

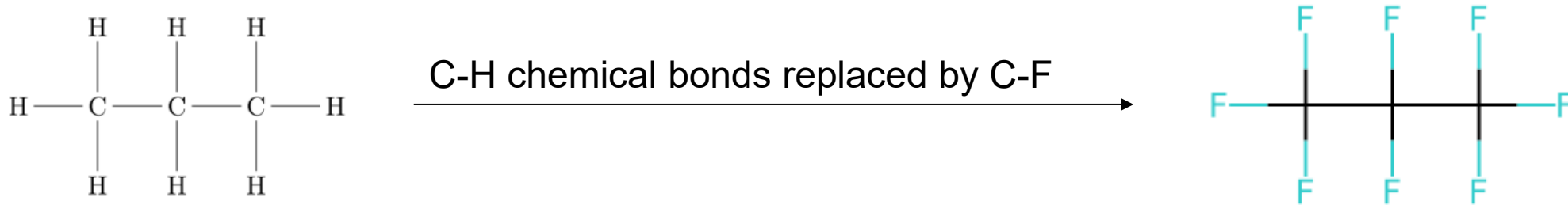
PFAS analysis results and trends in AFFFs and commercial products in Switzerland



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6th International Congress on PFAS 27.11.2025

- Properties of PFASs
- Sources
- Evolution of PFASs legislation in objects in Switzerland
- Our strategy for PFASs analysis
- PFASs analysis in AFFFs and commercial products
- Conclusions
- Questions

PFAS = **P**er- and **P**oly**F**luoro**A**lky**S** Substances



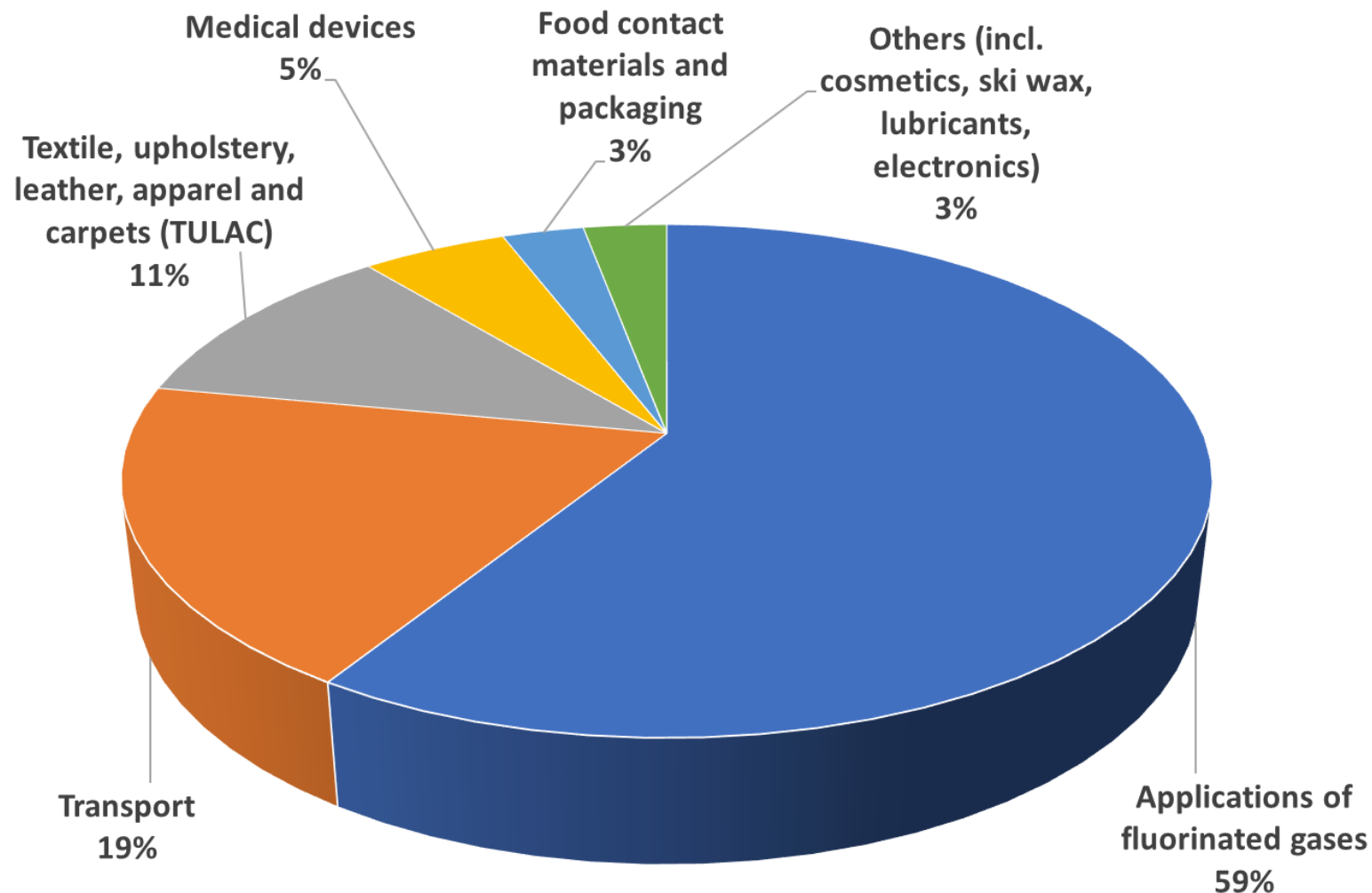
C-F chemical bonds is extremely strong and confers very interesting properties when added to materials:

- Chemical stability
 - Resistance to heat, radiations, chemicals
 - Electrical insulator
 - Stability over time (low degradation)
- Water and oil repellent

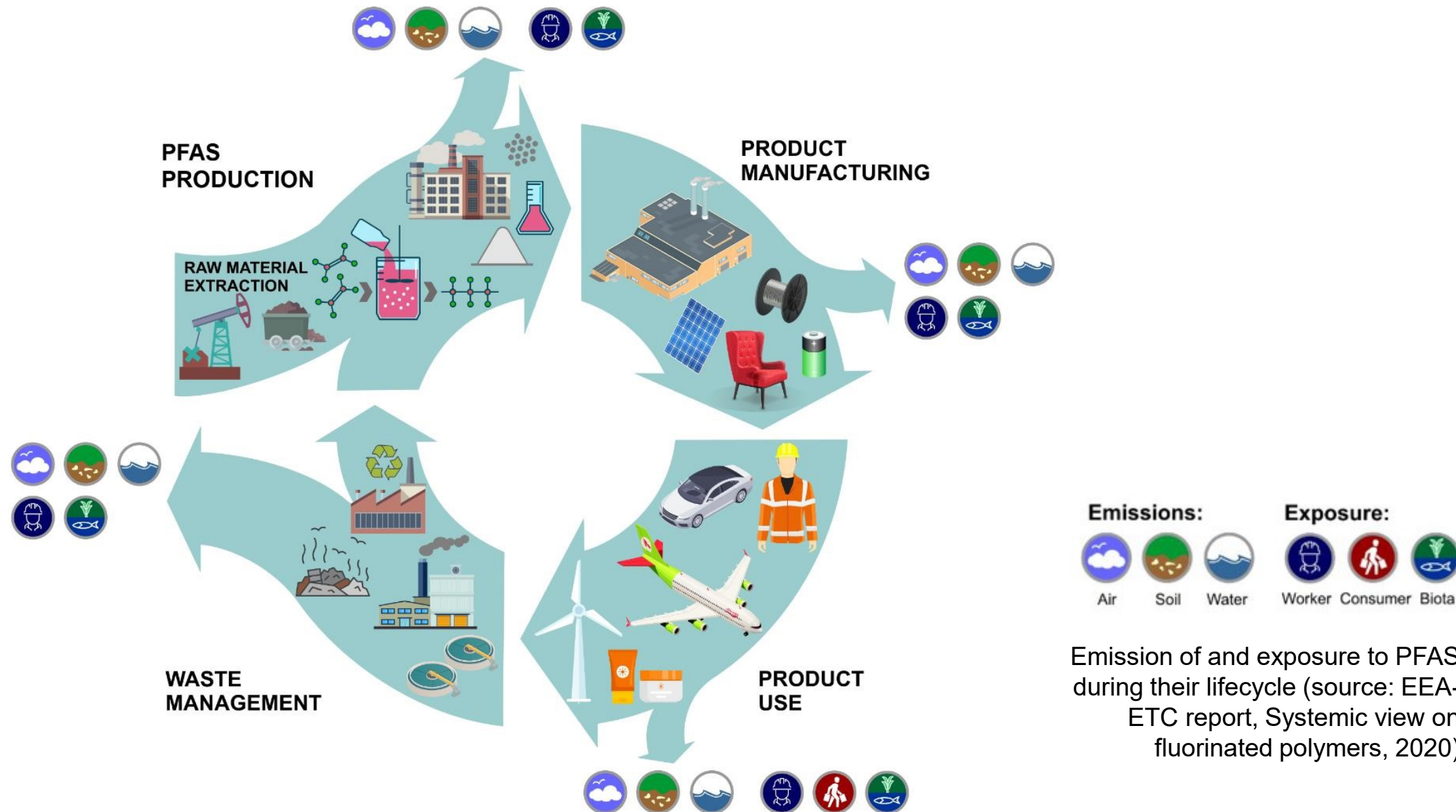


Persistent, Bioaccumulative and Toxic substances (PBTs)

According to an estimation in 2020, 690'000 et 990'000 tons per year of PFAS worldwide marketed as substances, in mixtures or in objects (excluding manufacturing).

