ERDYN Anticipate Act Assess
RDC environment

PFAS in Belgian Industry

« *How to stimulate the development of alternatives to PFAS : Presentation of the results* »

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Federal Public Service of Economy, SMEs, Self-employed & Energy
« Tackling PFAS pollution through a pro-active and systemic approach » - 1st February 2024

economie

Health
Food Chain Safety
Environment

1. Context

- **Growing concern with the Toxicity of PFAS**
- **Mapping of contaminated sites**
  - A well-known site of 3M plant in Zwijndrecht
  - Contamination of the Drinking Water in several sites in Wallonia
  - But much remains to be done
- **In Europe, recent ECHA proposals for Restriction**
  - PFAS in firefighting foams (request by EC)
  - PFAS in all other uses (request by several EU countries)
- **In Belgium, many industrial uses of PFAS**
- **Development of sustainable alternatives**
  → Major economic & environmental challenges

2. Objectives of the Study

- **Identification and characterization of the PFAS in Belgium**
  - Global overview and market segmentation
  - Focus on the PFAS uses considered as «essential»
- **Elaboration of a public support strategy towards the substitution of PFAS by safer alternatives**
- **From a transversal point of view, taking into account the alternatives already available or currently developed in Belgium**

3. Methodology

PFAS market in Belgium

Market preliminary analysis (review by sector/segment)

