Fluorocarbon Polymer Solutions

Industrieverband Halbzeuge und Konsumprodukte aus Kunststoff e.V.

PFAS UPDATE

Current status of EU PFAS Restriction Process

Focus on Fluoropolymers

Considering also F-Gas & POP Regulation

Fluorocarbon Polymer Solutions (FPS) GmbH

In cooperation with Fluoropolymergroup of pro-K

Dr. Michael Schlipf

3rd DFF Summit Meeting and
Members' Assembly 2026
Nov. 18. – 19. 2026 Lippstadt-Geseke

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Content

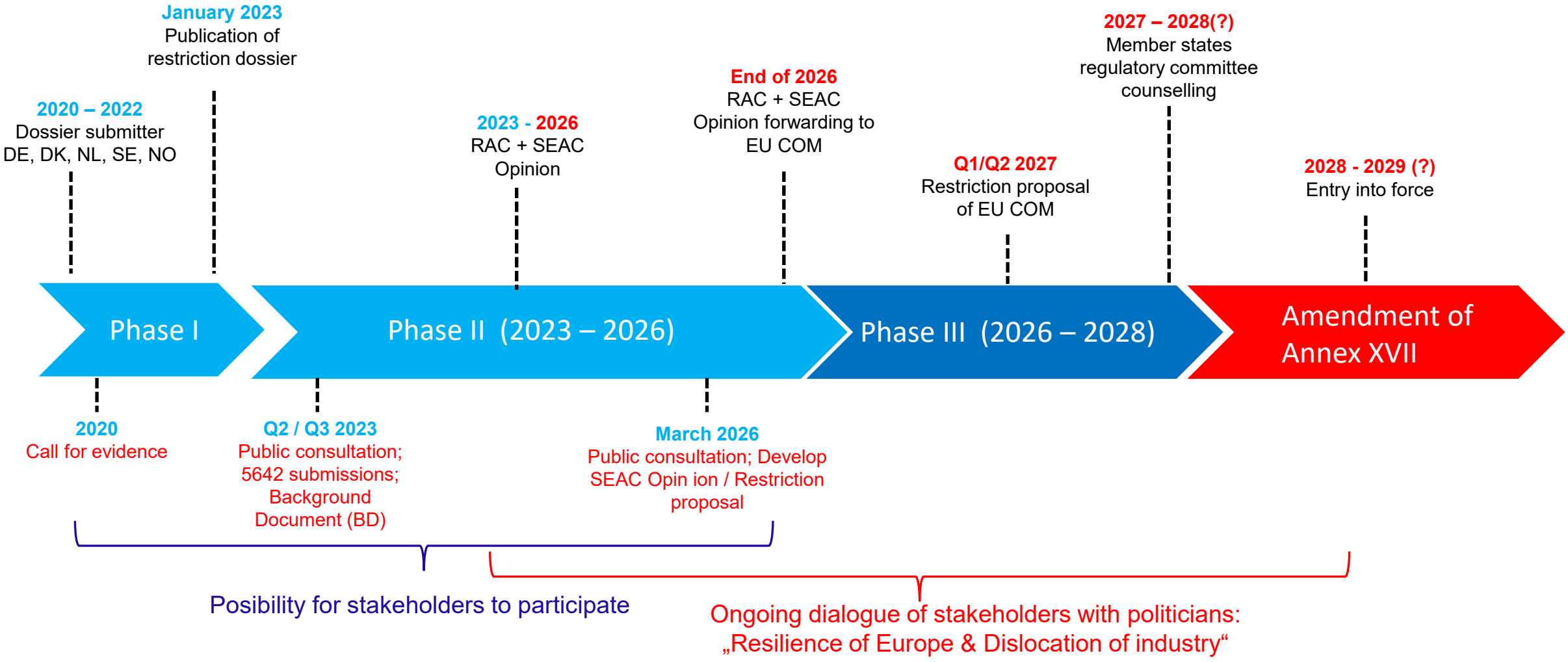
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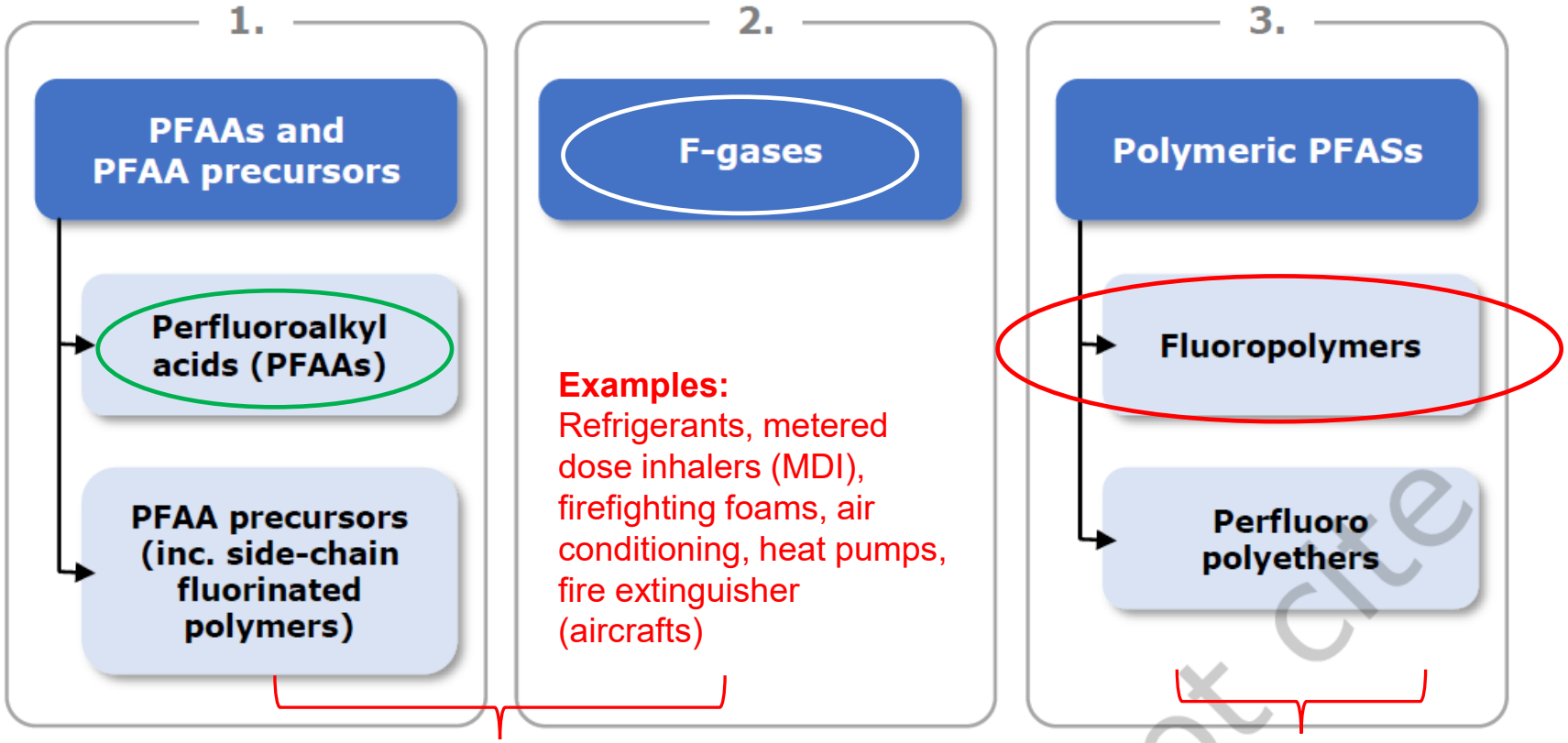
Current status of the PFAS restriction Process

Timeline



Focus on Fluoropolymers (38 Polymers), defending them to guarantee their survival is of highest importance for modern society

The whole PFAS group consist of more than 14.000 substances, most of them are unidentified