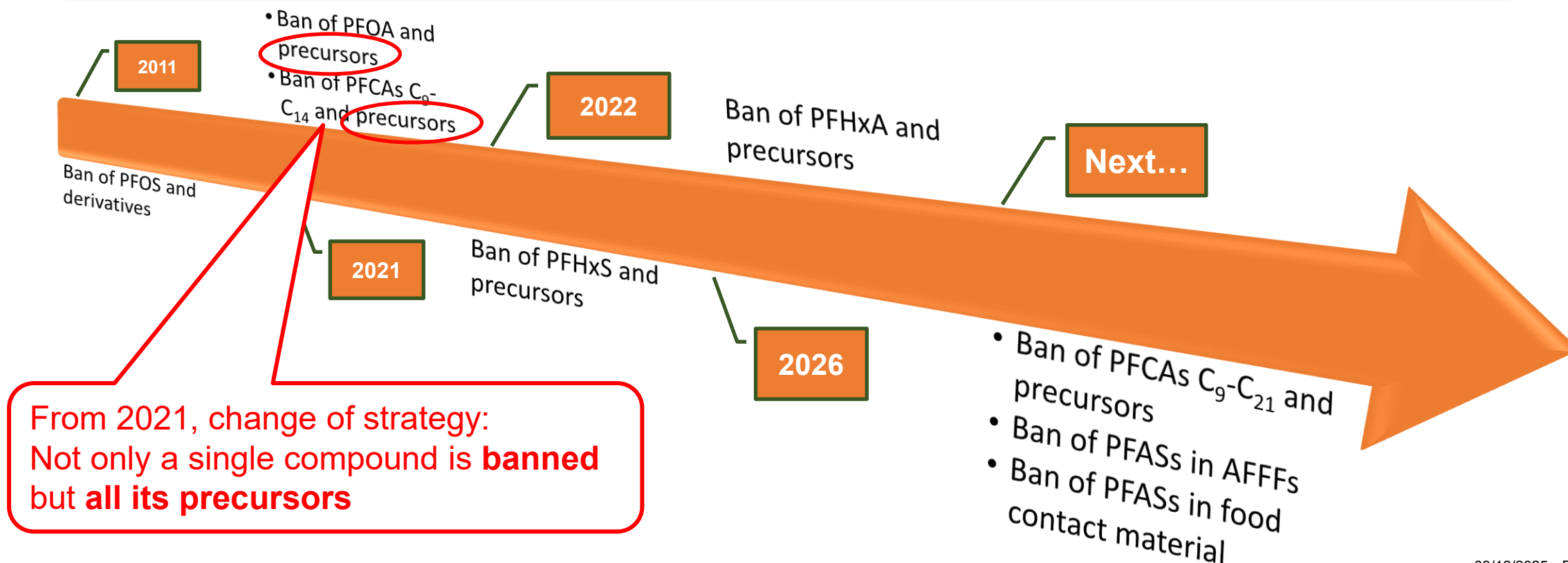


**Major use sectors and
manufacture for 2020**
ANNEX XV RESTRICTION
REPORT – Per- and polyfluoroalkyl
