Nordic Council of Ministers

Workshop on joint strategies for PFASs

Proceedings of an international workshop on per- and polyfluorinated substances held on 5–6 April 2017, at the Swedish Chemicals Agency, Sundbyberg, Sweden

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List of Abbreviations

Table 1: Abbreviations

Abbreviation	Explanation
8:2 FTOH	3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-heptadecafluorodecan-1-ol
Adona	3H-perfluoro-3-[(3-methoxy-propoxy)propanoic acid], ammonium salt
AFFF	Aqueous Film Forming Foam
BPR	Biocidal Products Regulation
BREF	Best Available Techniques Reference Document
CARACAL	Competent Authorities for REACH and CLP
CE	Conformité Européenne, (European Conformity marking)
CLP	Classification, Labelling and Packaging of substances and mixtures
CMR	Carcinogenic, mutagenic and toxic to reproduction
COM	European Commission
DiPAPs	di-substituted polyfluorinated phosphate esters
DK-MST	Miljøstyrelsen (The Danish Environmental Protection Agency)
DTU	Technical University of Denmark
DVFA	Danish Veterinary and Food Administration
DWD	Drinking Water Directive
ECHA	European Chemicals Agency
ED	Endocrine Disruptor
EEA	European Environment Agency
EEB	European Environmental Bureau
EFSA	European Food Safety Authority

Abbreviation	Explanation
CONTAM	Contaminants in the Food Chain
EPA	Environmental Protection Agency
EQS	Environmental Quality Standards
ETH	Eidgenössische Technische Hochschule
EU	European Union
F53-B	2-[(6-chloro-1,1,2,2,3,3,4,4,5,5,6,6-dodecafluorohexyl)oxyl]-1,1,2,2-tetrafluoroethanesulfonic acid,potassium salt
GenX	Commercial mixture from ammonium 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoate and 2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid to substitute PFOA
H4-PFOS	1-Octanesulfonic acid, 3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluoro- S. 33
HBM4EU	EU Human Biomonitoring Programme
IED	Industrial Emissions Directive, Directive 2010/75/EU of the European Parliament and the Council on industrial emissions
Kem	Kemikalieinspektionen (Swedish Chemicals Agency)
LC	Long Chain
MoBa	Norwegian Mother and Child Cohort Study
MonoPAPs	Mono substituted Polyfluorinated Phosphate Esters
MS	Member State
NEA	Norwegian Environment Agency
NFSA	Norwegian Food Safety Authority
NGO	Non-Governmental Organisation
NIP	National Implementation Plan of the Stockholm Convention
NIPH	Norwegian Institute of Public Health
Nordic Council	Official body for formal inter-parliamentary co-operation from Denmark, Finland, Iceland, Norway, Sweden, the Faroe Islands, Greenland and Åland
NRCWE	National Research Centre for the Working Environment, Denmark
NTE	Non Toxic Environment
OECD	Organization for Economic Co-operation and Development

Abbreviation	Explanation
PAHs	Polycyclic Aromatic Hydrocarbons
PBT	Persistent, bioaccumulative and toxic
PCB	Polychlorinated Biphenyl
PFASs	Per- and Polyfluorinated substances
PFBA	Butanoic acid, heptafluoro-
PFBS	Perfluorobutanesulfonic acid
PFCA	Perfluorinated carboxylic acids
PFHxA	Perfluorohexanoic acid
PFHxS	Perfluorohexanesulfonic acid
PFNA	Perfluorononanoic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctyl sulfonate
PFOSA	Perfluorooctanesulfonamide
PFPEs	Perfluoropolyether
PFPiAs	Perfluoroalkylphosphinic Acids
PFSA	Perfluoroalkyl sulfonic acids
PIGE	Particle Induced Gamma-ray Emission
PM	persistent and mobile
POPs	Persistent Organic Pollutants
PPPR	Plant Protection Products Regulation
R&D	Research & Development
RAC	Committee for Risk Assessment
REACH	Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)
RMOA	Risk Management Option Analysis
RoHS	Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment, Directive 2002/95/EC

Abbreviation	Explanation
SAICM	Strategic Approach to International Chemicals Management - a policy framework to promote chemical safety around the world.
SEAC	Committee for Socio-Economic Analysis
SEPA	Swedish Environmental Protection Agency
SGI	Swedish Geotechnical Institute
SLU	Sveriges lantbruksuniversitet (Swedish University of Agricultural Sciences)
Stockholm Convention	Stockholm Convention on Persistent Organic Pollutants
STP	Sewage Treatment Plant
SVHC	Substances of Very High Concern
TDI	Tolerable Daily Intake
TOF	Time-of-flight mass spectrometer
tpa	Tons per annum
vP	Very persistent
vPvB	Very persistent and very bioaccumulative
vvP	Very very persistent
WFD	Water Framework Directive
WP	Working Package
XRF	X-ray fluorescence spectroscopy

Summary

The "Nordic[1] workshop on joint strategies for per- and polyfluorinated substances (PFASs)" was hosted by the Swedish Chemicals Agency[2] in Stockholm, Sweden on 5–6 April, 2017.

The aim of the workshop was to gather scientific and regulatory experts, identify common issues related to PFASs, recommend priorities and steps/strategies forwards and facilitate continued information exchange and cooperation. Participants consisted primarily of Nordic delegates but also representatives from other regions and arenas e.g. the ECHA PFAS network.

The workshop consisted of two sections: firstly providing an update on the current status of work on PFASs, including an update on the current activities and responsibilities of participating national agencies from Nordic countries and also Germany and Austria; and secondly identifying possible strategic ways to deal with PFASs and identifying issues.

Group work focused on four topics: Regulatory, Monitoring, Science and Legacy. Based upon a list of proposed measures/activities, a strategy was developed and activities/measures prioritised by a process of critical and iterative discussions. This part of the work was based on a presumptive "ideal solution" as a thought starter and a systematic process described in the report. Finally after the workshop, the "Outcomes" of the workshop were described, agreed on and documented in a short report which has been previously published and the content of which is also presented in this full report from the workshop (section 5, Conclusions and Outlook).

[1] For more information on the Nordic Chemical Group, please read http://www.norden.org/en/nordic-council-of-ministers/council-of-ministers/the-nordic-council-of-ministers-for-the-environment-mr-m/institutes-co-operative-bodies-and-working-groups/working-groups/nordic-chemical-group-nkg

[2] http://www.kemi.se/

1. Background

Per- and polyfluorinated substances (PFASs) are widely used in society. Individual PFASs or their degradation products are extremely persistent in the environment and some are bioaccumulative and toxic. In a survey conducted in 2015, the Swedish Chemicals Agency estimated the number of PFASs on the global market to be more than 3,000 (KemI Rapport 7/15).[3] The Swedish Chemicals Agency is of the opinion that the extreme persistence of PFASs is a cause for concern. In addition, many PFASs are water-soluble and mobile in soil constituting a risk of contamination of drinking water supplies for a long time. The insufficient knowledge on the uses of PFASs and their toxicity makes it difficult to estimate the degree of exposure and the risks that PFASs pose to humans and the environment.

Because risk assessment and risk management activities on PFASs have intensified during recent years and involve different actors, coordination and interaction between these activities and actors have become more important. Oversighting, prioritizing and coordinating these activities could increase awareness and enable identification to synergies to improve the risk assessment and management of PFASs. A workshop on joint strategies for PFASs was therefore arranged, primarily focusing on the Nordic countries, but also involving other EU member states, the ECHA PFASs group as well as other persons with specific expertise in technical or regulatory issues linked to PFASs. The main aim of the workshop was to identify common political and regulatory strategies to prevent health and environmental problems from the use of PFASs.
More specifically, the aims of the workshop were to:

- gather scientific and regulatory experts from the Nordic and other EU member state authorities, ECHA, the Commission and other arenas;

[3] https://www.kemi.se/global/rapporter/2015/report-7-15-occurrence-and-use-of-highly-fluorinated-substances-and-alternatives.pdf

- identify common issues related to PFASs, exchange experience from and inform each other of ongoing initiatives and develop common priorities for regulating PFASs and defining related strategies and implementation steps;
- facilitate continued information exchange and cooperation between the Nordic countries as well as other EU member states and actors in the field;
- publish a workshop report in order to extend the debate on PFASs to other stakeholders.

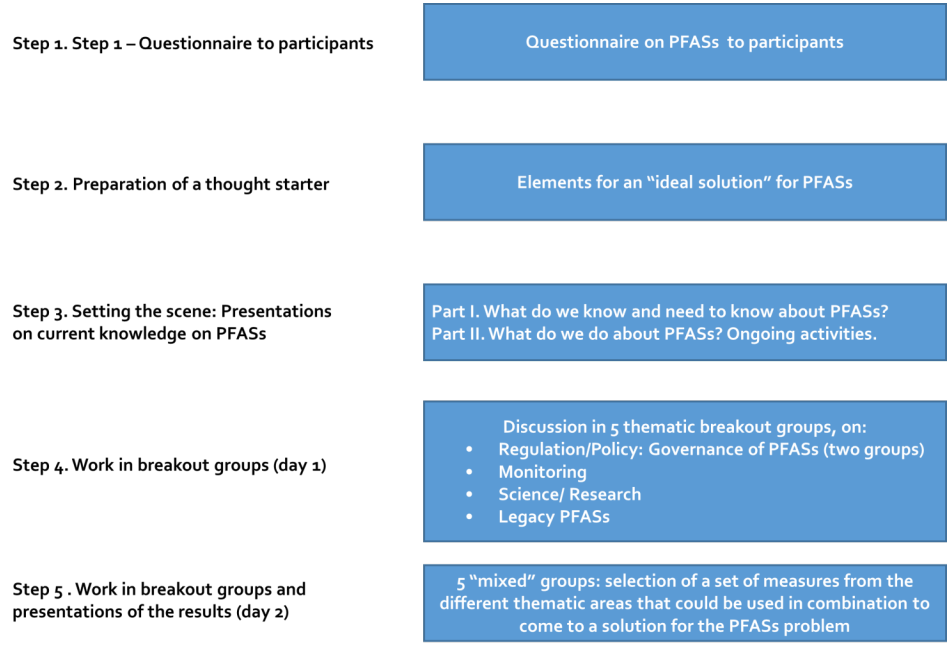
The workshop "A Nordic workshop on joint strategies for per- and polyfluorinated substances (PFASs)" was held on 5–6 April 2017 at the Swedish Chemicals Agency in Sundbyberg, Sweden. Participants from national and European agencies and the EU Commission attended the workshop. The participant list was complemented by invited speakers from academia and private actors that work on different aspects of PFASs (see Annex I –List of Participants).[4]The workshop was implemented in five steps (Figure 1) and was followed by the publication of its outcomes.

[4] Please note that the present report should not be considered as representing an official position of any of the agencies or organisations to which the participants belonged.

2. The Workshop

The workshop consisted of several steps. These are briefly described below and in part illustrated in a workflow diagram (Figure 1).

Figure 1: Workflow of the Workshop



2.1 Pre-workshop activities

2.1.1 Step 1 – Questionnaire to participants

Prior to the workshop, a questionnaire was sent out to the potential participants to gain an overview on current activities on PFASs in their respective countries. The questions covered by the questionnaire (see Annex IIIA – Questionnaire sent to the participants) and answers were compiled (see Annex IIIB – Compilation of Responses to pre-meeting questionnaire) and circulated to the participants prior to the workshop.

2.1.2 Step 2 – Preparation of a thought starter

A thought starter was developed in order to facilitate discussion at the workshop and to identify desirable elements of an approach to adequately control the risks from PFASs. The thought starter was developed based on the answers to the questionnaire and the information provided by the speakers before and on the first day of the workshop. It included a work hypothesis on "How to conclude the never ending story on PFAS"[5] which consisted of eight characteristics that could define a possible solution. It was clear to the organisers that not all of the elements listed in the thought starter could be achieved by only one measure or even one set of measures.

Box 1: Work hypothesis: How to conclude the never-ending story on PFAS?

