene (XL PE) - polyamides such as ethylene propylene diene (EPDM) - hydrogenated nitrile Rubber (HNBR) - polyether ether ketone (PEEK)

What is the specific application/functionality of PFAS in your product(s)/processes?

1000 characters left

Are in your view the listed non-PFAS alternatives technically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Are in your view the listed non-PFAS alternatives economically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Do you have information on the alternatives' risk profile?

- ◯ Yes
- ◯ No

Please describe.

1000 characters left

Are there legal approval schemes for your product(s)/processes, which have to be taken into account in case PFAS alternatives will be used?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

What is the average approval time?

1000 characters left

Do you actively work on finding alternatives?

- ◯ Yes
- ◯ No

Please specify.

1000 characters left

If alternatives have been identified as potentially suitable, which timescale do you foresee for a complete transition to those? Please explain.

1000 characters left

Do you have information on additional alternatives for any of the described applications that have not been disclosed in the attached information?

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V. Questions - Section D - Petroleum & mining
Questions in relation to impact of legislative measures (for companies and industry associations)

What is the economic impact (in euro) and social impact (e.g. jobs) on your business/company if the use of PFAS is prohibited?

a) In 3 years.

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b) In 10 years.

1000 characters left

c) Please explain by providing your calculations.

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What is the economic impact (euro) on your business/company, if the following measures will become mandatory? Please make your (indicative) calculations transparent.

a) A maximum concentration of e.g. 0.1% (or less) PFAS is set in mixtures and/or articles.

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b) Obligation to label your products visibly with "Contains PFAS".

1000 characters left

c) Obligation to report amount of PFAS in use and respective emissions.

1000 characters left

d) Specific waste management requirements with the obligation to collect, treat or recycle PFAS containing waste separately.

1000 characters left

e) In case you are using PFAS polymers: no PFAS processing aids are allowed during polymer production.

1000 characters left

V. Questions - Section E - Petroleum & mining

Specific questions for the use

Please provide additional market data for PFAS-free alternatives in antifoaming agents and tracers used by the petroleum sector.

1000 characters left

What are the expected timelines for when the PFAS-free alternatives may be introduced?

1000 characters left

Please provide additional information on the use of PFAS within refinery processes and mining (substance ID and market information), including the use of mist suppressants in hydrometallurgy.

1000 characters left

Please provide additional information on the use of PFAS in enhanced oil/ gas recovery stimulation products and in containment chemicals in the petroleum sector.

1000 characters left

Please provide additional information on the use of fluoropolymers in the petroleum sector and mining, including tonnages, price, market information. For example, information related to the use in liners, seals and tubing to handle mining materials at high temperatures.

1000 characters left

V. Questions - Section B - F-gas uses

Questions in relation to the use (mainly for industry associations)

The following linked information presents the current picture: Report summary F gas uses july 2021.pdf

Additionally, the Norwegian Environment Agency also published a short version of the report. This version can be accessed via the following link: Application of Fluorinated Gases (F-Gases) in the

European Economic Area

In the tables presented on this page and the following, '?' in the cells show that the authorities do not have any information available. Input to fill these gaps is highly appreciated.

Sub-Use	Tonnage (tonnes/PFAS) per year in the EEA	Expected trend (--/-/0/+/++)[1]	Emissions/year in EEA[2] (tonnes/PFAS)[3] all emissions to air for F-gases
Domestic refrigeration	122	0	17
Commercial refrigeration	7,915	+	9,547
Industrial refrigeration	2,360	-	3,680
Transport refrigeration	1,010	0	1,341
Mobile air conditioning	5,221	++	11,726
Stationary air conditioning and heat pumps	7,465	++	7,458
Foam blowing agent (closed cell)	4,940	+	4,186
Foam blowing agent (open cell)	271	0	1,074
Fire protection	863	0	703
Propellants (non-MDI)	504	-	701
Solvents	?	0	> 11
Cover gas for magnesium casting	?	+	> 23
Other	?	?	35

[1] -- = strong decrease, - = decrease, + = increase, ++ = strong increase, 0 = neutral

[2] Emissions relate to mixture/article production and mixture/article use. They do not include PFAS production and the waste
stage of the articles. These emissions are covered in a separate section.