Analysis deepening, relevance for public support

Public instrument identification

Stakeholder consultation

Support for the transition to alternatives

4. PFAS Market Analysis

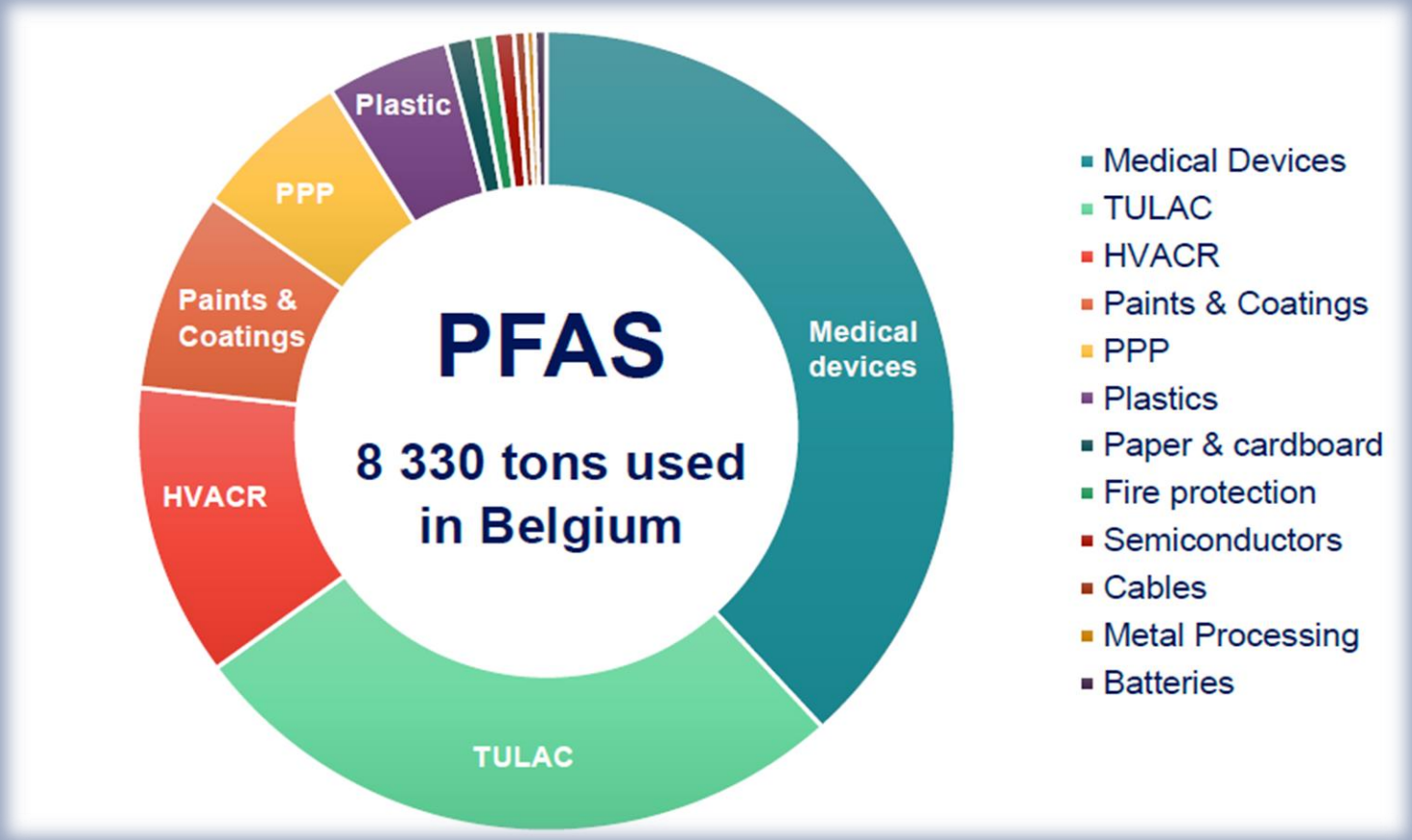
Sectoral Segmentation – 14 Segments

- ❑ Batteries
- ❑ Cables
- ❑ (Cookware) - Excluded
- ❑ (Cosmetics) – Excluded
- ❑ Fire protection
- ❑ **Medical Devices**
- ❑ **HVACR : Heating, Ventilation, Air Conditioning & Refrigeration**
- ❑ Metal Processing
- ❑ Paints & Coatings
- ❑ Paper & cardboard, including packaging
- ❑ PPP: Plant Protection Products
- ❑ Plastics
- ❑ Semiconductors
- ❑ **TULAC: Textile, Upholstery, Leather, Apparel & Carpet**

- Belgian PFAS market : 12 different segments without Cosmetic & Cookware
- Almost all PFAS Uses & Applications covered

- Global Estimate of the PFAS uses in Belgium & EEA in 14 segments with Cosmetic & Cookware

PFAS group	EEA (t/y)	Belgium (t/y)
PFAA and PFAA precursors	32 540	976
Fluorinated gases	64 001	1 920
Polymeric PFASs	128 504	3 855
All groups	225 045	6 751



PFAS market :

→ Heterogeneous industrial contexts

→ More or less critical applications

→ More or less mature alternatives to PFAS

→ Awareness on PFAS uses

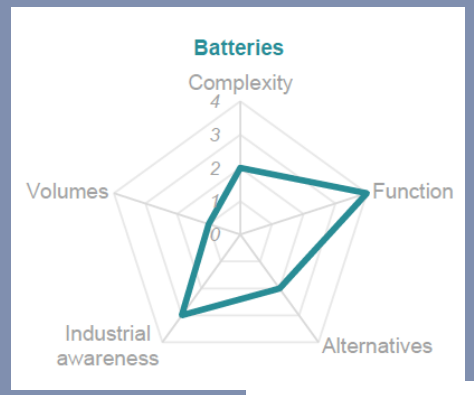
→ Economic importance

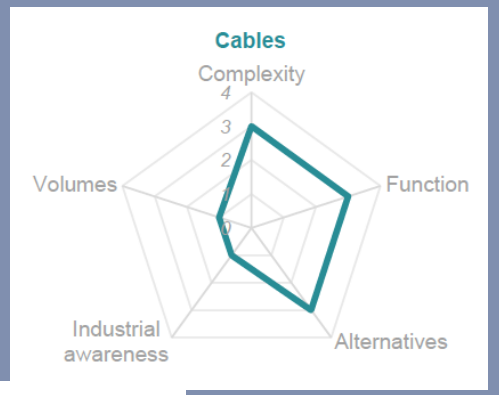
Criteria Definition for the Comparative Analysis

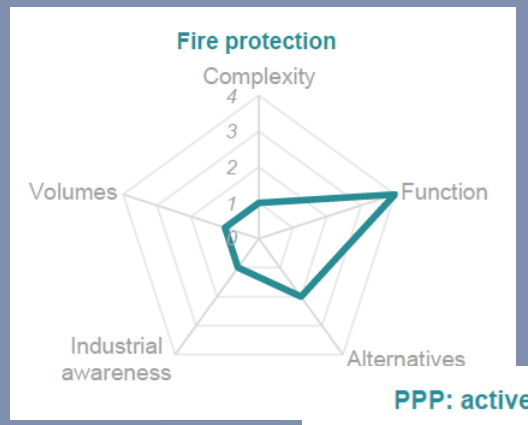
Criterion	1	2	3	4
PFAS role in the final product: functional importance and technical complexity	PFAS plays a key role in the final application, which is technically complex	PFAS is a secondary component in a technically complex product	PFAS plays a key role in a rather basic, mature application	PFAS is a secondary component in the final product, its role is not central
Final function considered as "essential"	The PFAS added value is basically classified as "comfort"	A deficiency in the final function associated with PFAS would have limited impacts	A deficiency in the final function associated with PFAS would have significant but manageable impacts	PFAS is associated with a function of the final product considered as "essential"
Maturity of alternatives	Some alternatives, tested in an industrial context, meet basic requirements	Some alternatives, partially satisfactory, need adaptations or further developments	Several potential alternatives are identified, none of which is technically satisfactory	No satisfying alternative is available, previous attempts were unsuccessful
Industrial awareness	PFAS uses are well identified by the industry, some alternatives are tested	PFAS uses are well identified by the industry, debates about alternatives are emerging	PFAS uses are identified by the industry, which has a limited knowledge of alternatives	The extent to which PFAS are used is not well known, and knowledge of alternatives is limited
Volumes (Belgium)	Less than 100 t/y	Between 100 and 500 t/y	Between 500 and 1000 t/y	More than 1000 t/y