Based on the current state of knowledge and on presentations for the workshop, an "ideal solution" may have the following characteristics:

- It would enable us to fill in data gaps on PFAS, their alternatives, and remediation technologies;
- It would apply to PFASs as a group/groups, as opposed to a substance by substance approach. It would also be designed to adapt to the evolutions of PFASs themselves, so that ideally there would be no need to revise the scope. This would also allow to tackle the problem of "pseudo-substitution";

[5] This expression referred to a recently published article: See 1A Never-Ending Story of Per- and Polyfluoroalkyl Substances (PFASs)? Zhanyun Wang, Jamie C. DeWitt, Christopher P. Higgins, and Ian T. Cousins, Environmental Science & Technology 2017 51 (5), 2508-2518 DOI: 10.1021/acs.est.6b04806

- It would effectively regulate not only at the level of substances but also at the level of articles (including imported ones, see the global scope below);
- PFASs would be allowed for some essential uses that are important for society and strictly controlled;
- Given the long-distance mobility of PFAS and PFASs containing articles, and the fact that a lot of production sites are in Asia, the ideal solution should have a global geographic scope;
- The PFASs remaining on the market due to the authorised uses should not be further spread by recycling – so as not to contaminate waste streams and end-up in articles where they would not be allowed;
- It should enable us to monitor PFASs in the technosphere, the environment and humans;
- PFAS-contaminated areas should be cleaned.

Another aim of this approach was to lift the discussions to a more general level and to address PFASs as a group. The current regulatory practice addresses chemical risks substance by substance, which is very time and resource consuming. Furthermore, it often triggers unintended market activities, in particular regrettable substitutions, when the restricted substances are frequently replaced by chemically closely related substances, which therefore exhibit the same or an insignificantly better environmental or health performance. A group approach could overcome some of these problems by concentrating the authorities' intervention and creating synergies in assessment and risk management as well as by making future markets of (groups of) PFASs more predictable regarding expected regulatory actions.

After discussion within the groups, some changes were made to this thought starter which formed a base for agreeing on the final outcomes.

2.2 Workshop activities

The workshop started with selected presentations to update the participants on the current knowledge on PFASs (step 3). After the presentations, the thought starter was presented to the participants and they were divided into groups to work on potential ideas to tackle the PFASs problem, which they presented to all the participants (steps 4 and 5).

2.2.1 *Step 3. Setting the scene: Presentations on current knowledge on PFASs*

The workshop started with an informative session. The presentations were divided into two parts. Part I reflected the current state of knowledge and the information gaps on PFASs, with a focus on the composition of the group PFASs, known uses and assumed trends and intrinsic properties that characterize the group. In part II, ongoing activities such as regulation, monitoring, remediation and research activities on PFASs were presented. This part resulted in a concluding reflection on a potential way forward to target known problems with a broad view on PFASs.

2.3 Summary of part I – Data and Uses of PFAS

2.3.1 *Data on PFAS*

During the presentations and in the working groups, it became obvious that the main problem in finding a workable solution for the PFASs issue is the variability of this substance group and the lack of a complete overview on substances and uses. The majority of PFASs are not covered by existing restrictions or are excluded to a large extent from REACH registration because they are polymers according to the REACH definition (for example perfluoropolyethers (PFPEs)[6]): polymers do not need to be registered, which means that no data on toxicity have to be provided by manufacturers or importers.[7] It was shown that for some substances it is not clear whether or not they are covered by the REACH polymer definition as there is a lack of information on the substance identity itself. Such substances are often used as replacements for the PFASs that were used in the past. Other PFASs are exempted from the REACH registration or require only few information due to their low tonnages. A Commission study has already analysed options to require registration of polymers. This study was completed in 2015[8] and will be further investigated in the future. Similarly, the sufficiency of data

[6] Some of these known under trade names as FOMBLIN®, Galden® (Solvay); Krytox® (DuPont); FLUORONOX®, Teccem.
[7] See Article 3(5) in combination with Article 6(3).
[8] BIO by Deloitte (2014). Technical assistance related to the review of REACH with regard to the registration requirements on polymers – Final report prepared for the European Commission (DG ENV), in collaboration with PIEP. http://ec.europa.eu/environment/chemicals/reach/pdf/FINAL%20REPORT% 20POLYMER%20SI671025.pdf

for low volume substances was discussed previously in the REACH review of 2012.[9] At that time for both substance groups (polymers and low tonnage[10]), no changes in REACH were implemented. In the context of the workshop, many participants were of the opinion that additional data generation obligations for such substances should be implemented under REACH to improve the information base for the PFAS assessment.

2.3.2 Uses of PFAS

Another aspect of the problem with PFASs that was discussed and presented in several of the presentations is the limited knowledge on their uses. When analysing information from national product registers and other regulatory databases, published literature and internet sources, it becomes apparent that the uses of many PFASs are unclear. Also, for some PFASs there is no indication that they are used at all. Despite having no indication from these information sources that certain PFASs are actually used, some have been detected in environmental samples. Since there are no natural sources of these substances, they therefore have to be of anthropogenic origin but their exact source remains unclear (some occurrence of the substances in the environment can partly be explained by historical uses). This means that the substances used several decades ago are only now detected in the environment. This might either be due to better analytical technologies or to the fact that some PFASs only slowly transfer between compartments.

A workshop participant informed that large waterbodies are not necessarily natural sinks for persistent substances but can release them again into air, soil or (other) waterbodies, e.g. via sea spray transport mechanisms. The workshop participants were of the opinion that this is one of the group's important characteristics of concern, which justifies a high level of precaution. This in part may explain why the use pattern and exposure pathways may diverge in space and time for persistent substances. In addition, this can add significant uncertainty to the evaluation of toxic properties of individual PFASs, in particular as long-term effects are usually not or only to a very

[9] Risk & Policy Analysts Limited, 2012 Review of REACH Registration Requirements for Substances Manufactured or Imported between 1 and 10 Tonnes, prepared for European Commission DG Environment http://ec.europa.eu/DocsRoom/documents/11918/attachments/1/translations/en/renditions/native

[10] 1–10 Ton substances, the scope of the study was to assess if information gaps occur at that tonnage band and if these prevent an adequate risk assessment under REACH. One observation was that a full PBT assessment is not possible in this tonnage band. This is even more so for substances that are not registered at all.

limited extent part of risk assessments. In conclusion, it is difficult to predict the long-term risks if continuous exposure over a very long time occurs, as it might be the case for PFASs.

In addition to historic and current uses of PFASs, an increasing number of new patents indicates a likely increased use of fluorinated substances. The patents describe new uses for applications for which PFASs are not currently used (based on public available information). The workshop participants were concerned that new PFASs would have similar effects or characteristics as known ones. Consequently, it was expected that these new uses would further add to a continuous increase in environmental concentrations.

2.4 Summary of part II – Monitoring, Remediation and Regulatory issues

2.4.1 Monitoring and Remediation

That there is a trend towards increased use of chemicals in general, and of PFASs in particular, suggests that early warning systems should be established. For instance, monitoring of chemicals could be extended to identify the early accumulation of PFASs. Also monitoring of diseases resulting from environmental exposure to chemicals may be another option; however, for persistent substances, monitoring chemical levels rather than disease incidence is preferred.

Monitoring data show that the environmental concentrations of certain PFASs increase. The PFASs in question are either persistent themselves or degrade into persistent products.

Currently, only very few PFASs are monitored. The Water Framework Directive only covers PFOS that are listed as priority substances. The TDI-levels[11] for PFOS and PFOA in food and food contact material legislation trigger respective controls. PFOA, GenX, Adona and other PFASs are included on the list of substances that are approved for use in plastics intended to come into contact with food.[12] DiPAPs, monoPAPs, PFOA

[11] Tolerable Daily Intake.

[12] All used as process chemicals in fluoropolymer manufacture.

and 8:2 FTOH have been monitored since 2011. At the national level, other activities are reported, such as the determination of total organic fluorine in paper/board used as food contact material and in human blood as well as in water, which are conducted in Denmark. Initiatives by other member states have specifically investigated the occurrence of PFASs whereas others, more broadly, included monitoring of PFASs together with other substance groups. The EU Human Biomonitoring Programme (HBM4EU)[13] will address a larger group of PFASs to gain a better understanding on the extent of exposure. However, it is yet unclear if the substances that are currently monitored fully represent the problem.

In addition to this uncertainty, the workshop participants discussed whether the monitoring of PFASs could also support the identification of sources of emission: if PFASs are detected in monitoring programmes, the sources of emission must be adequately identified in order to implement effective regulatory measures to limit emissions and remediation methods or procedures to reduce the environmental concentrations.

Standard remediation techniques might be ineffective for many PFASs, in particular because of the trend towards the use of shorter chain PFASs, which started after the restriction of PFOA. Due to their shorter chain length, these substances are more mobile in water and therefore cannot be removed from aqueous compartments by commonly applied techniques, such as activated carbon filters or ozonation. Sometimes the only possibility to limit or prevent emissions (e.g. from landfills) is to build large impermeable barriers that are economically very costly. There are ongoing activities to concentrate PFASs from contaminated soils and remove them locally. All these measures are only suited for remediating local contaminations but not for reducing the background exposure or remediating larger scale contaminations.

As a consequence of the limited possibilities to treat polluted areas and of increasing concentrations of PFASs in the environment and in organisms, many workshop participants supported the idea of reducing the initial emissions of PFASs as much as possible.

[13] https://www.hbm4eu.eu/

2.4.2 *Regulatory issues*

The workshop presentations and discussions showed an overall discord with the currently applied substance-by-substance approach to regulate PFASs. The REACH restriction and authorisation schemes hinder group approaches.[14] According to the workshop participants, this led to the unsatisfying situation where only few substances among all PFASs are regulated. Additionally, if a regulation is established, the market actors tend to use other PFASs with comparable hazardous properties (e.g. similar persistence) or other undesirable properties (high mobility in water instead of bioaccumulation potential). However, the PFOA-restriction and the restriction proposal on C9-C14 PFCAs demonstrate that a group approach under REACH is possible.

Overall, many workshop participants favoured better addressing PFASs at a global level, i.e. under the Stockholm Convention. However, it became clear that a change of the POPs criteria could take a very long time. Therefore, a clear preference was given to EU regulatory tools in the end with REACH being the most important one.

The limitations of REACH in this regard were presented and discussed as follows:

- REACH registration obligations do not apply to many of the PFASs (see also Step 5);
- Persistent or very persistent substances are only addressed as PBTs/vPvBs, i.e. only if they either show also a potential for high bioaccumulation/magnification and a toxicity or a very high bioaccumulation/magnification. The PBT/vPvB criteria are not suited to address the full spectrum of PFASs, even though – in the view of the workshop participants – the high persistency would justify an equivalent level of concern following Article 57f of REACH.

[14] There are grouping approaches that have already been used in risk management under REACH. These are mainly based on groups of substances that release the same molecule under certain conditions. Examples are Cadmium and its compounds or recently the nonylphenol/octylphenol ethoxylates. Other groups are justified because sufficient data are available for each of the substances that are member of the group as e.g. for the PAHs. Still, it might be difficult in practice to justify the group, even more if it is the intention to base groups on read across on specific endpoints (e.g. single target toxicity).

Other parameters that should be given higher relevance in regulatory processes according to the discussions are:

- Very very high persistence (vvP) – stable for decades;
- (Very) persistent and mobile – especially with regard to the aquatic environment.

According to some of the participants, both parameters should be sufficient to regulate the substance without the need to show toxicity in addition.

Risk management under REACH (SVHC listing, restrictions, Annex XIV listings) often covers only single substances. There was some support to allow grouping in the SVHC identification and the listing on Annex XIV as a regulatory approach based on the precautionary principle. According to this, the structural similarity of substances should be sufficient to establish a group and to start the regulatory process instead of demonstrating the hazardousness for each representative of the group. Another approach discussed was to establish the vvP as a trigger for regulating PFASs without showing toxic effects for all representatives of a group (see above).