[3] Due to large tonnages in stock, emissions can be higher than annual tonnage.

Do you have information that indicates that the information provided on the tonnage should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information that indicates that the information provided on the emissions should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information that indicates that the information provided on the expected trend should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information on risk management measures to minimize the use, human exposure and emissions to the environment for your application of PFAS?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

V. Questions - Section C - F-gas uses

Questions in relation to alternatives (mainly for individual companies)

Sub-Use	Non-PFAS alternatives
Domestic refrigeration	- iso-butane - propane (not in-kind refrigeration cycles)
Commercial refrigeration	- CO_2 - isobutane - propane
Industrial refrigeration	- CO_2 - ammonia - n-butane
Transport refrigeration	- CO_2 - ammonia - CO_2 with N_2 as direct coolant - propane (not in-kind: advanced cool box storage)
Mobile air conditioning	- CO_2 - propane
Stationary air conditioning and heat pumps	- CO_2 - ammonia - propane
Foam blowing agent (closed cell)	Depending on the specific application: - cyclopentane - iso-pentane

Foam blowing agent (open cell)	- n-pentane - isobutane - n-butane - 2-chloropropane - dimethyl ether (DME) - methyl formate - methylal - CO_2 / methyl formate - CO_2 (water) - CO_2 (liquid) - CO_2 / ethanol - water blown foams
Fire protection	- inert gases (nitrogen and argon) - CO_2 - water mist technologies - inert gas generators - fine solid particle technology - dry chemical agents - water and aqueous salt solutions
Propellants (non-MDI)	Compressed gases: - air - nitrogen - nitrous oxide - CO_2
	Liquefied gases: - butane - propane - isobutane - dimethyl ether
	Not-in-kind alternatives: - trigger sprays - finger pumps - squeeze bottles - non-sprayed products including roll-ons - bag-on-valve products
Solvents	Depending on the specific application: - isopropyl alcohol (IPA) - n-Propyl bromide - dichloromethane - trans-1,2-dichloroethylene - trichloroethylene (TCE) - perchloroethylene (PER) - volatile methyl siloxanes - hydrocarbons (hexane, heptane, benzene) - acetone - semi-aqueous / aqueous cleaning - manual cleaning methods (aerosols, brush, trigger spray, liquid immersion, spot cleaning, wipes)

	- ultrasonic - plasma cleaning - supercritical fluids – CO_2 - no clean fluxes
Cover gas for magnesium casting	- SO_2 - argon - salt fluxes - powdered sulfur

What is the specific application/functionality of PFAS in your product(s)/processes?

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Are in your view the listed non-PFAS alternatives technically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Are in your view the listed non-PFAS alternatives economically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Do you have information on the alternatives' risk profile?

- ◯ Yes
- ◯ No

Please describe.

1000 characters left

Are there legal approval schemes for your product(s)/processes, which have to be taken into account in case PFAS alternatives will be used?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

What is the average approval time?

1000 characters left

Do you actively work on finding alternatives?

- Yes
- No

Please specify.

1000 characters left

If alternatives have been identified as potentially suitable, which timescale do you foresee for a complete transition to those? Please explain.

1000 characters left

Do you have information on additional alternatives for any of the described applications that have not been disclosed in the attached information?

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V. Questions - Section D - F-gas uses
Questions in relation to impact of legislative measures (for companies and industry associations)

What is the economic impact (in euro) and social impact (e.g. jobs) on your business/company if the use of PFAS is prohibited?

a) In 3 years.

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b) In 10 years.

1000 characters left

c) Please explain by providing your calculations.