substances (PFASs)
ECHA



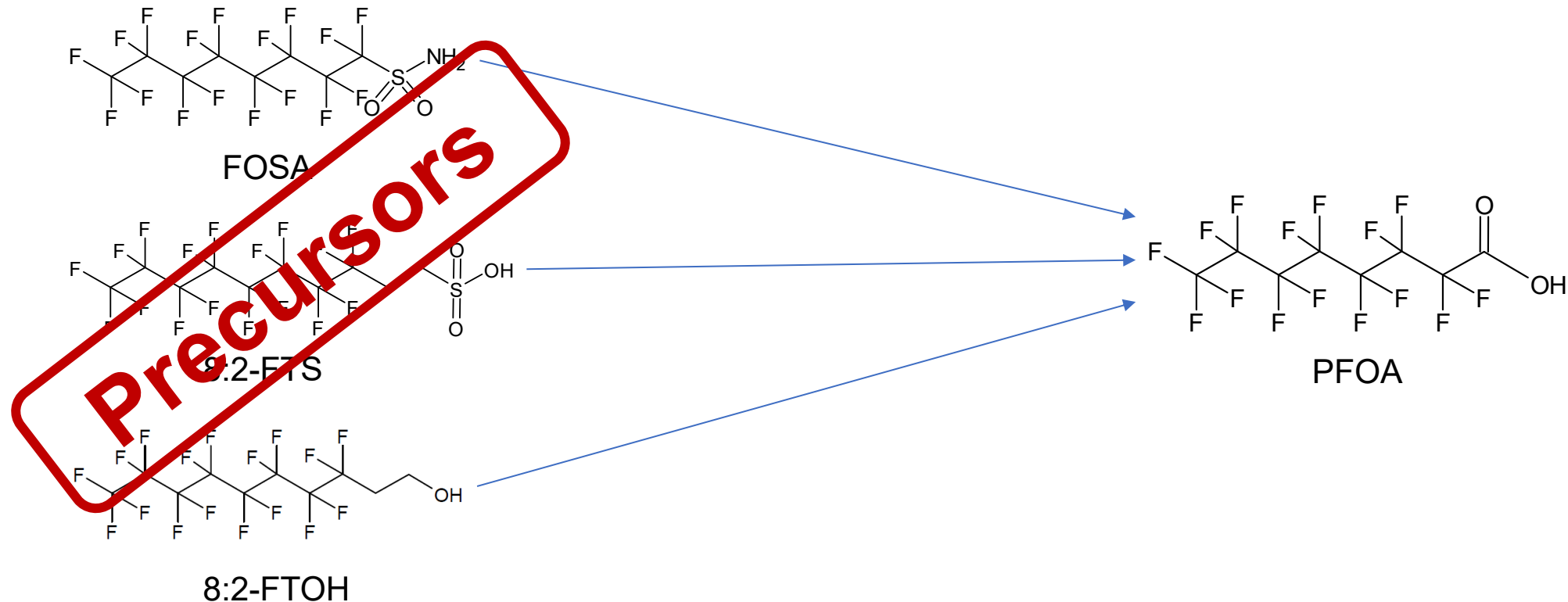
Evolution of PFASs legislation in objects in CH