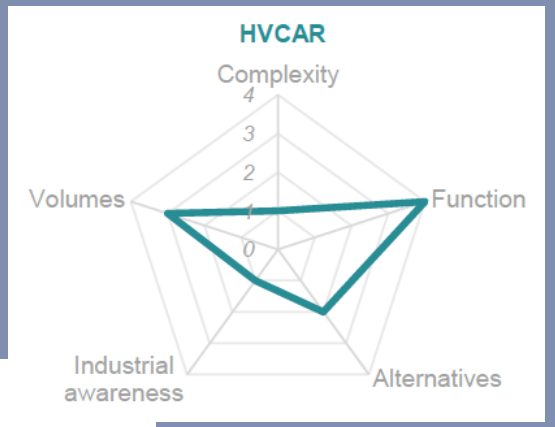
- **PFAS role in the final product : functional importance and technical complexity**
  - → Numerous Uses in Processes & Products
  - → Some cases, PFAS only a secondary role
  - → PFAS : Fundamental role in a complex Product
- **Final function considered as "essential"**
  - → When Evaluate Consequences of failures : Sanitary, Safety, Economy
- **Maturity of alternatives**
  - → ECHA Restriction report
  - → Strictly Technical point of view, NOT Cost
- **Industrial awareness**
  - → Uses vary according to the industry concerned
  - → Prerequisite before considering the awareness of the availability of alternatives.
- **Volumes**
  - → Estimations detailed in monographies
  - → Various Uncertainties