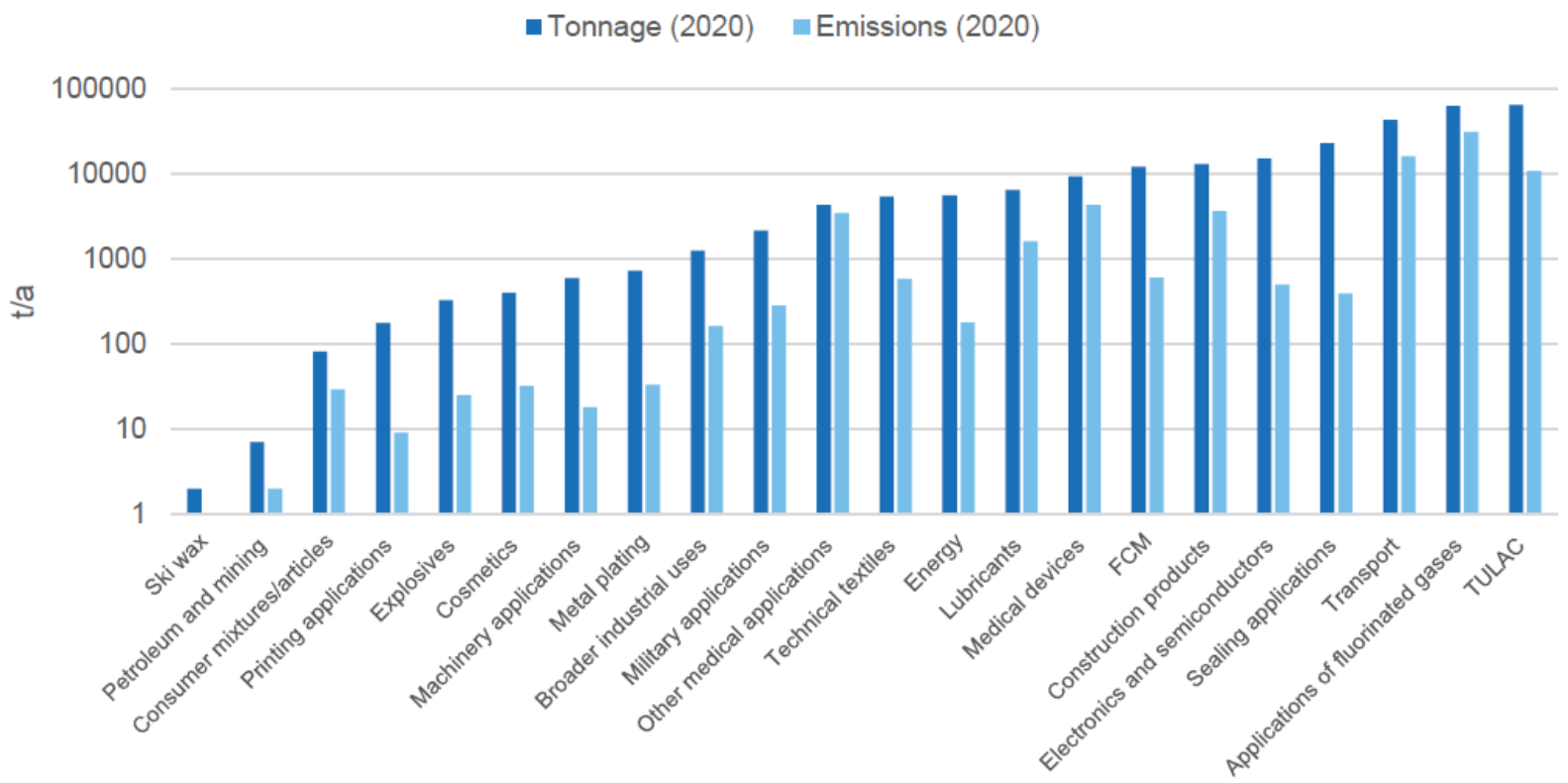


Examples:
Finishing of **t**extile, **u**pholstery, **l**eather, **a**pparel, **c**arpet
→ the so-called TULAC chemicals