1000 characters left

What is the economic impact (euro) on your business/company, if the following measures will become mandatory? Please make your (indicative) calculations transparent.

a) A maximum concentration of e.g. 0.1% (or less) PFAS is set in mixtures and/or articles.

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b) Obligation to label your products visibly with "Contains PFAS".

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c) Obligation to report amount of PFAS in use and respective emissions.

1000 characters left

d) Specific waste management requirements with the obligation to collect, treat or recycle PFAS containing waste separately.

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e) In case you are using PFAS polymers: no PFAS processing aids are allowed during polymer production.

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V. Questions - Section E - F-gas uses

Specific questions for the use

Within the following applications/uses, what are the barriers to the substitution from F-gases to fluorine-free alternatives, and how much time would it require to address those?

Commercial refrigeration, and specially alternatives to F-gases in mid to large scale facilities

Transport refrigeration

Mobile air conditioning in cars, vans and trucks

Foam Blowing Agent, both closed and open cell

Is there any potential niches, systems or processes that would still rely on F-gas use in a 10-years perspective within the applications/uses mentioned above, but also in other ones, such as for example:

Industrial refrigeration

Domestic air conditioning and heat pumps for space heating

Commercial air conditioning and heat pumps

Solvents

Propellants (non-MDI)

Electronic cooling

Other (please specify in the field to the right)

Do you have information on the use of F-gases apart from the ones considered so far (heating/ventilation/air conditioning/refrigeration, foam blowing agents, propellants, solvents, fire suppression, and as cover gas), like e.g. in electronics cooling/data centers or use as solvents in 3D printing?

- ◯ Yes
- ◯ No

If so, please provide information on substance ID, function, PFAS concentrations and market information for such applications.

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V. Questions - Section B - Electronics & energy

Questions in relation to the use (mainly for industry associations)

The following linked information presents the current picture: Report summary electronics and energy july 2021.pdf

In the tables presented on this page and the following, '?' in the cells show that the authorities do not have any information available. Input to fill these gaps is highly appreciated.

Sub-Use	Tonnage	Expected	Emissions/year in

	(tonnes/PFAS) per year in the EEA	trend (--/-/0/+/++)[1]	EEA (tonnes/PFAS)
Electronics industry and semiconductor	Non-Polymers: 1,200 Polymers: 3,100 Total: 4,300	++	Production: 700 Use: 20 Recycling / waste: 900
Semiconductor	Non-Polymers: 85 Polymers: 1,400 Total: 1,485	++	
Energy industry	Non-Polymers: 250 Polymers: 1,200 Total: 1,450	++	Production: 40 Use: 1 Recycling / waste: > 24
Batteries	Polymers: 15,000	++	Production: ? Use: ? Recycling: ?

[1] -- = strong decrease, - = decrease, + = increase, ++ = strong increase, 0 = neutral

Do you have information that indicates that the information provided on the tonnage should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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Do you have information that indicates that the information provided on the emissions should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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The environmental release category (ERC) is a key REACH use descriptor to define the release factors of a chemical substance in a specific use exposure scenario. It is used in various modelling tools to derive environmental exposure estimates. ERC default factors are used to estimate emissions of PFAS in three major life-cycle stages, namely the production stage including manufacture of substances, formulation of mixtures and production of articles, the 'in-use' stage, and the waste stage.

Please indicate if you have information on specific emission values (SPERCs) for (groups of) PFAS, based on measurements and / or model calculations.

