4. Projects (Working group), platforms, seminars and surveys

For the various activities mentioned below, member academies have indicated whether or not they are interested in participating. Of course, any member academy is free to take part in any working group by appointing a representative, even if that academy did not express an opinion when the project was launched.

4. Working groups

- **Soils: Synergizing Climate Protection and Climate Adaptation**

The objective for this working group is to:

- Assessment of key soil properties for carbon storage across EU Member States
- Analyse impact of land use, infrastructure, climate change
- Develop action plans and policy recommendation

Activity management and schedule:
Leading academy: acatech (Karen Wagner / Leon Niemeyer)
Chair of the Working Group: Reinhard Hüttl
Executive Committee member responsible: Reinhard Hüttl
Working group meetings: 08.01.2026, 19.02.2026 and 11.05.2026
Duration: 18 months
7 Academies involved: acatech, ATV, IAS, ITATEC, HAE, NAE, PAE, RAI
Product: Policy Brief entitled “Strengthening Soil Carbon Sinks for Climate Neutrality: From Monitoring to Action in European Soil Policy.”

Content:
Recent discussions focused on strengthening the strategic coherence, political relevance and implementation-oriented character of the document. A central outcome of the discussions was the shared understanding that climate change and soil degradation are already ongoing realities and that political action should not be delayed by scientific uncertainty or expectations of complete precision. The emerging policy narrative therefore emphasizes adaptive, learning-oriented and pragmatic governance approaches.
The current draft underlines the importance of soils as a strategic carbon sink while stressing that monitoring systems alone cannot enhance carbon sequestration. The Working Group therefore increasingly focuses on implementation-oriented and regionally adapted land management practices, including diversified crop rotations, permanent soil cover, agroforestry systems, regenerative agricultural approaches and sustainable forest management.
The discussions further highlighted the strong heterogeneity of European soils, climatic conditions and land-use systems. The group therefore agreed that European soil policy should combine common strategic goals with flexible implementation pathways adapted to regional and site-specific conditions.
Another major topic was the interaction between monitoring systems, scientific modelling, Earth observation technologies and practical experience from farmers and land managers. Living Labs were identified as important instruments for experimentation, adaptive learning and regional implementation, while recognizing that they should form part of a broader mix of policy instruments.
The Working Group also discussed the broader European policy context, including CAP instruments, carbon farming approaches, LULUCF accounting, sustainable forest management and the contribution of soils to climate resilience and food security.

Outlook
Following finalization, the Working Group intends to disseminate the Policy Brief to

relevant European Commissioners, national governments and further European stakeholders in order to contribute to current policy debates on climate neutrality, soil resilience and sustainable land management.
At the same time, the Working Group recognizes that the overall topic area extends far beyond what can reasonably be addressed within the concise format of a Policy Brief. The group is therefore already considering possible follow-up activities and more focused deep-dive analyses on selected thematic areas that emerged during the discussions, including broader soil health questions, forest and land-use systems, monitoring and verification approaches, and long-term resilience strategies.

The current objective remains to finalize and disseminate the Policy Brief before summer 2026.

Reinhard Hüttl will update the Board.

- **Energy transitions in Europe. Achievements, situations and challenges**

The objective of this project was to update the Euro-CASE report prepared in 2019 “Energy transition in Europe, Common goals but different path” by extending the consultation as widely as possible to all countries represented in Euro-CASE.

During the meeting of 30.01.2026, the co-chairs presented the scoping paper given in annex 1 outlining the document's structure and key objectives, including comparing national energy transitions, identifying barriers and incentives, and examining geopolitical changes since 2019. Participants discussed incorporating new aspects like defence, industrial competitiveness, and consumption-based emissions, while Andrew Haslett highlighted challenges specific to the UK's energy transition. The group agreed to focus on strategic recommendations and concise analysis, with a draft document to be completed by mid-September for the Euro-CASE general meeting.

Activity management and schedule:
Leading academies: RAI /acatech (Karen Wagner / Leon Niemeyer)
Chairs of the Working Group: Macarena Larrea Basterra / Reinhard Hüttl
Executive Committee member responsible: Reinhard Hüttl
Working Group meetings: 30.01.2026 and 27.03.2026.
Duration: 24 months
Product: Report. First draft report prepared for the CAETS 2026 in Munich.
17 Academies involved: acatech, ARB/KVAB, ASTR, ATV, CoFA, EACR, HAE, IAS, ITATEC, IVA, NAE, NATF, NTVA, PAN, RAEng, RAI, SATW,

Next steps
The scoping paper will be updated, taking into account received comments and sent to working group members. The version dated 24 March 2026 is given in the annex.
As of 27 March 2026, 10 academies have submitted their contributions, either in full or in part. Each academy is required to submit a complete, finalised version during April. Those that have not yet submitted anything are asked to do so as soon as possible.
The different chapters, described in the scoping paper, are currently being prepared and submitted to working group members.
A first draft the complete report should be ready by the end of 2026.
A science writer / proof-reader will be involved in ensuring consistency throughout the report
A peer review will be organised

Euro-CASE is in contact avec acatech to prepare for a possible interaction with CAETS

in September 2026.

Macarena Larrea Basterra and Reinhard Hüttl will update the Board.

- **PFAS today and tomorrow**

The objective was to give a technological view on the PFAS problem at the European level, using the NATF report as a basis for work.