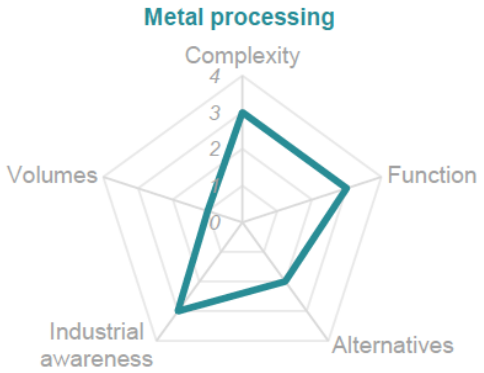
Results of Comparative Analysis

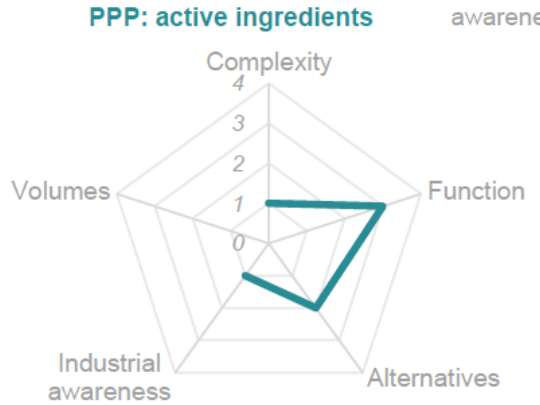


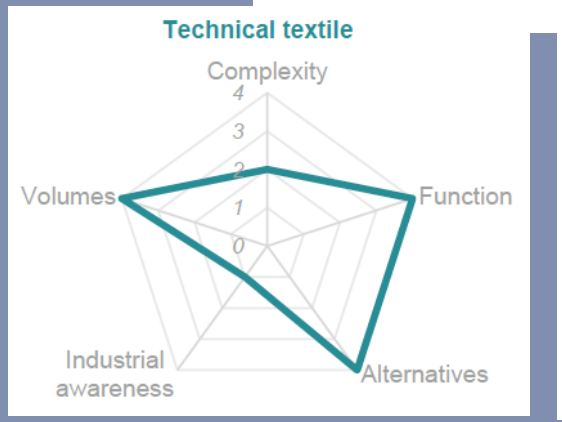


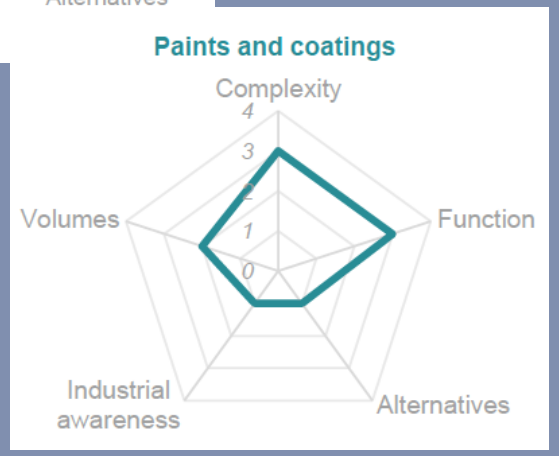


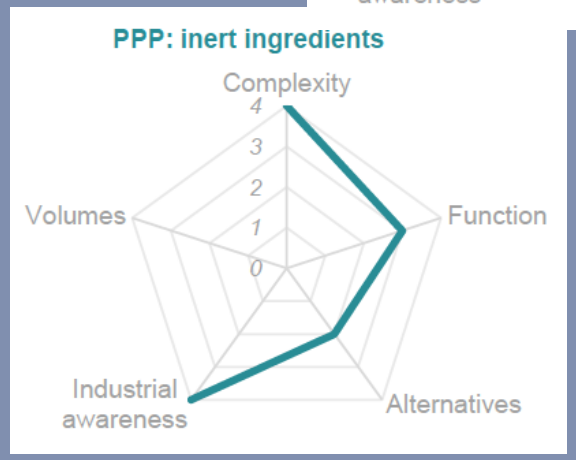


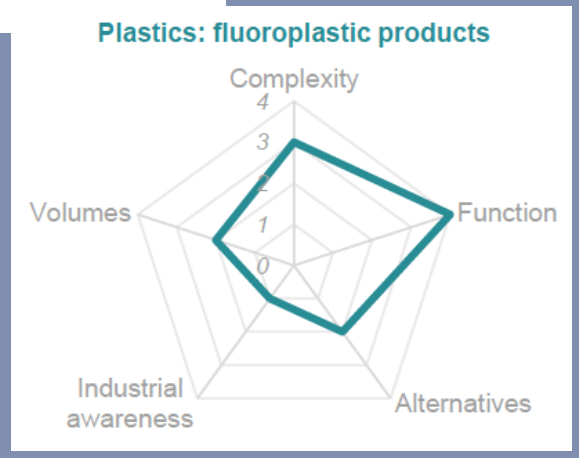












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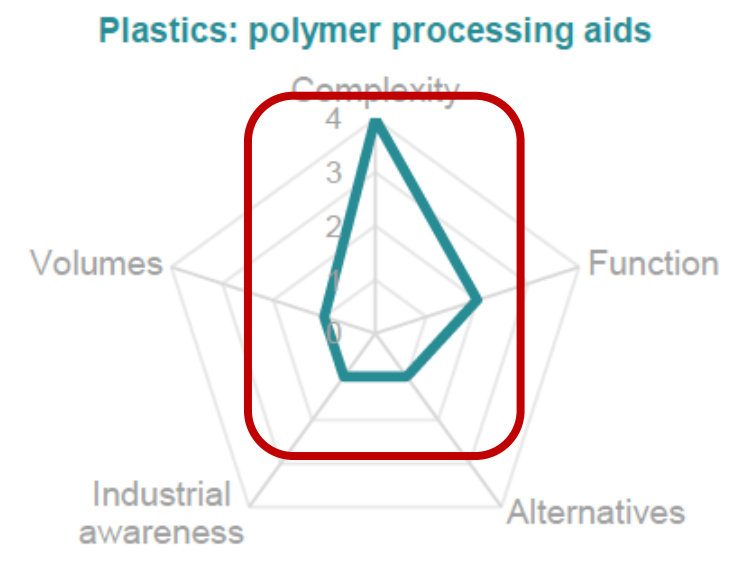
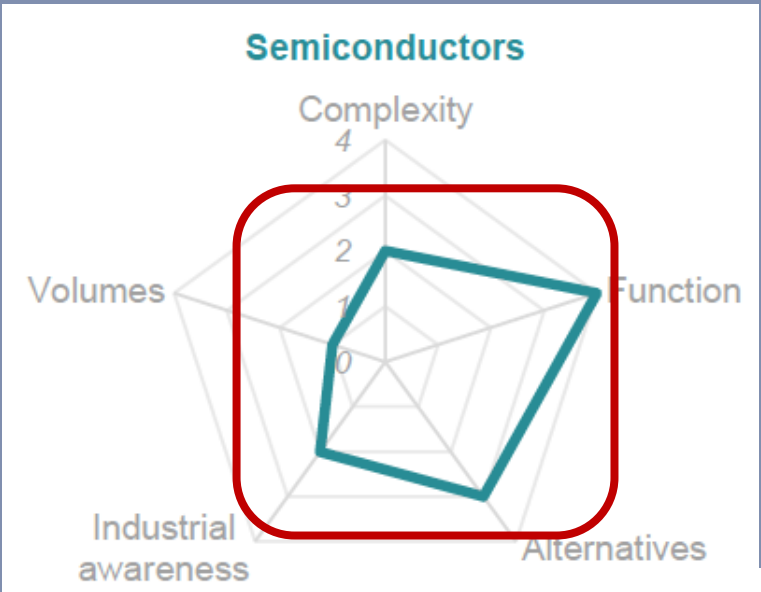
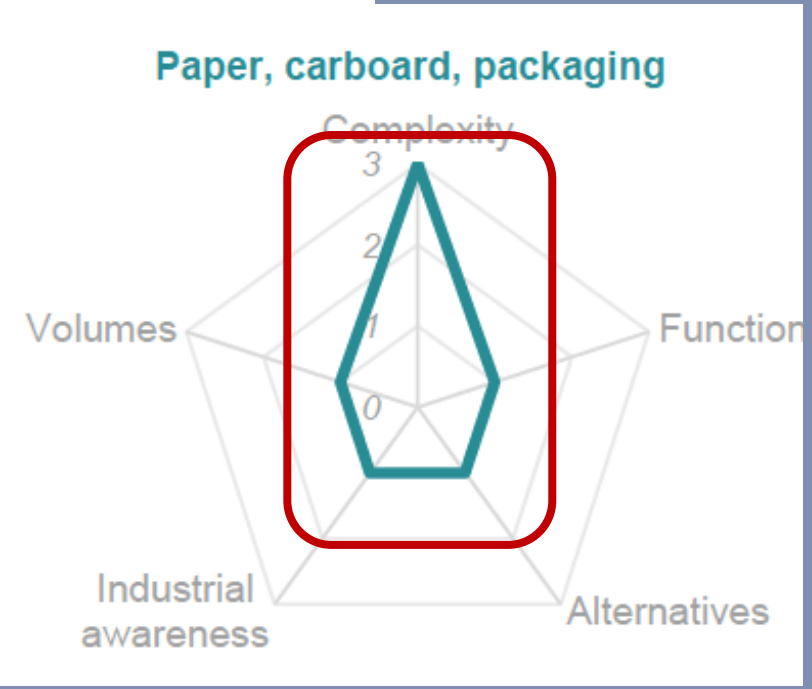
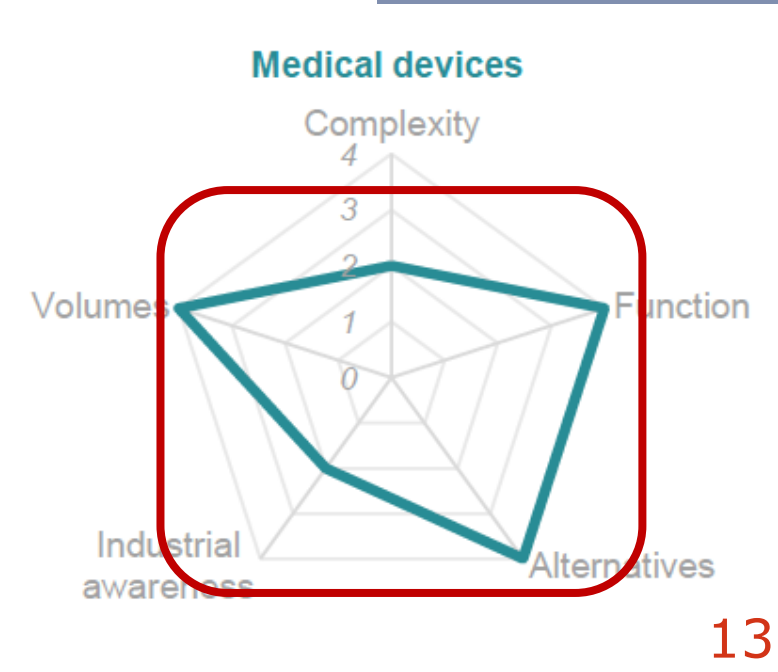