- In Switzerland PFASs in objects are regulated in the chemical Risk Reduction Ordinance (ORRChem).
- PFASs restrictions in objects have evolved over the last two decades simultaneously to EU regulation.



Evolution of PFASs legislation in objects in CH

A **polyfluoroalkyl substances** which, given its molecular structure, is likely to **break down or transform** to a terminal perfluoro carboxylic acid is considered as a **precursor**.



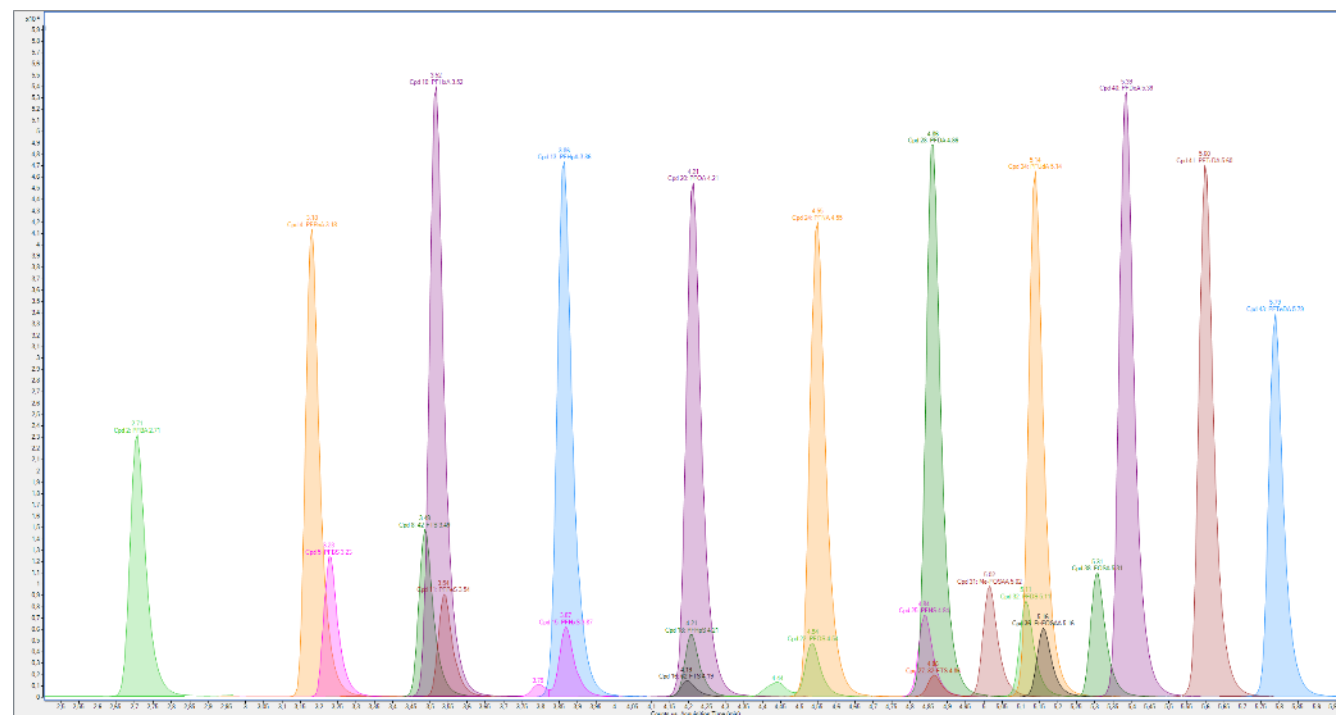
Our strategy for PFASs analysis

PFASs measured by liquid chromatography coupled to mass spectrometry (LC/MS-MS)