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Do you have information that indicates that the information provided on the expected trend should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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Do you have information on risk management measures to minimize the use, human exposure and emissions to the environment for your application of PFAS?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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V. Questions - Section C - Electronics & energy

Questions in relation to alternatives (mainly for individual companies)

Sub-Use	Non-PFAS alternatives
Electronics industry and semiconductor	For fluoroelastomers in sealing: ethylene propylene diene monomer (EPDM) and silicone rubbers For wire insulation: ilicone materials Polyetheretherketone (PEEK) For photolithography (hard and not for all applications): hydrocarbon-based greases, Molybdenum disulfide, graphite
Energy industry	For fluoropolymer-based backsheets for photovoltaic cells polyolefin could be an alternative. Other fluorine free backsheets made of polyethylene terephthalate (PET) and/or ethylene vinyl acetate (EVA) can/are also used For cables: Mica and EPDM For seals: Hydrocarbon elastomers For batteries :Solid-state batteries

Sub-Use	Non-PFAS alternatives
	For fuel cells: For PEM membranes: Hydrocarbon membrane and sulphonated polyetheretherketone (PEEK) Reinforcement material as alternative to PTFE: Electrospun polybenzimidazole-type materials For sealings: Some elastomers without fluorine exist and could potentially be used in the future for the Membrane Electrodes Assembly (MEA) function For immersion cooling: Synthetic oil

What is the specific application/functionality of PFAS in your product(s)/processes?

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Are in your view the listed non-PFAS alternatives technically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Are in your view the listed non-PFAS alternatives economically feasible in your product(s)/processes?

- ◯ Yes
- ◯ No

Please specify why.

1000 characters left

Do you have information on the alternatives' risk profile?

- ◯ Yes
- ◯ No

Please describe.

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Are there legal approval schemes for your product(s)/processes, which have to be taken into account in case PFAS alternatives will be used?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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What is the average approval time?

1000 characters left

Do you actively work on finding alternatives?

- ◯ Yes
- ◯ No

Please specify.

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If alternatives have been identified as potentially suitable, which timescale do you foresee for a complete transition to those? Please explain.

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Do you have information on additional alternatives for any of the described applications that have not been disclosed in the attached information?

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V. Questions - Section D - Electronics & energy

Questions in relation to impact of legislative measures (for companies and industry associations)

What is the economic impact (in euro) and social impact (e.g. jobs) on your business/company if the use of PFAS is prohibited?

a) In 3 years.

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b) In 10 years.

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c) Please explain by providing your calculations.

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What is the economic impact (euro) on your business/company, if the following measures will become mandatory? Please make your (indicative) calculations transparent.

a) A maximum concentration of e.g. 0.1% (or less) PFAS is set in mixtures and/or articles.

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b) Obligation to label your products visibly with "Contains PFAS".

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c) Obligation to report amount of PFAS in use and respective emissions.

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d) Specific waste management requirements with the obligation to collect, treat or recycle PFAS containing waste separately.

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e) In case you are using PFAS polymers: no PFAS processing aids are allowed during polymer production.

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V. Questions - Section E - Electronics & energy

Specific questions for the use

In case available, please provide information on the emissions during the manufacturing and end of life of electronic equipment and batteries:

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In case available, please provide information on concentration of PFAS in electronic, semiconductor and energy final products:

1000 characters left

In case available, please provide information on PFAS concentration (range) in WEEE scrap:

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V. Questions - Section B - Transportation

Questions in relation to the use (mainly for industry associations)

The following linked information presents the current picture: Report summary transportation july 2021.pdf

In the tables presented on this page and the following, '?' in the cells show that the authorities do not have any information available. Input to fill these gaps is highly appreciated.

Sub-Use		Tonnage (tonnes/PFAS) per year in the EEA	Expected trend (--/-/0 /+/++)[1]	Emissions/year in EEA[2] (tonnes/PFAS)
Body-, hull and fuselage construction		?	0	?
Sealing applications		111,104 (fluoroelastomers in road transportation vehicles)	0	?
Lubrication		?	0	?
Hydraulic fluids		?	0	?
Electrical engineering and information technology		?	++	?
Coating and finishings (incl. textiles, interiors and related applications, e.g. coating of trim materials)		?	+	?
HVACR systems (heating, ventilation, air conditioning and refrigeration)	F-gases in road transportation vehicles	184,130	+	9,000
	F-gases in systems in trains/ships/aircrafts	?	+	?
	F-gases in systems for transport refrigeration	10,926	+	495.8
Health protection and lifesaving equipment (incl. firefighting, life vests, life rafts, airbags, …)		?	+	?