The group approach for PFASs seemed to be a good way forward for many participants. Nevertheless, it was acknowledged that PFASs might not be one uniform or harmonized group but rather several subgroups of substances with similar intrinsic properties. Further research was regarded necessary in order to establish these subgroups with sufficient evidence to justify subsequent regulation. A potential separation of shorter chain PFASs (C-chain lengths of 7 and shorter) that are (very) persistent and mobile in water and PFASs of chain lengths of C8 and longer that fit in the current PBT and vPvB assessment was proposed. There was also a discussion on how to evaluate fluoropolymers and fluorinated polymers with regard to their role as source of fluorinated compounds in the environment and if this constitutes a reason to regulate them. This question remained open because there is not enough scientific data on the degradation of these substances into smaller molecules that might be of higher concern.

The discussions revealed a possible need to change REACH in order to close the knowledge gaps (e.g. registration obligation for polymers), while others could be addressed on the basis of the existing text. An example of this would be the possibility to accept vvP substances as substances of equivalent level of concern under Article 57(f) of REACH.

2.4.3 *Step 4 – Work in breakout groups (day 1)*

After an introduction to the breakout groups process, a keynote presentation on "Regulation and Governance" in general was given followed by an introduction to the principles of a potential "ideal solution" (see Box 1). The participants were then divided into five thematic breakout groups covering the following subjects:

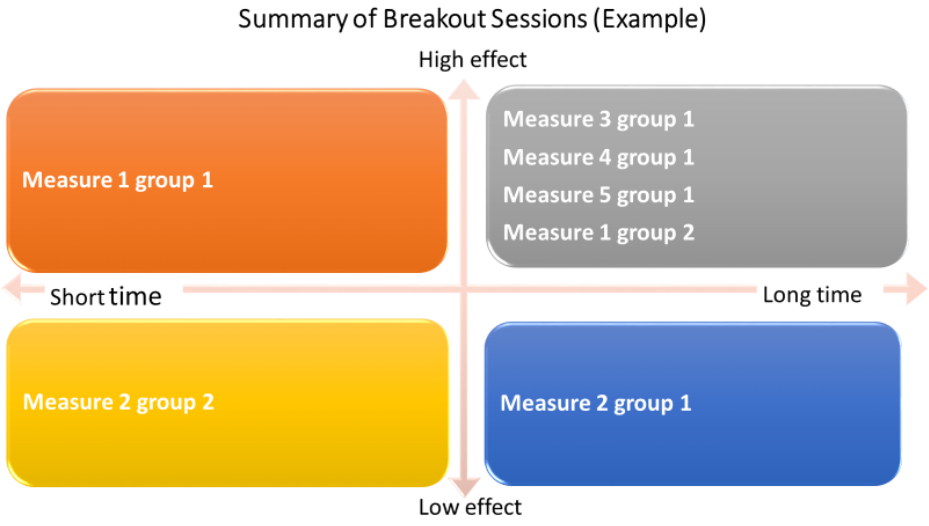
- Regulation/Policy: Governance of PFASs (two groups);
- Monitoring;
- Science/Research;
- Legacy PFASs.

First, the groups discussed the principles of the "ideal solution" with the aim of identifying necessary changes or additions as well as any disagreement with any of the principles.

Based on this discussion, the participants were requested to develop specific measures. The measures were supposed to be specific for the group theme and were supposed to be evaluated with regard to their effectiveness (high or low effect)[15] and potential contributions to the "ideal solution". In addition, their potential timeline (short term/ long term) was discussed and evaluated. These proposals were then gathered and classified (following in model in Figure 2 below) so that they could be used as input for step 5.

[15] Possible costs were not discussed.

Figure 2: Model in which the proposed measures were summarized



In this section, the overall outcomes of the breakout groups' work are described. A list of the specific measures is provided in Annex IV (the numbers in the brackets correspond to the numbers in the table of Annex IV).

2.4.4 Regulation/policy: Governance of PFASs (RB1–RB7 and RA1–RA12)

The regulatory options for PFASs that were discussed cover measures that aim to generate market information on PFASs and to identify and communicate risks in order to raise awareness and acceptance for subsequent limitations of the placing on the market and use of PFASs. This includes activities at political level, because additional regulatory measures (such as grouping) that include implementation of new legislative approaches need more political backing than currently exists. The latter includes awareness raising at global level, e.g. in the frame of SAICM.[16] Changes to existing

[16] http://www.saicm.org/

PFASs regulation in the EU were discussed as being possible under the Commission's upcoming *Non-Toxic Environment* Strategy.

Measures to close information gaps include introducing information requirements for polymers or extending them for low tonnage substances (c.f. above). It was discussed whether a very broad restriction proposal under REACH would be possible and could also enable information gathering on PFASs' uses via the public consultation. Albeit not necessarily leading to a broad restriction of PFASs, this may deliver information or evidence for potential (specific) restrictions. However, in the view of many participants a restriction would already be justified based on the high persistence of the PFASs, even if for some substances some data are missing. Other information-related measures should, among others, inform stakeholders on alternatives or already established substitution (platform on PFASs substitution obligation, clearing house on alternatives).

To limit market access, both groups proposed to include PFASs in the Stockholm Convention to enable targeting them at global level. A PFASs-specific legislation was seen as a possible but less likely option.

The following additional measures were discussed:

- to apply the current REACH provisions to PFASs (use of Article 68(2) for all non-essential consumer uses, using Article 57(f) for short chain PFASs);
- to further develop the REACH provisions to better address PFASs (e.g. include vvP[17] as cause for concern, extend authorisation to imported articles, to automatically include persistence in substance evaluation);
- to introduce new, precautionary elements into legislation (e.g. automatic ban of PBTs, pre-market authorisation scheme for new PFASs).

Furthermore, some of the measures proposed for REACH were mirrored in other substance regulations, e.g. the inclusion of cut-off criteria for persistent and mobile (PM) active substances and co-formulants under the Plant Protection Products Regulation (PPPR) and the Biocidal Products Regulation (BPR).

[17] This measure was also proposed to be implemented under the Stockholm Convention. Nevertheless, an implementation in that particular framework was anticipated to be possible in the long term rather than in the medium term.

The need for additional measures in other legislation was seen as an important complement to substance-related legislation. They would focus on the water legislation, such as the Ground Water Directive and the Drinking Water Directive and should include screening activities to establish limits for vvP. Annex II of the Industrial Emission Directive (IED)[18] was also considered a possible tool to limit emissions of PFASs.

Generally, measures based on existing legislation and that only require a more extensive interpretation of their provisions were regarded as the most likely for fast implementation, even if initiated by only a few actors. By contrast, measures that require a change of legislation are likely to take more time and require the agreement of a larger group of stakeholders.

2.4.5 Monitoring (M1 – M7)

The "Monitoring Group" discussed how more information could be generated on *which* PFASs are on the market and *where/for what* they are used. In the long term, PFASs manufacturers should be obliged to report the chemical identity and any impurities of PFASs, their synthesis methods, standards and analytical methods to a centralised register in order to enable them to assess and manage risks accordingly. In the short term, it would be valuable to have a publically available database on existing monitoring activities and to provide additional guidance to harmonise monitoring campaigns. This should be accompanied by measures that aim to establish methods to quantify PFASs in products and in the environment (e.g. Total Organic Fluorine, ionic PFASs, polymers).

2.4.6 Science/Research (S1 – S6)

Measures from the "Science/Research Group" were diverse and linked to several aspects of the PFAS discussions. One proposed measure aimed at establishing PFASs groups by investigating mechanistic effects and thereby facilitating the justification of group approaches for regulation. Another measure focussed on substance identity of PFASs themselves and developing or identifying potential alternatives for their use. Research on alternatives was regarded necessary to establish functional and

[18] It could e.g. be considered to set individual "best practice" or "acceptable" emission levels for substances that would justify exemptions from REACH-authorisation.

sustainable alternatives for as many uses as possible (one will not fit all applications). Further research needs were identified with regard to the fate of PFASs at the waste stage (e.g. incineration and recycling) and the cost effective remediation of legacy PFASs.

2.4.7 Legacy PFASs (L1 –L8)

The measures for legacy PFASs were partly similar to the ones developed by the working groups on regulation. Some proposed measures aimed at generating information on PFASs along the supply chain (candidate listing of PFASs groups, lowering the limits of Article 7 and 33 of REACH, including vvP as criterion of concern in Article 57 of REACH) and towards consumers and other market actors (label products with "contains PFASs"). The information generation should be accompanied by awareness raising to inform the public to increase the demand for PFAS-substitutes. For PFASs already on the market, the labelling obligation would foster waste separation resulting in separate treatment of PFASs-containing material streams. The group also discussed a measure enabling authorities to request information on PFASs from downstream users under REACH. Similarly, the group discussed whether a mandatory provision of information on industrial emissions to the authorities could be implemented under the IED and/or in BREFs.

2.4.8 Step 5 – Work in breakout groups and presentations of the results (day 2)

On the second day of the workshop, the composition of the breakout groups was changed so that (as far as possible) at least one representative of each "old" thematic group was present in the "new" group. The task of the groups was to select a set of measures from the different thematic areas that could be used in combination to come to a solution for the PFASs problem. The groups discussed and developed their reasoning as to why certain measures should be implemented first, how the measures would interact and what would be the next steps to take. The working groups then presented "their" set of measures and the reasoning as to how these measures would contribute to solving the PFAS problem to the other participants. It was of interest to understand the argumentation behind the selection of measures and to identify fields of broader agreement as potential starting points for the implementation of measures in reality.

An overall summary of the measures discussed by each group is provided below. For a detailed summary, see Annex V.

The different approaches the five breakout groups developed on day two on first sight might look completely different with regard to their extent and complexity, although making use of the same basic set of measures elaborated on day one. Still, there are elements that are part of all or at least some "solutions".

All groups included measures, which aimed at getting better information on the group of PFASs in general. The information gap regarding substance identity on PFASs on the market was identified as the main problem. Other measures in this area targeted analytical issues in products and in environmental compartments, the uses of the individual PFASs and, last but not least, information on substance properties on PFASs that are exempted from legally prescribed data collection regimes like the REACH registration system. Furthermore, it was suggested that this information should be available for risk assessment by the authorities (and also possibly the public) by setting up specific data bases. This would limit the need to contact industry on a case by case basis.

Measures were proposed with the intention to remove this information gap. Participants appeared to favour solutions where the responsibility for the information collection was allocated to the industry handling PFASs (manufacturers as well as users – formulators of mixtures, article producers). The market actors should be involved in data collection, and should, in line with mechanisms that currently exist, bear the responsibility for the registration of substances under REACH (e.g. when polymers would be included in that obligation) or the labelling of products. Besides these, a strong involvement of industry was favoured to set a basis for authorities to evaluate risks associated to PFASs. An example would be the development of analytical methods and standards for PFASs.

A second type of measures suggested dealt with regulatory barriers that impede an effective progress in solving the PFASs issue. Already mentioned above are the exemptions from registration obligations under REACH for polymers. Another limitation of the registration obligation under REACH applies for substances manufactured or imported at very low tonnages below 1 tpa per market actor. This seems relevant as it seems that some market actors do not use individual PFASs in tonnages above this and therefore these substances are not listed in the EU substance registers. Another field discussed was the exemptions from registration and authorisation for substances in articles (not intended to be released). To overcome

regrettable substitution or continued increasing use of new PFASs a pre-market authorisation scheme was seen as useful. In order to implement such measures it was quite clear to the participants that REACH would need to be changed. Furthermore, it was a clear preference from all the groups to extend the activities on a global level, preferably under the Stockholm Convention which would also require changes in the criteria under this convention.

Other measures were not necessarily linked to a change in the regulations. Here the challenge was to interpret the current regulation in a way that PFASs can be addressed more efficiently and find support for this among the member states and the EU Commission. This included the identification of vvP and PM PFASs as SVHC and the development and acceptance of grouping based on molecular similarity or read across.