Examples:
Refrigerants, metered dose inhalers (MDI), firefighting foams, air conditioning, heat pumps, fire extinguisher (aircrafts)

F-Emissions: appr. 97 % appr. 3 %

PFAS: Tonnages and emissions



=> Tonnages and Emissions updated based on consultation input

190,000 – 340,000 tonnes of PFASs newly introduced to market annually

4.7 mio tonnes of emissions over 30 year period (2025 – 2055)

Lifecycle assessment:

Managing a safe lifecycle of fluoropolymers

Polymerisation: Abatement technologies implemented: Emissions of non-polymeric PFAS manageable

Safe end-of-life processes are available: incineration and chemical recycling

!! !!



Avoidance of fluorinated polymerisation aids / minimisation of emissions

When applying 13 OECD PLC criteria: "Fluoropolymers are safe in use"

It must be ensured that no toxic emissions are generated after E-o-L

New developments / system solutions:

Self-declaration by the FPG:
- Emission reduction programme

Fluoropolymer manufacturers:
- Use of NFPA: non-fluorinated PM additives
- Use of: NFS: non-fluorinated surfactants
- Closed production cycles

End-of-life measures (E-o-L):
Safe incineration:
- Incineration of domestic and industrial waste at T > 860°C with > 2 sec residence time

- **Circular economy:**
- Collection of E-o-L fluoropolymers
- Upcycling technology: Back to the monomers
- **Reduction of the CO_2 footprint by 80%**

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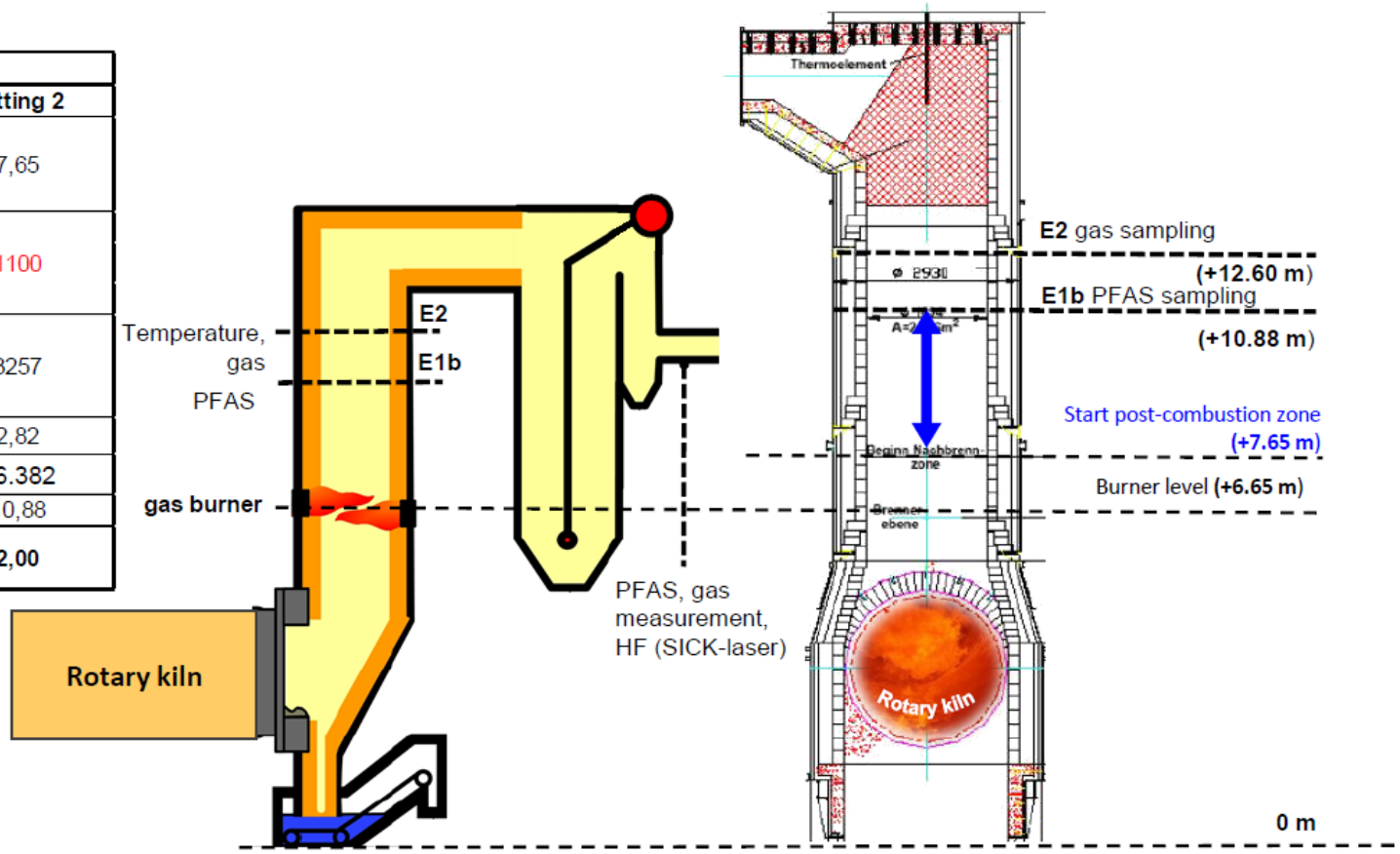
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Lifecycle assessment:

Combustion study at KIT, Karlsruhe:

BRENDA technical facility with post-combustion: Incineration of PFAS is a safe E-o-L process

PFAS Project, Level E1b		
	setting 1	**setting 2**
Start post combustion zone [m] 1 meter above the burners	7,65	7,65
Temperature in the post combustion chamber (PCC) [°C]	860	1100
Volume flow V_{PCC} [m_N^3/h wet] after boiler	3947	3257
Cross section PCC [m^2]	2,82	2,82
Volume flow V_{PCC} [m^3/h]	16.382	16.382
Height h [m] level E1b	10,88	10,88
Residence time from start PCC zone to level E1b [s]	**2,00**	**2,00**



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Lifecycle assessment:

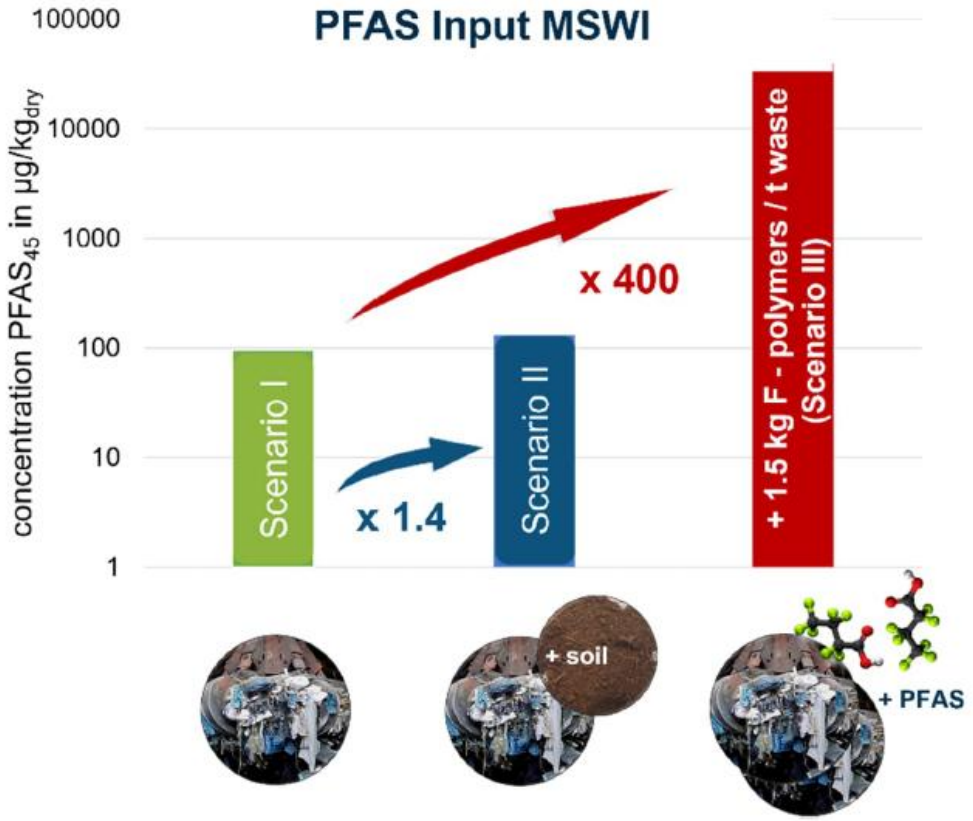
Combustion study at GKS, Schweinfurt:
Behaviour of PFAS in Waste Incineration Plants - Results of a full large-scale Test at the Thermal Waste Treatment Plant in Schweinfurt (GKS)