PRIORITY LEVELS

- **VERY HIGH**
  - Medical devices
- **HIGH**
  - TULAC : Textile, Upholstery, Leather, Apparel & Carpet
  - HVACR : Heating, Ventilation, Air Conditioning & Refrigeration
- **MEDIUM**
  - Semiconductors
  - Pesticides

5. Public Policies : How to Support the Transition to Alternative

Section sets out the following

1. PFAS substitution at the Belgian and EU levels.

2. Avoiding regrettable substitution.

3. Public policies to accelerate substitution.

4. PFAS alternatives across sectors.

5. PFAs alternatives and policies for priority sectors.

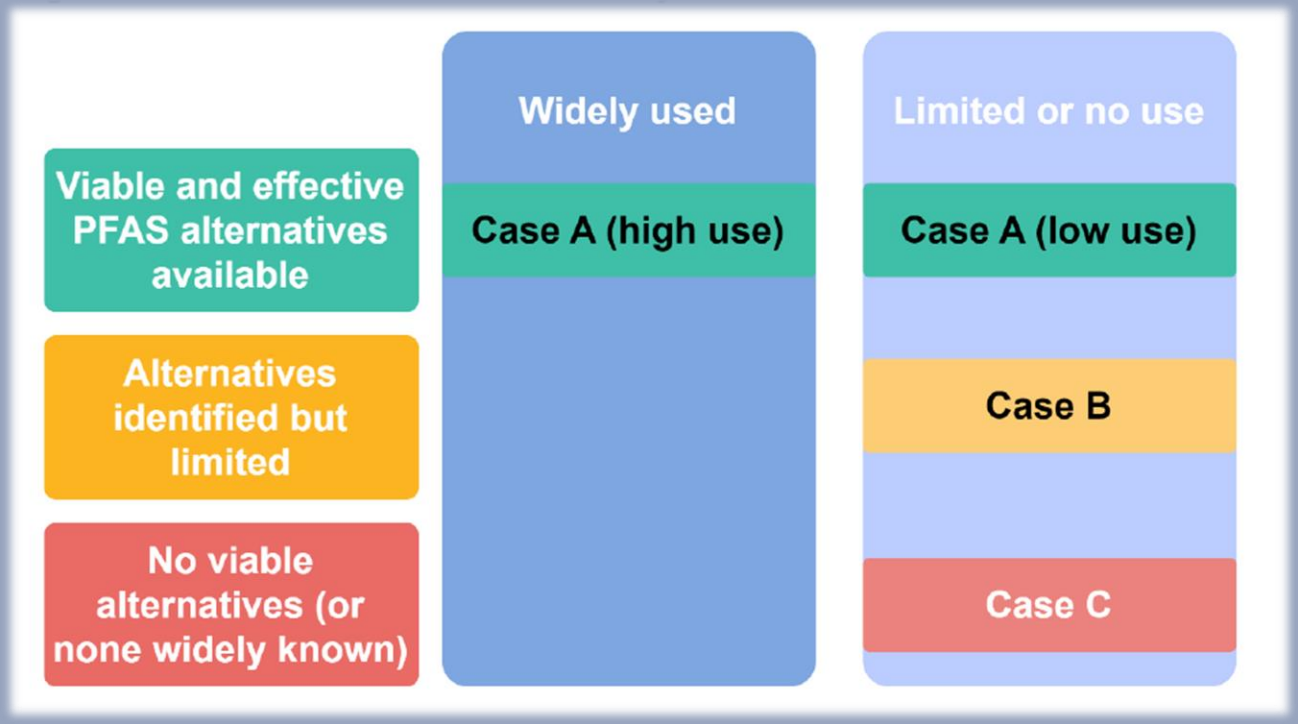
1. PFAS Substitution at the Belgian & EU levels