Public awareness raising was another element that all groups included into their approaches. Awareness raising was seen as precondition for several of the other activities. Regulatory changes need political support. Public awareness on the PFASs issue would trigger also political awareness and potentially result in political activities. Furthermore, public awareness of the problems linked to PFASs may facilitate to create economic pressure on producers of PFASs-containing products could be identified on shelves and then buying actively avoided. Measures linked to public awareness raising are also linked to transparency on the presence of PFASs.

In addition to measures aiming at limiting the increase of PFASs in the EU (and globally), all approaches included measures to remediate existing PFASs pollution or to ensure proper treatment for currently marketed PFASs-containing products. An example for the latter is the labelling of products that do contain PFASs to ensure they can be treated separately when they become waste.[19]

[19] A waste treatment operation that is specific for PFASs must be based on knowledge that PFASs are present or not present (this would mainly apply to products where both options can be found). A labelling obligation could help to build a bridge to the waste life cycle stage if there is no connection between the actor that introduced the PFASs to the product and the waste handler. This is the initial precondition for separate treatment and subsequent discussion on the correct treatment path.

2.5 Outcomes

Following the workshop, the "Outcomes" of the workshop were described, agreed on and documented in a short report which has been published in July 2017 on the Nordic Council of Ministers website.[20]

These "Outcomes" are reproduced below.

2.5.1 Outcome – General Considerations

PFASs are widely used in society and are as a whole group a cause for concern. Individual PFASs or their degradation products are extremely persistent in the environment. Some are proven to be bioaccumulative and toxic, whereas for others, there is a lack of publicly available scientific data. Nevertheless, certain PFASs have been ubiquitously detected in the global biotic and abiotic environment, even in remote regions such as the Arctic. Recently, PFASs have also been found in ground- and drinking water in a number of countries. Currently, there are strong indications that PFASs are increasingly used in chemical products, processes and articles, and more and more are detected in various environmental matrices. In contrast, knowledge about the specific uses and sources of emission as well as hazards and risks is poor for many of the substances in this group.

The workshop participants identified the needs for improving and expanding the current applicable PFAS terminology, in particular improving nomenclature for some subclasses of PFASs, as well as more research to fill data gaps. This includes e.g. substance identification and definition of the PFAS group, toxicity of some substances, in particular those that to date have been overlooked, and bioaccumulation potential. However, the workshop agreed also that the current level of knowledge on this group of substances and the extent of concerns about PFASs are sufficient to *justify prompt action*.

In order to tackle the problems raised by PFASs efficiently, the action should have the following characteristics (the numbering does not indicate any priority or chronological order):

[20] See http://norden.diva-portal.org/smash/record.jsf?pid=diva2%3A1120881&dswid=-5039

1. It would enable us to fill in critical data gaps on PFAS and their alternatives, ideally within an international cooperation;
2. It would apply to PFASs as a group/groups, as opposed to a substance-by-substance approach. It would also be designed to adapt to the evolution/development of PFASs themselves, so that ideally there would be no need to revise the scope to address novel PFASs. This would also allow the problem of "pseudo-substitution" (i.e. replacing a substance with one that is structurally similar and thus often has similar hazardous properties) to be tackled in the future;
3. It would effectively regulate not only PFASs but also PFAS-containing articles (including imported ones, see the global scope below) and improve the traceability of those articles;
4. Specific uses of PFASs that have been justified as essential for society would be allowed only under controlled conditions aimed at keeping any releases to the environment and human exposure during and after product life to an absolute minimum;
5. Given the long-distance mobility of PFASs and the global use of PFAS-containing articles, and the fact that many production sites are located in third countries, the action should have a global scope;
6. The PFASs remaining on the market due to the allowed essential uses (see element 4 above) should not be further spread by reuse or recycling – so as not to contaminate waste streams and end-up in articles where they would not be allowed;
7. It should enable to monitor PFAS in the technosphere, the environment and humans;
8. Remediation technologies for PFAS-contaminated sites should be developed and PFAS-contaminated areas should be identified and cleaned up;
9. Innovations should be promoted, and possibly incentivized, towards non-hazardous alternatives (e.g. sustainable chemistry).

2.5.2 Outcome – Specific Considerations

Based on the above characteristics, the workshop participants identified specific concrete measures in different areas (e.g. regulation, science, monitoring, and remediation). The groups of measures proposed were arranged according to different strategies based on distinct reasoning, but all strived to come as close as possible to the characteristics listed above. The measures that were most commonly discussed are described below. A key consideration is that these various measures should support and reinforce each other if they were to be implemented.

First, there is a need to raise more awareness on the problems that PFASs may cause for the environment and human health. The awareness raising measures should target the general public, relevant authorities, and policy-makers. This could be combined with an action at global level to label products containing PFASs. The labelling would show consumers the extent of the use of PFASs and allow an informed choice whether or not they want to buy such products. Furthermore, it would facilitate the separation of PFAS-containing products at the waste stage and allow dedicated handling.

Second, regulatory action is necessary. Preferably, a global regulation on PFAS would be needed (e.g. under the Stockholm Convention) but, given the time necessary to put it in place, existing EU regulatory tools can be used and further developed. The most effective instruments should be identified and used. The key regulation in this regard would be the REACH Regulation, but also other instruments can be used to accompany the measures under REACH. For instance, the drinking water directive and the groundwater directive could be amended in order to establish limits for PFASs and monitoring obligations.

The REACH Regulation enables to generate information on PFASs (that can be used in other legislation) and some of its provisions could be given their full potential. PFASs could indeed be considered "substances of equivalent concern" under Article 57(f) of the REACH Regulation (for instance based on extreme persistence and mobility) and included in the candidate list, with a view of making them subject to authorisation obligations or to be used as the basis of concern for restriction.

Restrictions under the REACH Regulation could also be applied to non-essential uses of PFASs (in particular in consumer products, both produced in the EU or imported), in addition to the restriction that was already adopted for PFOA, its salts and PFOA-related substances.

Workshop participants also identified areas of REACH where provisions were not sufficient to cover PFASs as a group. Therefore, it was suggested that the REACH Regulation should be amended in order to: (i) include registration for polymers, and a redefinition of a polymer in line with established polymer science definitions; (ii) allow for more automatic testing for persistence in substance evaluation; (iii) include "very persistent" substances in the list of substances of very high concern or make a specific category for "very very persistent" substances; and (iv) ensure that imported articles are covered when measures on PFASs are adopted.

Third, a number of monitoring measures were suggested including: (i) ensuring that producers share information on chemical identity of their products including impurities, synthesis methods, and analytical methods as well as analytical standards; (ii) developing a standardised method for monitoring total organic fluorine with a low detection limit in various matrices including products and in human blood; (iii) developing a historical inventory of PFAS on the market; and (iv) preparing a monitoring strategy guidance document to support policy measures.

Fourth, the following scientific needs were identified: (i) mechanistic studies of the effects and fate of PFASs in the environment and biota to facilitate read-across and to avoid pseudo-substitutions; (ii) more information on the substance identity of PFASs and alternatives; and (iii) more information on the fate and transport of PFASs at the waste stage (incineration and recycling).

Annexes

Annex I – List of Participants

Table 2: Participants from the following organisations attended the workshop

Organization	Country
Austrian Environment Agency	Austria
European Commission	Belgium
Milieu	Belgium
Danish Veterinary and Food Administration	Denmark
Danish Environmental Protection Agency	Denmark
European Environment Agency	Denmark
Danish Environmental Protection Agency	Denmark
The Faroe Islands Environment Agency	Faroe Islands
Finnish National Institute for Health and Welfare	Finland
Finnish Centre for Economic Development, Transport and the Environment	Finland
European Chemicals Agency	Finland
Finnish Environment Institute	Finland
German Environmental Protection Agency	Germany
German Federal Institute for Occupational Safety and Health	Germany
Ökopol GmbH	Germany
Icelandic Environment Agency	Iceland
Norwegian Environment Agency	Norway
Norwegian Institute of Public Health	Norway
Norwegian Food Safety Authority	Norway
Swedish Chemicals Agency	Sweden
Stockholm University	Sweden
Swedish National Food Agency	Sweden
Melika Biologkonsult	Sweden
Swedish Environmental Protection Agency	Sweden
Swerea IVF	Sweden
Swedish University of Agricultural Sciences, SLU	Sweden
Swedish Ministry of the Environment and Energy	Sweden
ETH Zürich	Switzerland

Annex II – Agenda and Presentations

Day 1. The overall picture

- Welcome and introduction.

Part I. What do we know and need to know about PFASs?

- Overview of PFASs – Classes and alternatives;
- Known uses of PFASs (including trends);
- Properties of concern of PFASs – knowledge and data gaps;
- Summary.

Part II. What do we do about PFASs? Ongoing activities

- Summary of PFASs regulation to date and ongoing initiatives;
- Ongoing initiatives: COMs view/policy initiatives ;
- Work plan for regulatory activities of PFASs under REACH/CLP;
- EFSA revision of PFOS/PFOA (and other PFASs);
- Early warning systems for PFASs;
- Innovative treatment techniques for per- and polyfluoroalkyl substances in soil; and groundwater;
- Academic research;
- How to conclude a never-ending story on PFASs?
- Summary and introduction to break out groups.

Part III. Identification of issues and possible solutions

- 16.30–18.30. Break-out groups:

Group 1	Group 2	Group 3	Group 4	Group 5
Regulation/policy: Governance of PFASs	Regulation/policy: Governance of PFASs	Monitoring	Science/ research	Legacy PFASs

- Introduction to break-out groups:
  - Key note: "Regulating PFASS in the EU and USA";
  - "Ideal solution" to PFAS issue.

Day 2. Steps forward (part IV)

- Priority of issues and actions. How does this fit into the overall chemical work at national/EU level? (*Working Groups*);
- Presentations and discussion of the outcomes from the Working Groups (*all participants*);
- Workshop recommendations on priorities for PFASs and steps/strategies forward. (*KemI/Ökopol*);
- Workshop summary and conclusions (*KemI/Ökopol*).

End of workshop.

Annex IIIA – Questionnaire sent to the participants

1) Does your country have a policy/focus area/action plan for PFASs?
2) What activities are ongoing in your country concerning PFASs related to, for example:
   - Regulation (chemical, food/feed, cosmetics, waste etc.) –
   - Monitoring –
   - Research –
   - Enforcement and customs –
   - Other.
3) What activities are upcoming/planned in your country concerning PFASs related to, for example:
   - Regulation (chemical, food/feed, cosmetics, waste etc.) –
   - Monitoring –
   - Research –
   - Enforcement and customs –
   - Other.
4) Does your country have any health/environmental issues related to PFASs?
5) Does your country have any health/environmental issues related to PFASs?
6) What do you consider being the biggest issues related to PFASs?
   How can they be addressed?

Annex IIIB – Compilation of Responses to pre-meeting questionnaire

Table 3: Answer to Q1 - Does your country have a policy/focus area/action plan for PFASs?