Three scenarios:

1.) Combustion of municipal solid waste (household waste and household-type commercial waste) as the reference Scenario I.

2.) Co-incineration of PFAS-contaminated soil with compost and sewage sludge, added to the waste stream of Scenario I.

3.) Substantial over-dosing of PFAS, introduced into the waste from Scenario I.



Result:

Thermal waste treatment plants act as sinks for PFAS, achieving fluorine-related Total Delta Destruction Rates (TD^2R) of > 99.9999 wt.-%.

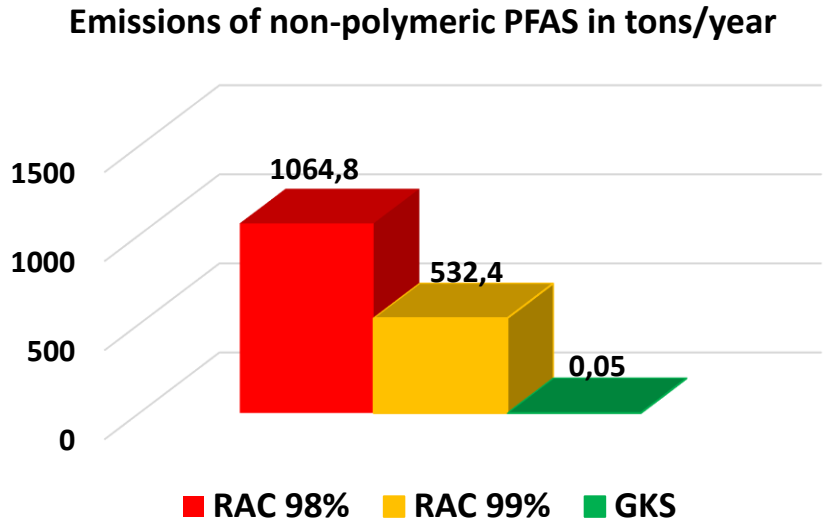
Comparison of risk assessment after end-of-life (incineration)

Assumption RAC*):

Destruction rate (mineralization) of PFAS in incineration:

- 99% in industrial waste incineration
- 98% in municipal waste incineration

RAC*): Risk assessment committee



Confirmed by GKS-study:

Destruction rate of PFAS in incineration:
99,9999 % (GKS incineration plant)
The results of the previous KIT study are confirmed.

Base for risk assessment:

"Conversio Study": Fluoropolymer Waste in Europe 2020 (Published January 2023)

End-of-Life (EOL) analysis of fluoropolymer applications, products and associated waste streams
84% of fluoropolymer waste are ending in incineration.
Two scenarios are taken into consideration: Municipal waste incineration and industrial waste incineration