- **Much of PFAS manufacture** → outside of Belgium & the EU
- **Companies manufacturing PFAS ≠ Companies using in final products**
- **Companies active in Belgium & EU**
  - → Focused on the use and end of life phases rather than the development of the PFAS
  - → Limiting factor in the research of alternatives due to a lack of adequate skills and conflicting interests
- **In many sectors, companies using PFAS in their products (in medical devices and HVACR sectors)**
  - → Active across multiple EU countries
  - → Location of R&D finding PFAS alternatives : unlikely to be significant as long as they are able to effectively use them in their applications

2. Avoiding Regrettable Substitution

- **Applications an alternative would be used for**
- **Risks of PFAS for this application**
- **Be balanced against the impact of specific alternative(s)**
  → Comprehensive cost-benefit and/or life cycle analyses environmental, social & economic aspects
- **How the switching to alternatives may interact with other regulation**
  → Linked to global warming potential or EcoDesign targets
- **Cases with many possible alternatives or avenues for alternatives**
  → Clear understanding of the hierarchy of alternatives
  → Communication of technological readiness levels by the administration
  → Help unlock the necessary means and support for the potential more desirable substitutes.

3. Public Policies To Accelerate Substitution



Case A - Available alternatives

- → Available and viable substitutes for the relevant applications
- → Require minimal public support
- → Can be further split into cases where the viable alternative is widely or not yet widely used

Case B - Imperfect alternatives/in development

Alternatives that result in significant trade-offs (cost increases or performance drops)

→ Need additional support and/or development

→ Not currenty widely used

Case C - No viable alternatives identified or very little development

→ Applications with no widely accepted alternatives (or none at all) as of today

Figure 3 : Types of policies for applications with PFAS alternatives (Case A)

PFAS alternatives in use (viable, effective alternatives)

Low current levels of use in applications

Policy A1: Increase consumer/producer information levels.

Policy A2: Short term and decreasing over time subsidies for a given share of consumers to switch.

Policy A3: Ensure technical guidance on use of alternatives is widely available and accessible.

Policy A4: Ensure (through trainings or incentives) that there is enough competent staff to use and install alternatives to PFAS where relevant.

High current levels of use in applications

Policy A1: Increase consumer/producer information levels.

Policy A3: Ensure technical guidance on use of alternatives is widely available and accessible.