	Does your country have a policy/focus area/action plan for PFASs?
DE	None
FIN	Only related to PFOS in the National implementation plan (NIP) of the Stockholm Convention
FO*	None (**Faroe Islands*)
DK	*DK EPA* DK has currently no long term action plans for PFASs under REACH/CLP. However, PFASs is considered a focus area and DK are involved in the development of an EU strategy (with Sweden as lead) *DK DVFA* The Danish Veterinary and Food Administration discourage the use of fluorinated substances in paper and board food packaging materials
IS	No special policy has been formed regarding issues related to PFASs
NO	Norway has a national action plan for PFAS, valid for the period 2016–2018. It is available in Norwegian only and may be found at the following web address: http://www.miljodirektoratet.no/Documents/publikasjoner/M611/M611.pdf In addition we have a national list of priority substances. For the substances listed we aim to considerably reduce or stop the use and emissions within 2020. Currently the list includes the following PFASs: PFHxS, PFOA, PFOS and C9 – C14 PFCAs Further information: http://www.miljostatus.no/tema/kjemikalier/kjemikalielister/prioritetslisten/
SE	PFAS is part of KemIs "Action Plan Non-Toxic Everyday Environment (2015–2020)" http://www.kemi.se/files/8040fb7a4f2547b7bad522c399c0b649/rapport-5-14-handlingsplan-giftfri-vardag.pdf?_t_id=1B2M2Y8AsgTpgAmY7PhCfg%3d%3d&_t_q=handlingsplan&_t_tags=language%3asv%2csiteid%3a007c9c4c-b88f-48f7-bbdc-5e78eb262090&_t_ip=172.17.2.105&_t_hit.id=KemI_Web_Models_Media_SiteMediaData/_38cfb96b-72cb-46fc-8958-28acfaf03561&_t_hit.pos=5 KemI has developed a strategy for reducing the use of PFAS aiming at minimising and eventually discontinuing the uses which could cause environmental pollution. The policy is available at: http://www.kemi.se/global/rapporter/2016/report-11-16-strategy-for-reducing-the-use-of-higly-fluorinated-substances-pfas.pdf SE Government hass commisionen KEMI to develop an cross-cutting action plan for natl., EU and international initiatives (deadline Sept 2017) The Swedish Food Agency has recomended, based on analysis of PFAS-11, that the concentration of PFAS-11 should be below 90 ng/Liter in drinking water. At concentrations above 900 ng/L, the water should not be consumed

	Does your country have a policy/focus area/action plan for PFASs?
Summary	
National:	*NO*: (2016–2018) + priority list. Development of action plans for PFOS-polluted airport fire-fighting training sites (NEA). Support the work towards a global regulation of PFOA under the Stockholm Convention (NEA); *FI*: only natl implementation (NIP) Stockholm convention; *SE*: PFAS part of Action Plan, commissioned to develop natl/EU/intl. Action plan (Sept 2017), drinking water limits; *DK*: develop EU plan in coop. with SE
None:	*FO; IS; DE*

Note: * Faroe Islands.

Table 4: Answer to Q2 - What activities are ongoing in your country concerning PFASs related to, for example: regulation (chemical, food/feed, cosmetics, waste etc.), monitoring, research, enforcement and customs, other?

	What activities are ongoing in your country concerning PFASs related to, for example: regulation (chemical, food/feed, cosmetics, waste etc.), monitoring, research, enforcement and customs, other?
DE	Research project 2016–2018: PFAS in building products (e.g. paints, lacquers) and technical textiles (e.g. car seats, water filters) Research project 2016–2018: data collection for preparation of restriction proposals for PFAS (industry survey) Substance evaluation of PFHxA-precursors (2016), 4 fluoroethers, such as ADONA and GenX (2017), 2 PFBA precursors (2018) Substance evaluation of PFHxA-precursors (2016), 4 fluoroethers, such as ADONA and GenX (2017), 2 PFBA precursors (2018) Restriction proposal for C9-14 PFCAs, their salts and related substances (2017) RMOA for PFHxA (2017) Projects at German Environmental Specimen Bank
FIN	Regulation: REACH Monitoring: a groundwater and contaminated site survey carried out. Waterworks now measure the PFAS compounds in the incoming water Continued monitoring in the Gulf of Finland following an isohexane fire in 1989 (large amounts of PFOS containing AFFF was used) Environmental monitoring campaigns of PFAS in biota + WFD Research: Contaminated sites remediation study Enforcement and customs: none

	What activities are ongoing in your country concerning PFASs related to, for example: regulation (chemical, food/feed, cosmetics, waste etc.), monitoring, research, enforcement and customs, other?
FO	Monitoring Research
DK	*DK EPA* Regulation: Restriction proposal for polyfluorsilanes in spray products for consumers. RMOA for PFBA (focus on harmonised classification based on existing data) Research: DTU Food is conducting in vivo ED test on PFHxS (paper not published yet). The National Research Centre for the Working Environment (NRCWE) is conducting acute tox in vitro and in vivo on 22 impregnation products for spray application (paper not published yet) *DK DVFA* Research: DTU Food is investigating the analysis method for determining total organic fluorine in paper and board food packaging materials. Also, DTU food is looking into background levels of total organic fluorine in paper and board from sources other than the use as impregnation agents
IS	Some screening is in preparation as part of a Nordic Screening Group project PFOS and PFOA were included in a study regarding persistent pollutants in blood samples from pregnant women carried out in 2009 PFASs are not being regularly monitored
NO	For some of the specific activities mentioned below, it is indicated which institution is responsible: – Norwegian Institute of Public Health = *NIPH* – Norwegian Food Safety Authority = *NFSA* – Norwegian Environment Agency = *NEA* Continuous environmental screening and monitoring programs of different kinds, including offshore programs (*NEA*) Identification of PFOS-polluted ground at airport fire-fighting training sites (*NEA*) Development of action plans for PFOS-polluted airport fire-fighting training sites (*NEA*) Focus on substitution of PFAS-containing fire-fighting foam with fluorine-free alternatives offshore (*NEA*) Preparation of risk management option analysis (RMOA) for perfluorobutanesulfonic acid (*PFBS*) and related substances (*NEA*, assisted by *NIPH*) NIPH have been involved in the human health evaluation of the different REACH regulation processes of PFOA; CLP, SVHC and Restriction (*NIPH*) Support the work towards a global regulation of PFOA under the Stockholm Convention (*NEA*) Evaluation of health risks for non-professionals when preparing skis with PFAS-containing products, gliders (*NEA* and *NIPH*) Monitoring of PFAS particles in the working environment for ski-waxers during ski waxing seasons and performance of serum analysis on professional ski-waxers (*NIPH*) Ongoing research projects where we monitor PFAS in human serum from umbilical cord, breast milk, mothers, fathers and children at different age (enrolled in the Mother- and child (MoBa) cohort in Norway) and study the association to different health effects and molecular signatures (*NIPH*) Experimental studies both in vitro and in mice on PFOS, PFOA and PFNA (*NIPH*)

	What activities are ongoing in your country concerning PFASs related to, for example: regulation (chemical, food/feed, cosmetics, waste etc.), monitoring, research, enforcement and customs, other?
SE	Nomination of PFHxS as a REACH SVHC Producing a brochure with advice to fire-fighters as to how to use AFFF in a responsible manner Proposing national legislation on the use responsible of AFFF *Naturvårdsverket/Swedish EPA:* Monitoring: Trend monitoring: Biota (fish, guillemot eggs); Sewage effluent and sludge; Air Screening studies/monitoring but not every year: Eggs from white tailed sea eagle and osprey Otters Retrospective study on archived STP sludge: total organic fluorine + targeted PFAS Screening of "ultra short" PFAS One year monitoring of riverine input to the sea (10 rivers 4x/year) 26 PFAS Guidance on PFAS and contaminated areas (SEPA and SGI) Project on PFAS and waste management (consultant Sweco commissioned by the Swedish Waste Management Association) Research project EnForce 2017–2022: "Innovative environmental research, scanning the horizon for chemical threats and opportunities, providing scientific understanding, sustainable solutions and information for society and business". Örebro University in collaboration with 10 industrial partners. One (out of three) WP on PFAS. https://www.oru.se/english/research/research-teams/rt/?rdb=g314 Research project "Innovative treatment techniques for per- and polyfluoroalkyl substances in soil and groundwater" (SLU and SGI)
Summary Regu-lation:	*FI*: REACH; DK: REACH/CLP; NO: REACH/CLP, Development of action plans for PFOS-polluted airport fire-fighting training sites (NEA). Focus on substitution of PFAS-containing fire-fighting foam with fluorine-free alternatives offshore (NEA); *SE*: Proposing national legislation on the use responsible of AFFF
Guidance:	*SE*: Producing a brochure with advice to fire-fighters as to how to use AFFF in a responsible manner. SE-EPA – Guidance on PFAS and contaminated areas (SEPA and SGI)
Research:	*FI*: remediation; FO: ongoing; *DK*: DTU Food is conducting in vivo ED test on PFHxS. NRCWE conducting acute tox in vitro and in vivo on 22 impregnation products for spray application. DTU Food (DK DVFA) method for total organic fluorine in paper and board food packaging materials, and background levels in paper and board from sources other than the use as impregnation agents; *NO*: Ongoing research projects where we monitor PFAS in human serum from umbilical cord, breast milk, mothers, fathers and children at different age (enrolled in the Mother- and child (MoBa) cohort in Norway) and study the association to different health effects and molecular signatures (NIPH); Experimental studies both in vitro and in mice on PFOS, PFOA and PFNA (NIPH); SE Research project EnForce 2017–2022: Örebro University in collaboration with 10 industrial partners. One (out of three) WP on PFAS; "Innovative treatment techniques for per- and polyfluoroalkyl substances in soil and groundwater" (SLU and SGI);

	What activities are ongoing in your country concerning PFASs related to, for example: regulation (chemical, food/feed, cosmetics, waste etc.), monitoring, research, enforcement and customs, other?
Research:	Project on PFAS and waste management (SE-EPA, consultant Sweco); *DE*: Research project 2016–2018: PFAS in building products and technical textiles (e.g. car seats, water filters). 8: data collection for preparation of restriction proposals for PFAS (industry survey)
Sub-stances:	*DK*: restriction proposals (RMOA for PFBA (incl. harmonised classification)); *NO*: Preparation of risk management option analysis (RMOA) for perfluorobutanesulfonic acid (PFBS) and related substances (NEA, assisted by NIPH); NIPH have been involved in the human health evaluation of the different REACH regulation processes of PFOA; CLP, SVHC and Restriction (NIPH); NIPH have been involved in the human health evaluation of the different REACH regulation processes of PFOA; CLP, SVHC and Restriction; Evaluation of health risks for non-professionals when preparing skis with PFAS-containing products, gliders (NEA and NIPH); *SE*: Nomination of PFHxS as a REACH SVHC; *DE*: Substance evaluation of PFHxA-precursors (2016), 4 fluoroethers, such as ADONA and GenX (2017), 2 PFBA precursors (2018); Substance evaluation of PFHxA-precursors (2016), 4 fluoroethers, such as ADONA and GenX (2017), 2 PFBA precursors (2018); Restriction proposal for C9-14 PFCAs, their salts and related substances (2017); RMOA for PFHxA (2017)
Monitor-ing:	*FI*: groundwater, Gulf of Finland isohexane-fire (1989), Environmental monitoring campaigns of PFAS in biota + WFD; FO conducted; NO environmental, soil/ground fire-fighting, (NEA), PFAS-particles ski-waxing (NIPH); *SE*: Trend monitoring, and Screening studies/monitoring but not every year (SE EPA); *IS*: PFAS not being regularly monitored
Enforce-ment	*FI*: none
Substitu-tion:	*NO*: Focus on substitution of PFAS-containing fire-fighting foam with fluorine-free alternatives offshore (NEA).

Table 5: Answer to Q3 - What activities are upcoming/planned in your country concerning PFASs related to, for example: regulation (chemical, food/feed, cosmetics, waste etc.), monitoring, research, enforcement and customs, other?