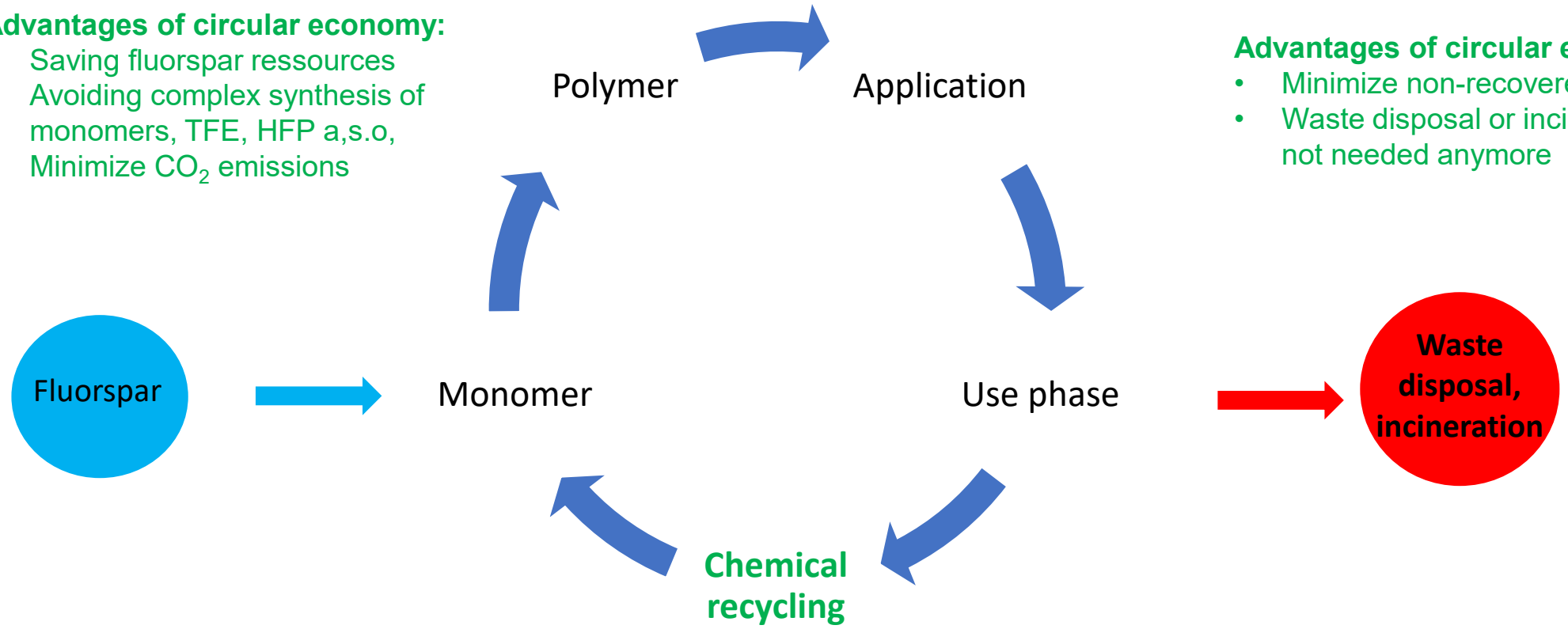
Findings of both studies, KIT as well as GKS, are not being considered so far in the ongoing PFAS restriction process

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Closing the loop: Introduction of circular economy for fluoropolymers

Advantages of circular economy:
- Saving fluorspar ressources
- Avoiding complex synthesis of monomers, TFE, HFP a,s.o,
- Minimize CO_2 emissions



Advantages of circular economy:
- Minimize non-recovered waste
- Waste disposal or incineration not needed anymore

By implementation of circular economer in fluoropolymer business, carbon footprint of these group of high-performance plastics can be reduced by 80 – 90%. This make fluoropolymers even more climate friendly.

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Perfluoroalkyl Acids PFAAs: Considering POP*) Regulation (EU) 2019/1021: long-chain perfluorocarboxylic acids, their salts and related compounds

Timeline

- **European Commission, Brussels 07.09.2026: Key points regarding usage thresholds:**
- **Until December 16, 2026:** Products (mixtures and articles) must be confirmed to contain less than 25 ppb of total C9–C21 LC PFCA to be used. The derogation does not include mixtures and articles.
- **After December 16, 2026:** Two separate thresholds will apply: below 100 ppb for C9–C14, and below 15 ppm for C15–C21. The derogation includes mixtures and articles
- **After December 20, 2030:** The threshold will become 100 ppb for all C9–C21 LC PFCA. The derogation includes mixtures and articles.