In our lab we focus on **21 targeted compounds**:

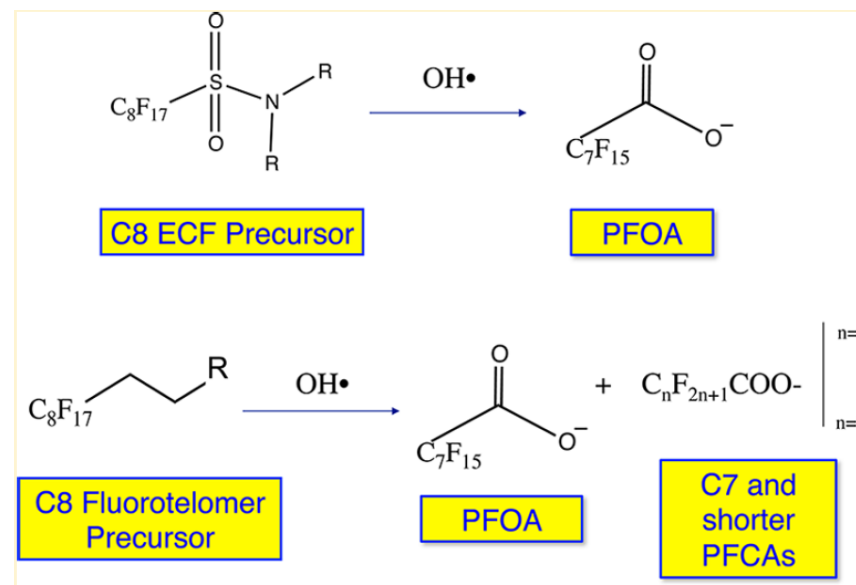
- 11 perfluoro carboxylic acids (C_4 to C_{14})
- 7 perfluoro sulfonic acids/salts (C_4 to C_{10})
- 3 fluorotelomers (4:2-FTS, 6:2-FTS and 8:2-FTS)



All compounds regulated in ORRChem are analysed, including those to come.

Our strategy for PFASs analysis

TOP Assay (Total Oxidizable Precursors) enables converting unknown precursors to targeted PFCA through chemical oxidation in basic media.