	What activities are upcoming/planned in your country concerning PFASs related to, for example: regulation (chemical, food/feed, cosmetics, waste etc.), monitoring, research, enforcement and customs, other?
DE	REACH regulation of short chain PFASs beginning with PFHxA Research project on phytoremediation of soil contaminated with PFASs (2017–2019) Research project on novel PFASs 2018–2020
FIN	Further carry out environmental monitoring studies in high-risk areas (airports, fire-fighting training areas) and extend to groundwater contamination Following the potential additional regulation of PFOA and short chain PFAS, develop further management actions Risk assessment of PFAS contaminated sites, esp. related to groundwater quality The risks caused by landfills remain to be addressed
FO	Monitoring Research
DK	*DK EPA* Currently nothing under REACH/CLP besides the outcome of the PFBA RMOA *DK DVFA* Upcoming activities await the outcome of the current DTU Food research into total organic fluorine in paper and board food packaging materials. The Danish Veterinary and Food Administration issued in August 2016 a recommended limit for the content of organic fluorine in paper and board food contact materials. However, this limit has proven to be exceeded also in cases, where organic fluorinated substances have not been added to the paper and board material
IS	No specific actions planned to my knowledge
NO	Identification of PFOS-polluted fire-fighting training sites outside of airports (*NEA*) Several ongoing programs and actions on environmental screening and monitoring will be continued in the future (*NEA*) New PFASs may be considered added to the Norwegian national list of priority substances (*NEA*) Continue the assessment of PFBS and related substances in the RMOA, maybe with a particular look at the PFBS potassium salt and the sulfonamide related substance. Consider whether e.g. a proposal for harmonised classification may be justified (*NEA*, with assistance from *NIPH*) Work on proposal for nomination of PFHxS to the Stockholm Convention (*NEA*) Analysis project in 2017 on Food Contact Materials of paper and board. Approximately 30 samples will be analysed for fluorinated organic compounds by the Technical University of Denmark, DTU (*NFSA*)

	What activities are upcoming/planned in your country concerning PFASs related to, for example: regulation (chemical, food/feed, cosmetics, waste etc.), monitoring, research, enforcement and customs, other?
SE	Reach restriction of long-chain perfluoroalkyl acids Contributing to a potential EU strategy for PFAS *Naturvårdsverket/Swedish EPA*: National monitoring (SEPA) Screening of PFPiAs and PFPAs (incl a long range of other PFAS) Screening of total organic fluorine and "emerging PFASs" such as ADONA, GenX, F53-B (incl a long range other PFAS) Monitoring of blood from approx. 800 individuals, "emerging PFAS" in approx. 40 samples Increased air monitoring (from 1 to 3 stations and more PFAS)
Summary	
Regu-lation:	*FI*: Following the potential additional regulation of PFOA and short chain PFAS, develop further management actions Risk assessment of PFAS contaminated sites, esp. related to groundwater quality *DK*: Upcoming activities await the outcome of the current DTU Food research into total organic fluorine in paper and board food packaging materials *IS*: non planed *NO*: Identification of PFOS-polluted fire-fighting training sites outside of airports (NEA) *SE*: Contributing to a potential EU strategy for PFAS
Research:	*FO*: further research required *NO*: Analysis project in 2017 on Food Contact Materials of paper and board. Approximately 30 samples will be analysed for fluorinated organic compounds by Danish DTU (NFSA) *DE*: Research project on phytoremediation of soil contaminated with PFASs (2017–2019), and on novel PFASs 2018–2020
Sub-stances:	*NO*: Work on proposal for nomination of PFHxS to the Stockholm Convention (NEA). New PFASs may be considered added to the Norwegian national list of priority substances (NEA). Continue the assessment of PFBS and related substances in the RMOA, maybe with a particular look at the PFBS potassium salt and the sulfonamide related substance. Consider whether e.g. a proposal for harmonised classification may be justified (NEA, with assistance from NIPH) *SE*: Reach restriction of long-chain perfluoroalkyl acids *DE*: REACH regulation of short chain PFASs beginning with PFHxA
Monitor-ing:	*FI*: Further carry out environmental monitoring studies in high-risk areas (airports, fire-fighting training areas) and extend to groundwater contamination *FO*: further monitoring required *NO*: Several ongoing programs and actions on environmental screening and monitoring will be continued in the future (NEA)

	What activities are upcoming/planned in your country concerning PFASs related to, for example: regulation (chemical, food/feed, cosmetics, waste etc.), monitoring, research, enforcement and customs, other?
Monitoring:	*SE*: Screening of PFPiAs and PFPAs (incl a long range of other PFAS) Screening of total organic fluorine and "emerging PFASs" such as ADONA, GenX, F53-B (incl a long range other PFAS) Monitoring of blood from approx. 800 individuals, "emerging PFAS" in approx. 40 samples. Increased air monitoring (from 1 to 3 stations and more PFAS)
Issues:	*FI*: The risks caused by landfills remain to be addressed

Table 6: Answer to Q4 - Does your country have any health/environmental issues related to PFASs?

	Does your country have any health/environmental issues related to PFASs?
DE	– HBM I values for Perfluorooctanoic acid (PFOA) and Perfluorooctane-sulfonic acid (PFOS) in blood plasma were calculated by the German Human Biomonitoring Commission (HBM Commission): Based on an assessment of the literature on animal and human epidemiological studies which it discussed during its last meeting in May 2016, and following clarification of a few open details, the HBM Commission has decided to set HBM I values for PFOA and PFOS in blood plasma of 2 ng PFOA/ml and 5 ng PFOS/ml – Maximum drinking water values for 13 PFASs (C4-C10 PFCAs; C4, C6-C8 PFSAs; H4-PFOS, PFOSA) – So-called "Geringfügigkeitsschwellenwerte" for PFASs are generated, something related to EQS
FIN	Yes. Sites that have been contaminated from the use of PFAS AFFF. The extent in the whole country is not yet fully known, nor the risks related to concentrations More information should be collected on sites where AFFF have been used in the past
FO	Yes, human exposure via marine mammals which carry high concentrations
DK	*DK DVFA* No, the issue with organic fluorinated substances in food contact materials is not specific to DK. Recent studies have shown the presence of these substances in paper and board food contact materials from US and a range of European Countries
IS	At this point, there is no confirmed knowledge of health or environmental issues, but research is very scarce
NO	– PFOS-polluted airport fire-fighting training sites – Drinking water is not affected to the same extent as in some other Nordic countries – Elevated levels of PFAS in some lakes. Currently unknown sources. Investigations are ongoing – PFOS in fire-fighting foam was prohibited from 2007, and in the petroleum sector PFOS-containing foam was substituted with PFOS-free foam in time for the regulation. However, in 2016 chemical analysis demonstrated a PFOS-content above the limit value at several installations. Apparently, the practical procedures have not ensured complete emptying of the tanks when switching to PFOS-free foam. There have been considerable emissions to sea in the period 2007–2016

	Does your country have any health/environmental issues related to PFASs?
SE	Several drinking water supplies have been closed due to PFAS contamination. Health surveys of the most affected communities are ongoing, but there is no results yet
Summary	Human blood values, human exposure, drinking water, contaminated sites, extent of contamination, exposure of marine animals, food contact materials, airport contamination, fire-fighting products, emission to sea

Table 7: Answer to Q5 - Do you have any examples of successful risk management of PFASs?

	Do you have any examples of successful risk management of PFASs?
DE	None
FIN	Phase out of PFOS-containing AFFF, as well as PFOS used in metal plating processes
FO	Not for PFAS as such, but for mercury and PCB
DK	*DK DVFA* The Danish Food and Veterinary Administration has had a focus on organic fluorinated substances in paper and board food packaging materials for several years. This has led to dialogue with trade organizations and business operators, which have increased their awareness of these substances and contributed to a partial phase out of the use in paper and board food packaging materials in Denmark
IS	None
NO	- Two high-volume users of fire-fighting foam have switched to fluorine-free foam, Avinor and the Norwegian Defence (Forsvaret) - PFOA levels in all-weather clothing have decreased after the introduction of a national regulation of PFOA in consumer products in 2013 - Work with the restriction proposal for PFOA and related substances under REACH
SE	Svedavia has substituted fluorine-based AFFF at all major Swedish commercial airports. Wide-spread monitoring has led to identification of polluted drinking water wells and subsequent closing of the most contaminated ones. Some wells (with low concentrations of PFAS) have been taken into use after introducing successful cleaning measures
Summary:	Some (maybe limited but a step forward)

Table 8: Answer to Q6 - What do you consider being the biggest issues related to PFASs?

	What do you consider being the biggest issues related to PFASs?
DE	Short-chain PFASs are persistent and mobile and can occur in raw water and can therefore be found in drinking water. Short-chain PFASs cannot be eliminated from water with the commonly applied measures. Furthermore, modern technologies are ineffective in removing short-chain PFASs from water. Ubiquitous presence of short-chain PFASs in aquatic systems might lead to continuous background exposure to short-chain PFASs. Short-chain PFASs can be taken up by plants and have already been found in edible crops. Exposure via food might lead to increased exposure, due to the consumption of water rich edible plant (parts) contaminated with short-chain PFASs. Short-chain PFASs show a relevance in organisms: toxicokinetic experiments illustrate bioavailability of short-chain PFASs. protein interactions are similar to that of long-chain PFASs. the half-lives of short-chain PFASs enable sufficient exposure durations for provoking adverse effects in organism. Exposure via background concentrations of short-chain PFASs may affect sensible population groups or development stages. Due to the prognosticated increasing use of short-chain PFASs (based on substitution of long-chain PFASs), background concentrations might reach toxic levels. Effects cannot be sufficiently predicted and experimental data are not suited to describe potential long term effects with adequate clarity
FIN	Water resource contamination from contaminated sites and past use of AFFF. This will require extensive screening/monitoring as well as continued drinking water monitoring. Issues related to sampling and analysis of man-made materials (e.g. carpets, textiles) which should be sorted out to facilitate enforcement. PFAS are used in low concentrations and standard is only available for PFOS.
DK	DK DVFA The fluorinated organic substances form a large group of substances. Currently, we only have information of their health effects for very few of them. This is a challenge that requires research into the identification of, exposure to and toxicity of these chemicals.
IS	Their ubiquity and the foreseeable difficulties in phasing them out world-wide. The issue needs to be addressed in international for a.
NO	- Emissions from manufacturing in remote countries of products intended for the western market. May lead to local pollution hot spots, as well as long-range transboundary pollution that may end up in the Nordic countries or even the Arctic.
SE	The extreme persistency and wide-spread use of thousands of PFAS, often in unknown applications. Summary: numerous

Table 9: Answer to Q6a - How can they be addressed?

	6a. How can they be addressed?
DE	SVHC-identification under REACH and restriction; promotion of alternatives (e.g. fire-fighting foams)
FIN	An important factor in identification of PFAS contaminated sites is that there is no information on the past content of foams – i.e. whether the foams that were used at the site of fire contained PFOS/PFAS or not. The only option is therefore to sample and analyse the soil/water of the possibly contaminated areas.
FO	Emerging PFAS should be addressed through research, monitoring and new international policy measures.
DK	Research into the identification of, exposure to and toxicity of these chemicals.
SE	International collaboration leading to policy measures minimising the emissions of PFAS to the environment

Annex IV – List of specific measures from breakout groups

Table 10: List of specific measures from breakout groups

Ref	Description of measure	Effect	Time
M1	Producers have to develop and share chemical ID and impurities, synthesis methods, standards and analytical methods	High	Long
M2	Total Organic fluoro method developed with low detection limit	High	Short
M3	Historical inventory of PFASs on the market (Chem ID., use, brand name, …)	Low	Short
M4	Identification criteria for all PFASs should *not* require analytical standards (fingerprinting methods: m/z, source, negative mass effects)	Low	Short
M5	Public available database for PFASs monitoring data	High	Short
M6	Monitoring strategies guidance doc available: should support policy measures	High	Short
M7	Methods will be applicable for ionical PFASs and polymers	Low	Short
M8	Method for persistency is developed and is part of authorization	High	Long
RB1	Extend the scope of Stockholm Convention to include vvP and start with the example of PFASs	High	Long
RB2	Clearing house for alternatives on global level	Low	Long
RB3	Combined action from Member States to put together a public awareness campaign	High	Short
RB4	SAICM: act to raise awareness for the authorities around the world and revive the existing groups (in particular at OECD)	Low	Short
RB5	Drinking Water Directive and Ground Water Directive: establish the limits for vvP and monitoring obligations	High	Long
RB6	Pre-market authorisation scheme (under Reach) on new substances and new uses according to some specific criteria and new flexible information requirements	High	Long
RB7	Restriction proposal (total ban) for all PFASs (which would also allow to get information on uses, including critical uses)	High	Short
L1	Candidate listing for groups under REACH should be possible (including polymers)	High	Short
L2	Lower limit values for Article 7 and 33 under REACH	High	Short
L3	Include vvP in SVHC Properties	High	Short
L4	Label products with PFASs (globally)	High	Long
L5	Waste separation (for special treatment)	High	Long