[1] -- = strong decrease, - = decrease, + = increase, ++ = strong increase, 0 = neutral

[2] Emissions relate to mixture/article production and mixture/article use. They do not include PFAS production and the waste
stage of the articles. These emissions are covered in a separate section.

Do you have information that indicates that the information provided on the tonnage should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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Do you have information that indicates that the information provided on the emissions should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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The environmental release category (ERC) is a key REACH use descriptor to define the release factors of a chemical substance in a specific use exposure scenario. It is used in various modelling tools to derive environmental exposure estimates. ERC default factors are used to estimate emissions of PFAS in three major life-cycle stages, namely the production stage including manufacture of substances, formulation of mixtures and production of articles, the 'in-use' stage, and the waste stage.

Please indicate if you have information on specific emission values (SPERCs) for (groups of) PFAS, based on measurements and / or model calculations.

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Do you have information that indicates that the information provided on the expected trend should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information on risk management measures to minimize the use, human exposure and emissions to the environment for your application of PFAS?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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V. Questions - Section C - Transportation

Questions in relation to alternatives (mainly for individual companies)

Sub-Use	Non-PFAS alternatives
Body-, hull and fuselage construction	?
Sealing applications	?
Lubrication	?
Hydraulic fluids	?
Electrical engineering and information technology	?
Coating and finishings (incl. textiles, interiors and related appliactions, e.g. coating of trim materials)	- silicone based chemicals - sulfosuccinates - propylated aromatics - fatty alcohol polyglycol ether sulphates - alkyl acrylates - polyurethanes and -acrylics
HVACR systems (heating, ventilation, air conditioning and refrigeration)	- air - water - ethylene glycol - mineral oils - silicone oils - alcohols - natural gases: HC-600 (n-butane), R-717 (Ammonia), R-744 (CO_2)
Health protection and lifesaving equipment (incl. firefighting, life vests, life rafts, airbags, …)	?

What is the specific application/functionality of PFAS in your product(s)/processes?

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Are in your view the listed non-PFAS alternatives technically feasible in your product(s)/processes?

- Yes
- No

Please specify why.

1000 characters left

Are in your view the listed non-PFAS alternatives economically feasible in your product(s)/processes?

- Yes
- No

Please specify why.

1000 characters left

Do you have information on the alternatives' risk profile?

- ◯ Yes
- ◯ No

Please describe.

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Are there legal approval schemes for your product(s)/processes, which have to be taken into account in case PFAS alternatives will be used?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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What is the average approval time?

1000 characters left

Do you actively work on finding alternatives?

- ◯ Yes
- ◯ No

Please specify.

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If alternatives have been identified as potentially suitable, which timescale do you foresee for a complete transition to those? Please explain.

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Do you have information on additional alternatives for any of the described applications that have not been disclosed in the attached information?

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V. Questions - Section D - Transportation

Questions in relation to impact of legislative measures (for companies and industry associations)

What is the economic impact (in euro) and social impact (e.g. jobs) on your business/company if the use of PFAS is prohibited?

a) In 3 years.

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b) In 10 years.

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c) Please explain by providing your calculations.

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What is the economic impact (euro) on your business/company, if the following measures will become mandatory? Please make your (indicative) calculations transparent.

a) A maximum concentration of e.g. 0.1% (or less) PFAS is set in mixtures and/or articles.

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b) Obligation to label your products visibly with "Contains PFAS".

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c) Obligation to report amount of PFAS in use and respective emissions.

1000 characters left

d) Specific waste management requirements with the obligation to collect, treat or recycle PFAS containing waste separately.