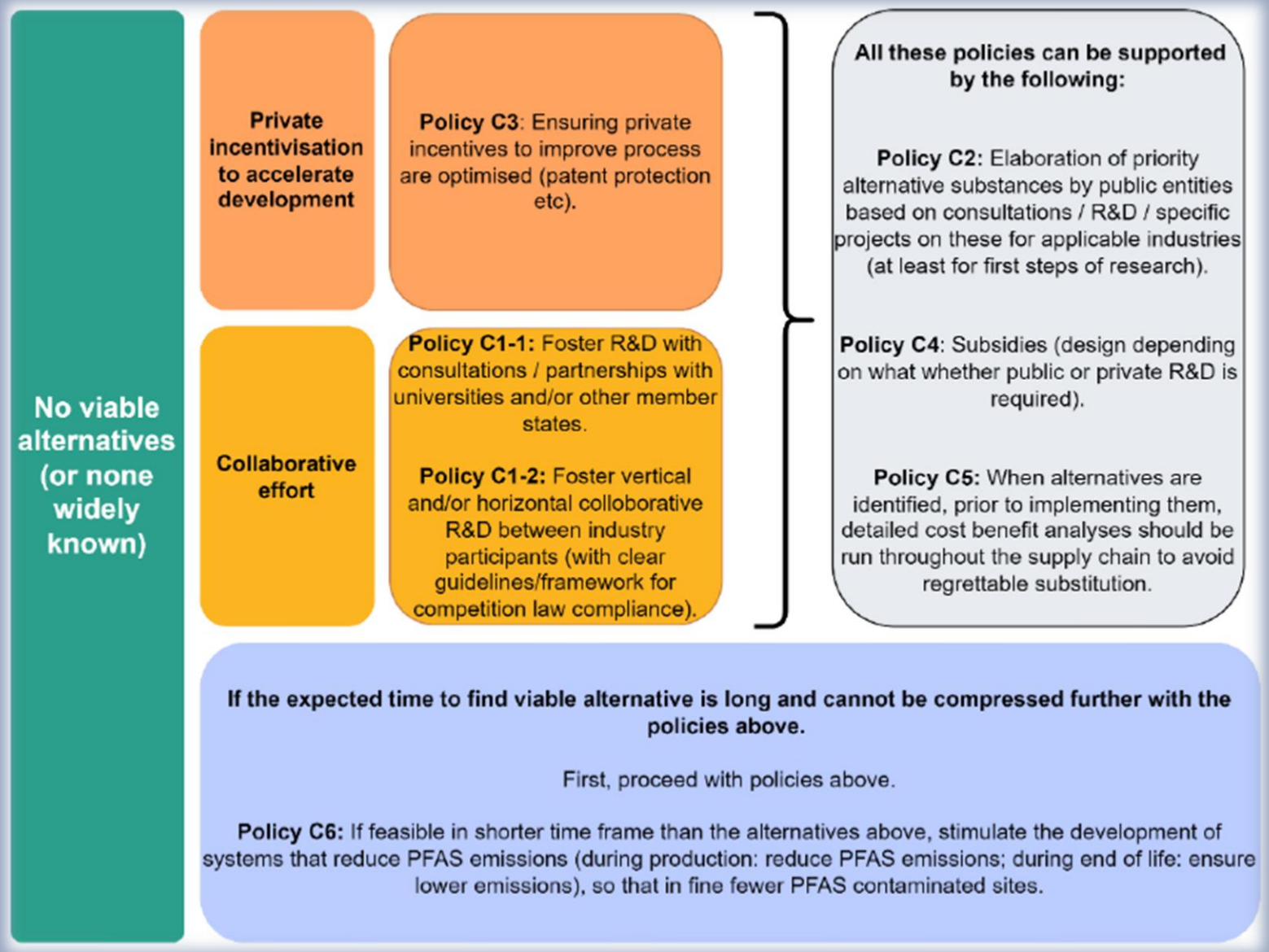
Policy A5: Place increasing restrictions on PFAS with environmental permits.

Policy A5 likely be implemented at the regional level but could be suggested/coordinated at the federal level

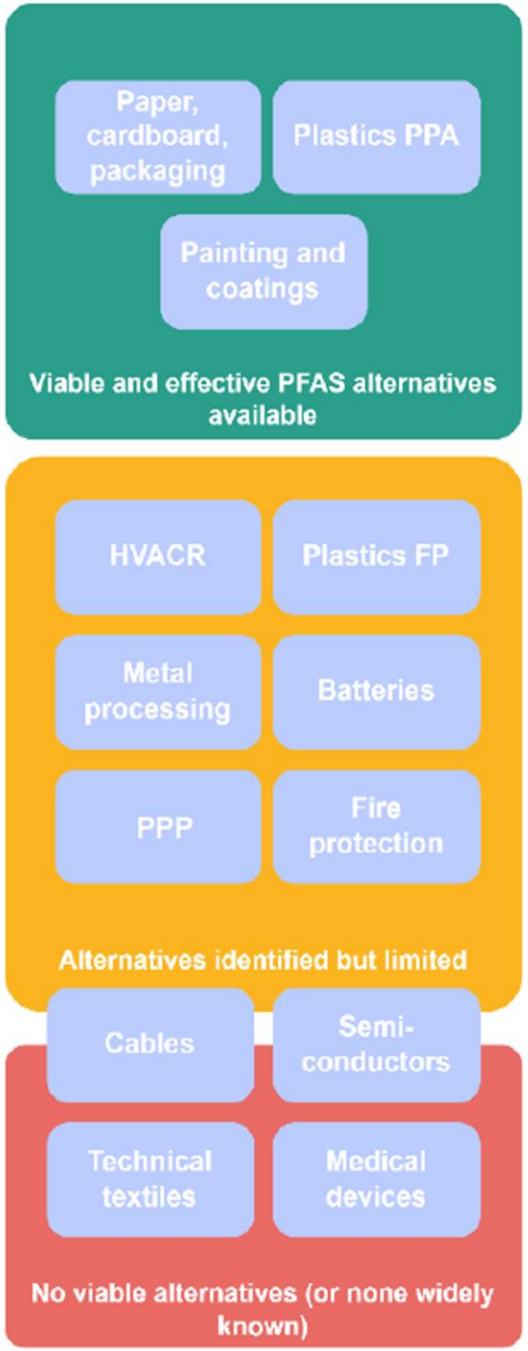
Figure 4 : Types of policies for applications with problematic PFAS alternatives (Case B)