Ref	Description of measure	Effect	Time
L6	Information flow from industrial sites towards authorities (BREF?)	High	Long
L7	Easier access to DU information (via REACH)	High	Long
L8	Awareness raising on legacy PFASs towards public	High	Long
RA1	Self-standing regulation on PFAS	High	Long
RA2	Short chain Authorisation as DE-initiative. PM (Persitent Mobility) – art 57f equivalent concern	High	Short
RA3	Grouping (reference substances for toxicity testing) – facilitate uptake in Stockholm Convention	High	Short
RA4	Amendment of REACH Enacting terms (polymers incl. in scope) (automatic testing for persistence in substance evaluation) (imported articles included)	Low	Long
RA5	Amend REACH annexes (XIII, VII)	Low	Short
RA6	Drinking water directive – conduct on a screening level – add substances similar to U.S.A. approach [must check DWD]	High	Short
RA7	Non essential uses for consumers – incl. All SVHC REACH art 68.2 (i) change PBT auto ban. (ii) include vP (note this could be enhanced by NTE)	High	Long
RA8	PPPR + BPR all as. and co-formulants subject to cut-off criteria for "PM"	High	Short
RA9	Authorisation to cover imported articles. Similar to RoHS) revision of REACH	Low	Long
RA10	Information to consumers	High	Short
RA11	Platform on substitution PFASs obligation	Low	Short
RA12	Ind. Emission add PFASs to annex II – but do not set Emissions Limit Values rather strict limits for PFASs should not be added.	Low	Short
S1	Mechanistic studies needed (to facilitate read-across)	High	Long
S2	More information of substance identity (facilitate availability of standards) for PFASs and alternatives	High	Short
S3	More information on the waste stage (incineration, recycling)	High	Long
S4	Development on cost-effective remediation methods	High	Long
S5	Screening – Assess the overall fluorine "burden" of various matrices (e.g. TOF, XRF, PIGE)	High	Short
S6	Development of functional and sustainable alternatives	High	Long

Annex V – Brief summary of the group discussions (step 5, day 2)[21]

Group 1

Group 1 developed a strategy that consisted of three main parts (see Figures 3 and 4), with an overarching of goal of restricting PFASs at global level under the Stockholm Convention based on their persistence and mobility.

The first part of the strategy aimed at evaluating and assessing PFASs as groups, and restricting them under REACH based on their persistence and mobility (either in combination or alone). The group proposed to use two "test cases" to confirm the soundness of this approach, namely the ongoing restriction proposal on long chain PFASs (C9-14 PFCAs and related substances)[22] and a restriction proposal for the short chain PFASs (C6 PFCA and related substances).[23] The second part of the overall strategy on PFASs would comprise measures raising public awareness on the PFASs problem and creating more transparency in supply chains. The third part would cover monitoring activities such as PFASs monitoring in water. Adequate waste treatment options were also discussed.

[21] These summaries should not be considered as representing an official position of any of the agencies or organisations to which the participants belonged.

[22] https://echa.europa.eu/de/registry-of-current-restriction-proposal-intentions/-/substance-rev/16121/term

[23] At the moment, the available data do not provide sufficient information to show toxicity for C6 PFCA.

Figure 3: Group 1 Part I Evaluation and Assessment of PFASs

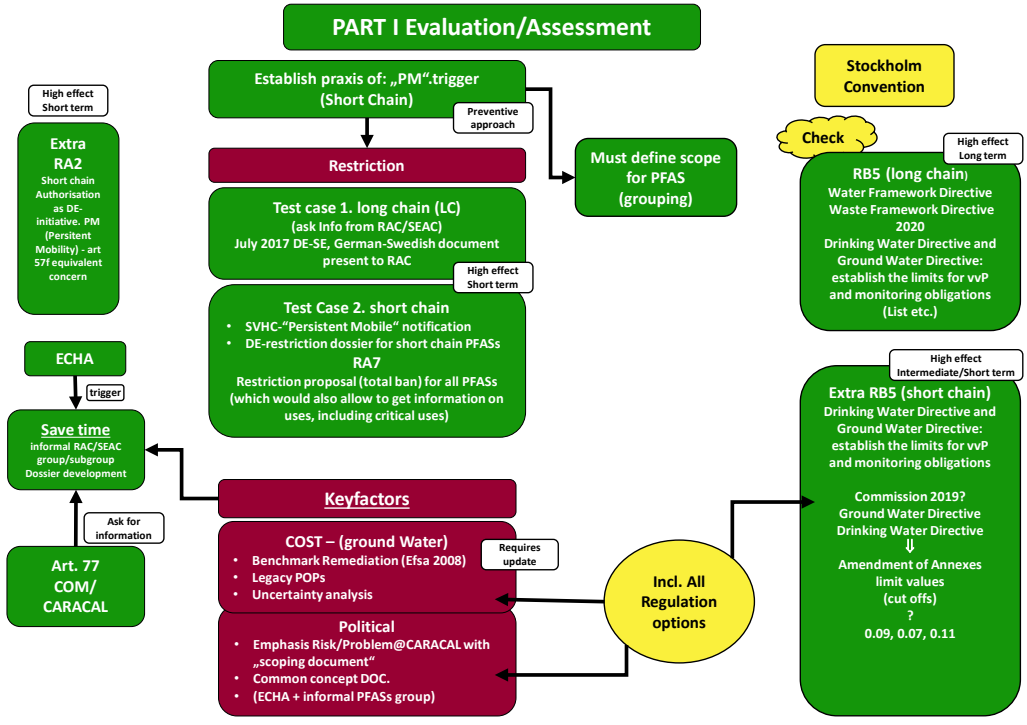
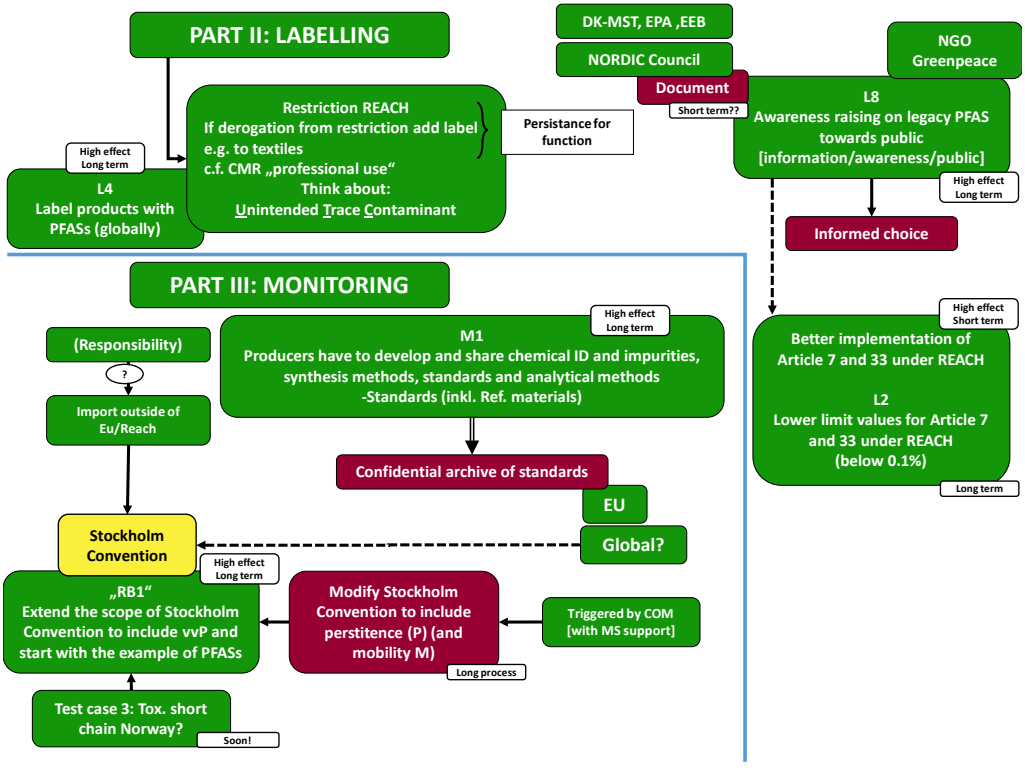


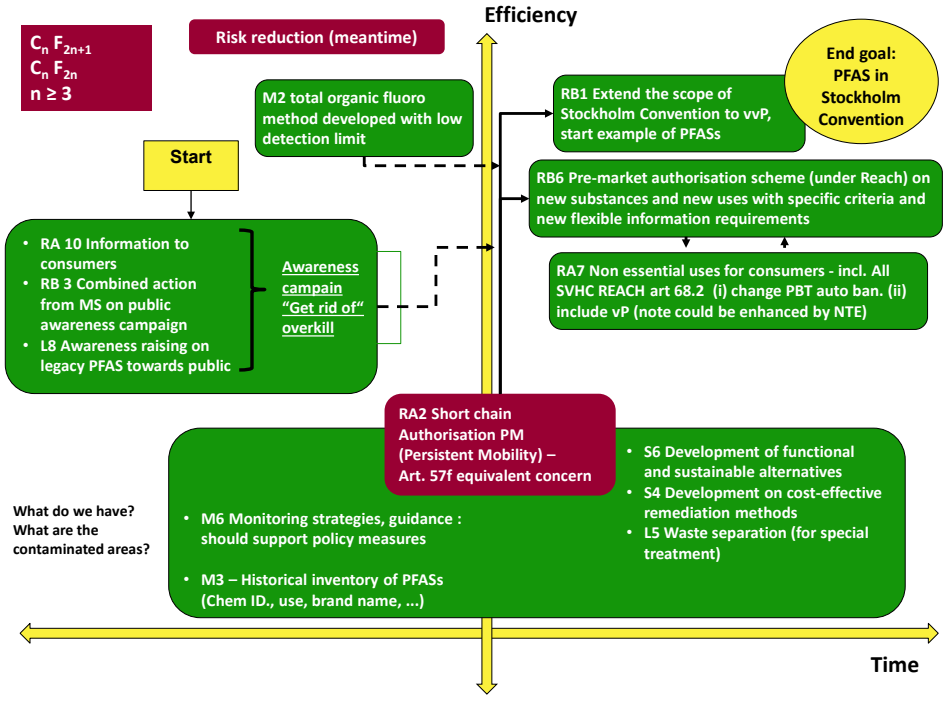
Figure 4: Group 1 Part I Labelling and Monitoring of PFASs



Group 2

The main focus of Group 2 was to establish a market restriction for all PFASs with the general molecular formula elements "Cn F2n+1" or "Cn F2n" (n ≥ 3) and that are persistent and mobile. Eventually, this approach should lead to a global regulation under the Stockholm Convention (see also Figure 3 below). No time frame was specified for this approach.

Figure 5: Group 2 Transition of regulation from EU-Level to Stockholm



The group regarded the completion of several actions necessary to pave the ground for global regulation under the Stockholm Convention. These included:

- awareness raising;
- identification of substances as substances of very high concern under REACH on EU-level (potentially equivalent concern Article 57 (f) of REACH for substance e.g. just vvP);
- making use of potential "fast track" restrictions for PFASs in consumer products that are not essential, to reduce excessive use of the substances.

As a start, the group proposed a broad awareness raising campaign to get the necessary support for future measures. The campaign should inform about the problems caused by the (excessive) use of PFASs in general and by the – frequently – unnecessary uses, especially in consumer applications.