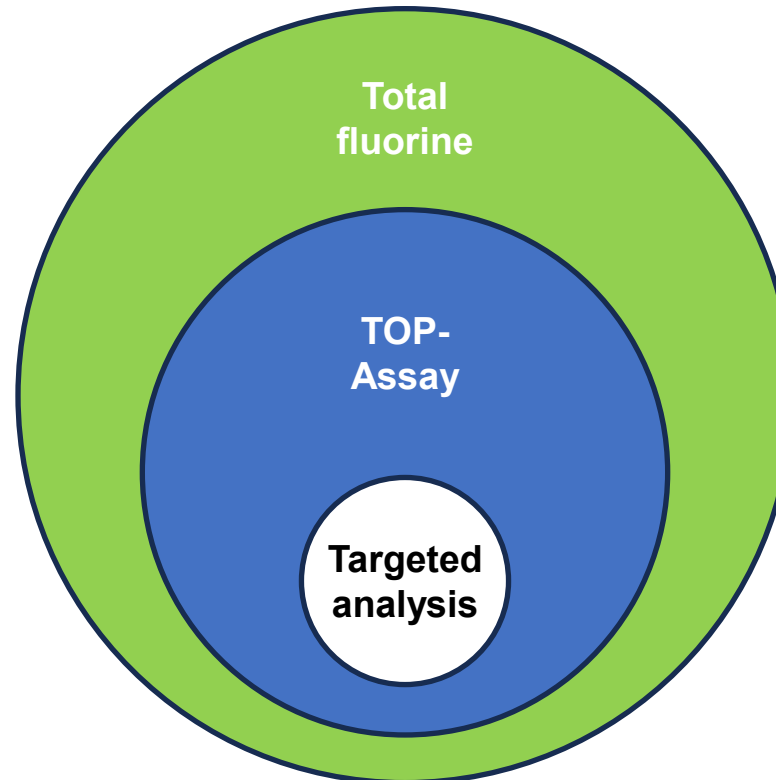


Houtz, E. F.; Sedlak, D. L., Oxidative Conversion as a Means of Detecting Precursors to Perfluoroalkyl Acids in Urban Runoff. *Environmental Science & Technology* **2012**, 46, (17), 9342-9349.

Our strategy for PFASs analysis

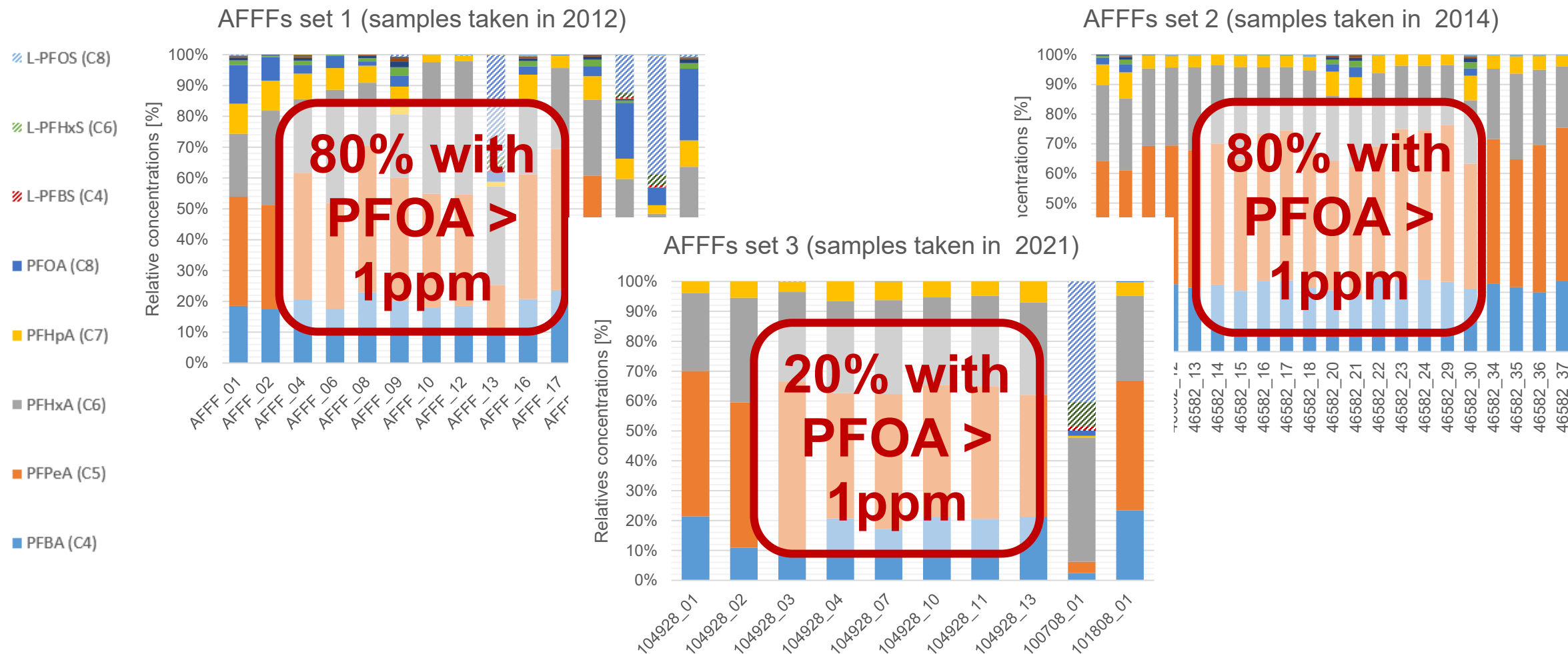
Usually we combine different technics for assessing the PFAS content