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e) In case you are using PFAS polymers: no PFAS processing aids are allowed during polymer production.

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V. Questions - Section E - Transportation
Specific questions for the use

For this restricton proposal the assessment of the transportation sector encompassess: road traffic, ships, trains and aircrafts. We identified the following applications of PFAS in the transportation sector:

1.) Body-, hull and fuselage construction
2.) Sealing applications
3.) Lubrication
4.) Hydraulic fluids
5.) Electrical engineering and information technology
6.) Coating and finishings (incl. textiles, interiors, and related applications e.g. coating of road signs)
7.) HVACR systems (heating, ventilation, air conditioning and refrigeration)
8.) Health protection and life saving equipment (incl. fire prevention and fire fighting)

Are applications missing in the overview above? If so, please name them. Where possible, refer to literature/public sources.

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Which PFAS content is necessary in the below cases so that they can be used in the transporation sector?

In fluroelastomers for sealing applications.

In fluroelastomers in coating applications.

In fluroinated lubricants for lubricants.

In fluroinated hydraulic fluids for fluids.

Are there legal and/or industry standards in place in your industry that could no longer be met when the use of PFAS is no longer possible?

- ◯ Yes
- ◯ No

What would be a realistic timeframe and realistic costs in case standards need to be adjusted?

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V. Questions - Section B - Waste

Questions in relation to the use (mainly for industry associations)

The following linked information presents the current picture: Report summary waste july 2021.pdf

In the tables presented on this page and the following, '?' in the cells show that the authorities do not have any information available. Input to fill these gaps is highly appreciated.

Sub-Use	Tonnage (tonnes/PFAS) per year in the EEA	Expected trend (--/-/0/+/++)[1]	Emissions/year in EEA[2] (tonnes/PFAS)
Textiles/TULAC	43,605	++	WWTP: 3.5 (median) Landfill: 1.8 (median) Incineration: Flue gas: ? Bottom ash: 0.03 Fly ash: 0.05
Food contact material (paper & board)	2,894	+	
End-of-life-vehicles (ELV)	2,219	+	
Waste electrical and electronic equipment (WEEE)	?	++	
Sewage sludge	0.404	?	0.3

[1] -- = strong decrease, - = decrease, + = increase, ++ = strong increase, 0 = neutral

[2] Emissions only relate to the waste stage. They do not include mixture/article production, mixture/article use and PFAS production. These emissions are covered in the other sections of this survey.

Do you have information that indicates that the information provided on the tonnage should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information that indicates that the information provided on the emissions should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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The environmental release category (ERC) is a key REACH use descriptor to define the release factors of a chemical substance in a specific use exposure scenario. It is used in various

modelling tools to derive environmental exposure estimates. ERC default factors are used to estimate emissions of PFAS in three major life-cycle stages, namely the production stage including manufacture of substances, formulation of mixtures and production of articles, the 'in-use' stage, and the waste stage.

Please indicate if you have information on specific emission values (SPERCs) for (groups of) PFAS, based on measurements and / or model calculations.

1000 characters left

Do you have information that indicates that the information provided on the expected trend should be adjusted?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

1000 characters left

Do you have information on risk management measures to minimize the use, human exposure and emissions to the environment?

- ◯ Yes
- ◯ No

Please specify and/or refer to literature/public sources.

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V. Questions - Section E - Waste

Specific questions for the use

If available, please provide data on PFAS (or total F) measurements in flue gas, fly ash or bottom ash from waste incinerators (Energy from Waste installations, cement kilns, hazardous waste incinerator etc.).

1000 characters left

If available, please provide data on PFAS emissions to air from landfill sites.

1000 characters left

If available, please provide information on PFAS recycling.

1000 characters left

Thank you for your participation!

This is the last page of the survey. Please make sure your information is correct. After clicking on 'Submit', you will not be able to change your entries anymore. The following page however will give you the opportunity to save your answers as PDF document or print them.