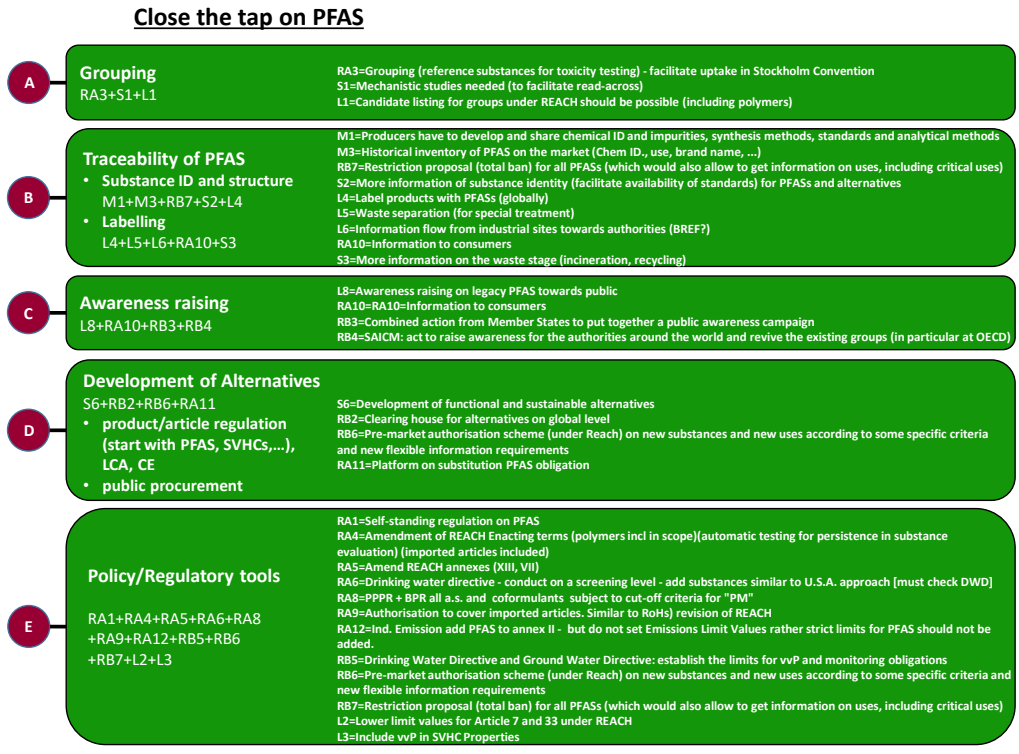
Further activities aimed at reducing environmental concentrations of PFASs by control of waste streams or application of dedicated remediation technologies.

Group 3

Group 3 proposed to use a broad mix of different instruments and measures to target the PFASs problematic. The final aim, again, was to regulate the substances on a global level, by making use of the Stockholm Convention but also by the application of other international instruments like the Strategic Approach to International Chemicals Management (SAICM).

Group 3 also came to the conclusion that this aim is not reasonably achievable in the short term and therefore developed a transition strategy. This strategy covered elements on information collection on PFASs (databases with substances and uses/products, monitoring), grouping approaches for regulation of PFASs, accompanying measures that provide substitution alternatives to market actors making a phase-out of PFASs more viable and, in the end, establishing regulation on national and on EU-Level (see Figure 6).

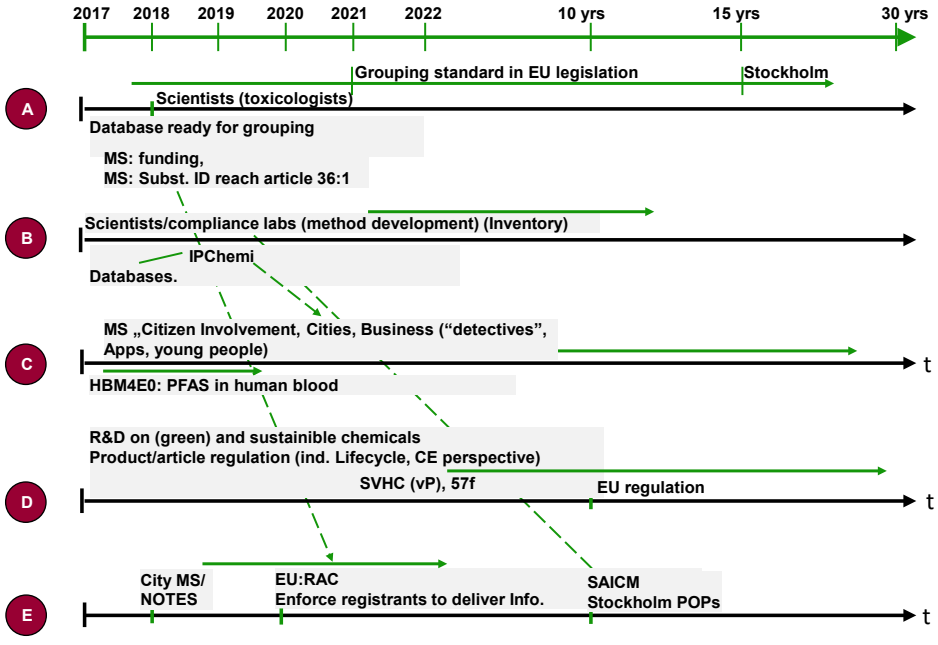
Figure 6: Action areas to "Close the Tap" on PFASs



The group also developed a timeline for the implementation of the measures (see Figure 7). It was also important in this approach that the measures were linked to other existing initiatives that in general, aim at reducing hazardous substances and, thereby, generate synergies (e.g. non haz cities[24]).

[24] http://nonhazcity.eu/

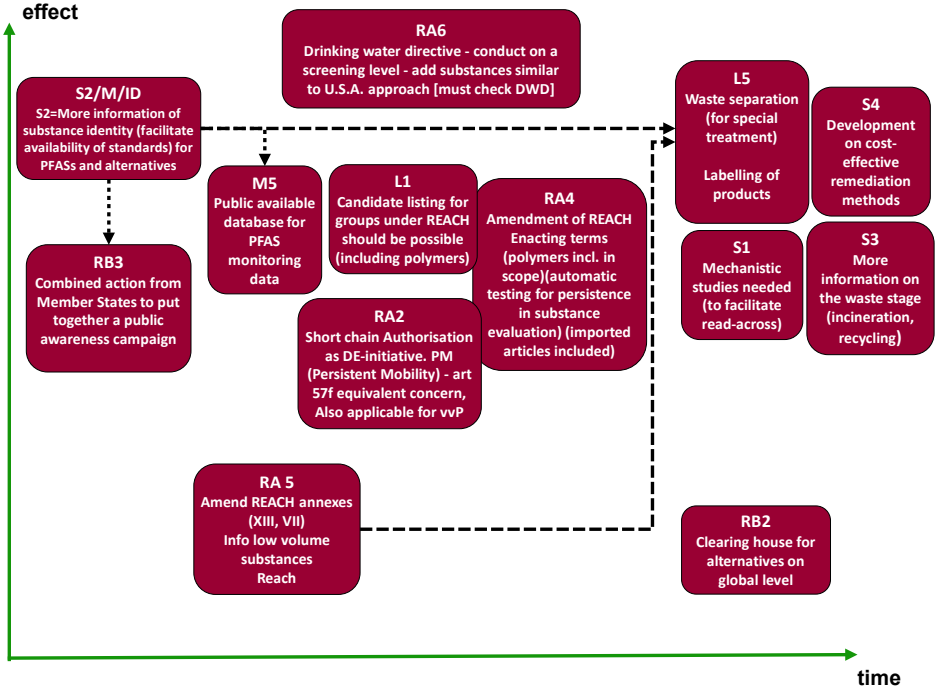
Figure 7: Timeline for the implementation of measures



Group 4

Group 4 mainly focussed on measures to overcome gaps within the current framework. (see Figure 3). The main problem identified is the lack of knowledge on the individual substances that are on the market. Simultaneously, an awareness raising campaign by various EU member states should create political support for regulatory measures. The group recommended concentrating on the most important substances first, i.e. on substances for which the largest effects (substances with broad application spectrum, high tonnage) are expected or for which evidence of risks/damage already exist to enable quick action. On the regulatory level the group intended to extend the current scope of regulated properties on substances that are "not classical" PBT as e.g. vvP PFASs with the subsequent option to regulate them by making use of Article 57 (f) and by including polymers in the scope of REACH (registration and authorisation). Other aspects of the approach aimed at reducing legacy PFAS in waste streams and the environment.

Figure 8: Measures to overcome the problems on regulating PFASs



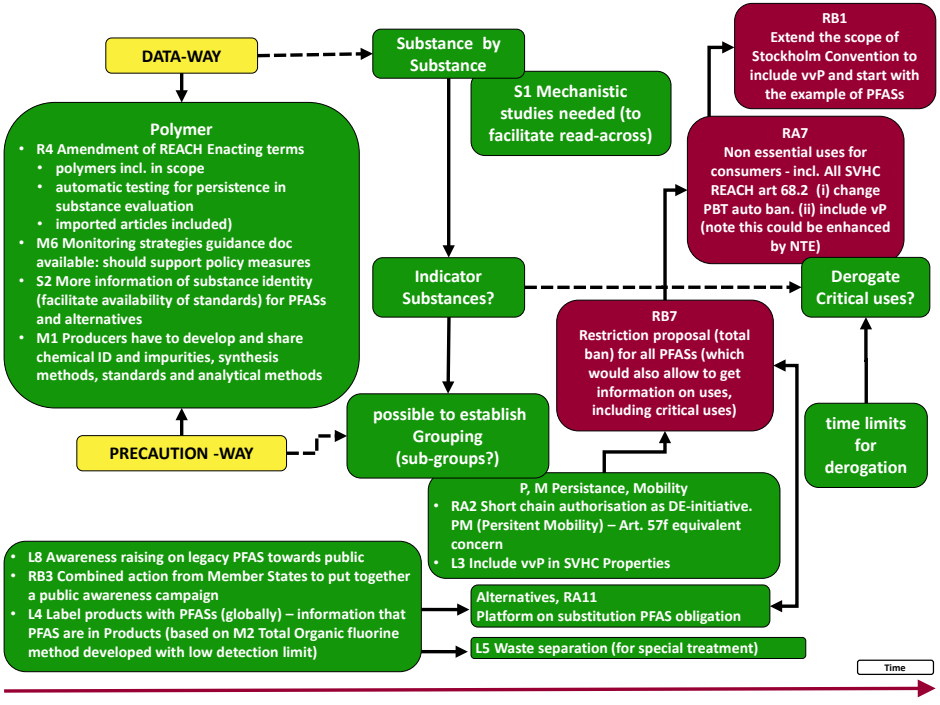
Group 5

Group 5 prioritised measures to improve the understanding of which substances are on the market, in which products they are used and how they can be analysed (see Figure 3). Other measures aimed at generating sufficient hazard data on all representatives of PFASs, including improved guidance on effective monitoring of PFASs, taking into consideration PFASs that are currently not covered by legislation (e.g. polymers), and establishing persistence as an automatic trigger for substance evaluations. The regulation PFASs should be possible based on the precautionary principle.

The ultimate aim of the approach was to propose a broad restriction of all PFASs, first at EU level and, later on, at the global level within the framework of the Stockholm Convention. One or several initial restriction proposal(s) could help to

establish more knowledge on essential uses of PFASs where no substitution is possible at the moment and where exemptions (temporary) are needed. For consumer uses, it was generally questioned whether exemptions should be granted using the fast track restriction route under Article 68.2 of REACH.[25] This would require changes in the REACH regulation and should be initiated by EU-policy plans like e.g. the Strategy on a Non Toxic Environment (NTE).[26]

Figure 9: From data collection to implementing the precautionary principle



[25] Currently, only CMR substances can be regulated under this route.

[26] Currently under development.

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Workshop on joint strategies for PFASs

The "Nordic workshop on joint strategies for per- and polyfluorinated substances (PFASs)" was hosted by the Swedish Chemicals Agency in Stockholm, Sweden on 5–6 April, 2017. The aim of the workshop was to gather scientific and regulatory experts, identify common issues related to PFASs, recommend priorities and steps/strategies forwards and facilitate continued information exchange and cooperation. The workshop consisted of two sections: firstly providing an update on the current status of work on PFASs, including an update on the current activities and responsibilities of participating national agencies; and secondly identifying possible strategic ways to deal with PFASs and identifying issues.

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