*): POP= Persistent Organic Pollutants

F-Gas Regulation update
Timeline

Examples:
Refrigerants, coolants (e.g. immersion cooling), firefighting foams, air conditioning, heat pumps, fire extinguisher (aircrafts)

F-Gas regulation considering R32*):

- January 1st 2027 onwards, the following new restriction for R 32 will enter-into-force:
- As of January 1, 2027, new monobloc heat pumps with a capacity of up to 50 kW and new split air-to-water units with a capacity of up to 12 kW may only contain refrigerants with a GWP**) of less than 150.
- This means that R32 (GWP 675) will be prohibited in these new units.
- Existing R32 systems may continue to be operated and serviced indefinitely.

*): R32 = Difluoro-methane = CF_2H_2
**): GWP = Global Warming Potential

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Legal Opinion on PFAS restriction process
-Updated version 2026-

Abstract of the Legal Opinion:

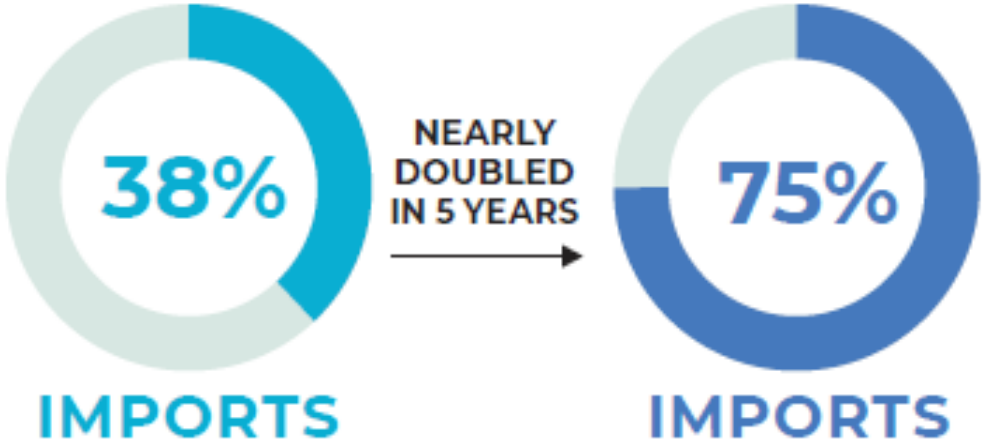
- The procedure governing the PFAS restriction dossier violates the requirements of Title VIII of the REACH Regulation in several respects.
- The procedural errors, particularly when considered cumulatively, preclude the European Commission from adopting a restriction corresponding to the proposal.
- If such a restriction were nevertheless adopted, it would be unlawful. It could be challenged by affected parties through an action under Article 263(4) TFEU*) and annulled by the European courts pursuant to Article 264 TFEU*).

Source:
Redeker, Sellner, Dahs; Partnership of Attorneys-at-Law, Bonn, Berlin
*): DE: AEUV

Impact of a long-lasting restriction process onto the fluoropolymer idustry

- The Fluoroplastics Group, FPG (a subgroup of the association ‚Plastics Europe') has just recently published new figures:

- Within five years only, from 2020 to 2025, the imports of fluorpolymers into Europe nearly doubled:



Conclusion, Outlook and Key Demands:

- Differentiation between ‘polymeric PFAS’ and ‘non-polymeric PFAS’ is a necessity
- Risk-based approach: Reverse the regulatory approach – instead of a blanket ban with numerous exemptions, introduce targeted and differentiated regulation of PFAS uses that pose risks.
- **Full exemption for fluoropolymers.**
- Comprehensive assessment of alternatives: Consider technical and safety-related, economic and sustainability criteria.
- Review mechanism: Establish a mechanism to review, extend or supplement exemptions where necessary.
- Ensure practical implementation: Regulation must be feasible, workable and enforceable in practice.
- Regulatory certainty for businesses: Industry needs clarity as soon as possible to avoid investment uncertainty.

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Thank you!