- Extraction of PFASs - targeted analysis → LC-MS/MS
- Total oxidation of precursors (TOP-Assay) → LC-MS/MS
- Total fluorine → Combustion ion chromatography (C-IC)



PFASs analysis in AFFFs and commercial products

AFFFs formulations changed progressively from C8-based to C6-based before restrictions entered into force.

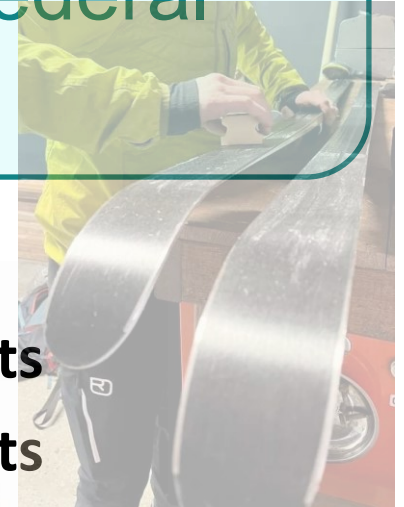
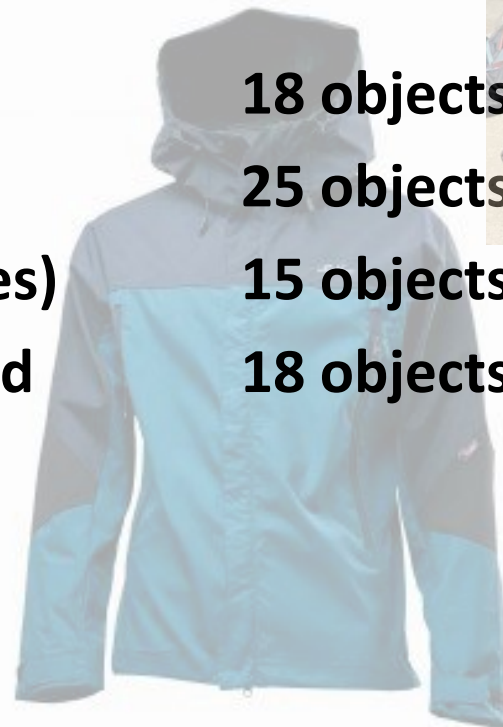


PFASs analysis in AFFFs and commercial products

In 2024 a national pilot phase of market control has been organised with the support of 4 cantons and the Federal Office for the Environment (FOEN).

1. Ski waxes
2. Waterproofing and stain protection
3. Various textiles (outdoor fabrics, clothes)
4. Food contact material used for fast-food

18 objects
25 objects
15 objects
18 objects



PFASs analysis in AFFFs and commercial products

	Number of objects	Non-compliant to ORRChem 2025	Non-compliant to ORRChem planned in 2026 (ban of PFHxA)	Objects without added fluor
Ski waxes	18	44% (all banned PFCAs)	56%	39% (54% in shops)
Waterproofing and stain protection	25	4%	48% (mainly from precursors)	48%
Fabrics	15	20%	67% (mainly from precursors)	13%
Food contact material for fast-food	18	6%	50% (mainly from precursors)	39%

- Complementary methods to targeted analysis are essential (e.g. total fluorine, TOP-Assay, etc).
- For certain categories of items, where alternatives exist, PFAS are gradually being phased out (firefighting foams, ski waxes, fabrics).
- Restricting the use of PFASs by banning out families of compounds instead of single products is much more efficient. However the road to a complete ban is still long and the legislation is evolving step by step.
- A national large campaign will follow in 2026 for commercial products.

Thank you for your attention!