Alternatives identified but limited	**CAPEX Barrier: Capital expenditure required to bring solution to market**	**For new installation of alternative / system / unavoidable CAPEX increase** **Policy B1-1:** Subsidies decreasing over time, based on percentage of CAPEX covered, with different criteria for attribution by size of applicant, (automated for domestic small applications, project reviewed for larger scale).	**For R&D related CAPEX** See performance barriers below.
	OPEX barrier: Operating expenditure required to run solution	**OPEX increase can be reduced** **Policy B1-2:** R&D subsidies to reduce OPEX. **Policy B2:** Facilitating information exchange or collaborative R&D.	**OPEX increase cannot be reduced (and there are no better product alternatives)** **Policy B1-3:** Creating time limited subsidies on basis of usage. **Policy B1-4:** Where there are exisiting product subsidies, modify them to be more favourable to PFAS-free alternatives.
	Performance barrier (alternative exists but results in signficant drop in performance in key properties)	**If R&D is unlikely to reduce the performance gap** **Policy B1-5:** Subsidies (decreasing over time) for switching or identifying functional alternatives (if they exist) instead of product alternatives.	**If R&D is likely to reduce the performance gap** **Policy B4-6:** Subsidies for R&D to improve performance. **Policy B1:** Facilitating information exchange or collaborative R&D. **Policy B3**: Ensuring private incentives to improve process are optimised (patent protection etc).

Figure 5 : Types of policies for applications with no PFAS alternatives (Case C)



4. PFAS Alternatives Across Sectors



- Very large range of sectors and applications that use PFAS
  → need specific tailored policies to suit their needs
- It is important to group applications which can use the same or similar solutions
  → based on consultations with the industry and public bodies
- To ensure that policies are designed effectively
  → applications of PFAS should be carefully grouped by industry
  → to reduce duplication of work, without selecting categories that are too broad
- Figure to the left : a rough classification of the 12 sectors
  → to help guide which policies could be applied to each sector
- Cables and semi-conductors are classified in between the red and orange boxes
  → as they appear to be in very early stages of alternatives identification
  → but are more advanced than medical devices

Focus the analysis on the three priority sectors :

Technical textiles | HVACR | Medical devices

Classification of sectors by technological readiness levels, based on Erdyn research

5. PFAS Alternatives and Policies for Priority Sectors

❑ Technical Textiles Sector

❖ **Currently NO Alternatives with sufficient oil repellence properties**

❖ **Policies that could help this sector include :**

➢ Assessing the need for personal protective equipment
→ potentially adapt new requirements for certain uses
→ to reduce the need for PFAS in the short term

➢ Once an alternative is available from the chemicals industry
→ subsidies for testing them could be provided

➢ Organising a collaborative workshop
→ to foster the development of alternatives

PFAS Alternatives and Policies in the Context of Priority Sectors

❑ HVACR Sector : Heating, Ventilation, Air Conditioning & Refrigeration

- ❖ **Many sub applications of PFAS, some with PFAS-free alternatives**

- ❖ **Policies that could help this sector include :**
  - ➢ CAPEX and R&D subsidies
  - ➢ Collaboration with city planning,
  - ➢ Stimulation of collaborative R&D/private incentives to innovate
  - ➢ Ensuring the presence of skilled workers
  - ➢ Establishment of prioritisation lists of desirable alternatives

PFAS Alternatives and Policies in the Context of Priority Sectors

❑ Medical Sector

- ❖ **General lack of knowledge of potential viable alternatives**
- ❖ **Lack of significant collaborative research/information sharing**
- ❖ **Some applications → the solution will be relatively straightforward**
  BUT many where it will be difficult
- ❖ **Not a clear path of which applications or potential alternatives to stimulate**

- ❖ **Policies that could help this sector include :**
  - ➢ R&D subsidies
  - ➢ Stimulation of collaborative R&D/private incentives to innovate
  - ➢ Establishment of prioritisation lists of desirable alternatives
  - ➢ Groups of applications : mutualise some of the steps of research for alternatives

6. CONCLUSIONS

Barriers to the Development Alternatives

Technical and knowledge barriers

Lower performance, safety concerns, skills gap for use.

Competing regulations imposing other demands

For example concerning global warming, EcoDesign, safety requirements.

Additional costs which can be prohibitive

CAPEX (installations, more complex products) or OPEX (operating costs).

Uncertainty as to which PFAS will be banned

When and for what applications; together with which alternatives will be brought in.

Concerns over sharing of innovation results

Potential market power of companies finding viable alternatives).

Lack of centralisation of information / coordination

Reduces flow of information as to potential solution and possible duplication of work.

Prioritisation of Alternatives

- **Establishing a list of common priority requirements of the industry** → to help focus research by the chemical and material development industries
- **Consultation with manufacturers, material and chemical development industries and relevant public bodies**
- **Priorisation of certain streams of research**
  → this list may also identify overlaps in R&D
- **Creation of a common list of alternatives with assessments of the full supply chain**
- **Creation of positive list of alternatives to reduce duplication of costs**

“ PFAS in Belgian Industry – Market Study ”

economie

NL : https://economie.fgov.be/nl/themas/ondernemingen/duurzame-economie/duurzame-productie/chemische-stoffen-en-duurzame

FR : https://economie.fgov.be/fr/themes/entreprises/economie-durable/production-durable/substances-chimiques-et

Thank you for your attention ☺

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