The group proposed to deliver a Euro-CASE contribution to the **Committee for Socio-Economic Analysis (SEAC)** consultation launched by the **European Chemicals Agency (ECHA).** The deadline for submissions was 25.05.2026.

The Euro-CASE contribution (annex 7) has been approved by member academies and submitted on 22.05.2026.

Activity management and schedule:
Leading academy: ITATEC
Chair of the Working Group: Giuseppe Resnati with the support of Marco Apostolo
Executive Committee member responsible: Matteo Pardo / Patrick Maestro
Duration: First semester 2026
First meeting: 28 January 2026 and 4 March 2026.
Product: Contribution to SAEC ECHA consultation
Academies involved: ARB/KVAB, CoFA, ITATEC, NATF, PAE

Patrick Maestro and Matteo Pardo will update the Executive Committee.

- **Innovation III**

The objective of the group is to focus on innovation processes: how to get innovations/commercial products/processes/knowhow from research to market. So, how to support those processes, how they differ in selected countries, what recommendations that can be given, etc.

Activity management and schedule:
Leading academy: CoFA with the support of Norbert Babcsan
Chair of the Working Group: Jari Hämäläinen
Executive Committee member responsible: Jari Hämäläinen
Duration: 2 years
Working group meetings: 29.01.2026, 04.06.2026
Product: tbd
Academies involved: CoFA, HAE, IAS, ITATEC, IVA, PAE
Timeline: Phase 1 – Scoping & Framework (late 2025 – early 2026)
Phase 2 – Data Collection (mid–late 2026)
Phase 3 – Analysis & Drafting (early 2027)
Phase 4 – Review & Dissemination (mid-late 2027)

A document providing an overview of the working group's activities is provided in annex 2. This document has been revised in accordance with comments received at the last Board meeting on 18 February.

The working group will hold a workshop on Innovation on 4 June afternoon in Paris to enable all Board members attending the meeting on 5 June to take part in the meeting

the day before.

Jari Hämäläinen will update the Board.

- **Industrial competitiveness of Europe**

During the last Board meeting Philippe Freyssinet mentioned the Mario Draghi's report on the future of European competitiveness and the setup of the European Competitiveness Fund which is a proposed EU funding instrument aimed at closing the EU's innovation gap by channelling large-scale investment into strategic sectors. According to him Euro-CASE could play a role at the interface of Innovation, Industry and Academics to promote partnership between R&D and Industry.

The Board members considered this suggestion to be very interesting. Ph. Freyssinet, P. Maestro and M. Matlosz met to work on a proposal given in annex 3 and submitted to the Board.

Philippe Freyssinet will present this proposal to the Board.

4.2. Platforms in progress

- **Engineering Diplomacy**

Since the Board meeting in Vienna Martin Bech, Albert Husniaux, Shane McHugh and Matteo Pardo have been communicating regarding potential follow-up actions to be undertaken regarding the two proposals put forward by Mr Bech/Mr Pardo and the Belgian academies presented to the Board on 30.09.2025.
Jan Marco Muller from the European Commission has mentioned that he is still very interested in receiving policy briefs and analysis from Euro-CASE on topics previously mentioned.

Activity management and schedule
Leading academy: tbd
Chair of the Working Group: Martin Bech who left ATV on 31 January 2026
Executive Committee member responsible: Matteo Pardo
Duration: tbd
Next meeting of the working group: tbd
Product: tbd
Academies involved: ARB/KVA, ATV, HAE, ITATEC, IVA, RAEng

Patrick Maestro met with Albert Husniaux and Luc Chefneux to discuss a potential follow up under the leadership of the Belgian Academies. Whether this can go ahead depends on a high level of participation from member academies.

Patrick Maestro will update the Board.

- **Critical Raw Materials**

Thanks to the RAEng team, a short report has been drafted summarising the findings of the workshops held in December 2025 and June 2026. The synthesis is given in annex 4.

Potential follow-up actions are being considered in the context of contacts with EIT

Raw Materials which appears to be the European stakeholder with whom Euro-CASE should pursue this activity.

Activity management and schedule:
Leading academies: RAEng
Chair of the Working Group: Tim Chapman supported by Shane McHugh
Executive Committee member responsible: Tim Chapman
Duration: tbd
Product: Report + Survey
Academies involved: AESS, ARB/KVAB, HAE, HATZ, IAE, IVA, NATF, RAEng, RAI,

Tim Chapman and Shane McHugh will update the Board

4.3. Seminars

- **Defence Industry in Europe**

The President of the Real Academia de Ingenieria from Spain proposes to hold in Madrid a one-day seminar on the Industry of Defence. On 24.03.2026 member academies have been invited to provide feedback on this proposal at the latest on 10 April. A working group has been set up to contribute to the organization of the seminar by selecting specific topics to be addressed, speakers, …

An updated description of the proposal is given in annex 5.

Eloy Alvarez Pelegry will update the Executive Committee.

- **Industrial competitiveness of Europe**

A Euro-CASE event could be organised in 2027 on this topic. A proposal will be presented to the Board on 5 June.

Patrick Maestro will update the Board.

4.4. Survey

- **Relationship between Academies and Industry**

A survey (annex 6) has been prepared and sent to members academies to provide an overview of the relationship between industry and academia in the various countries represented in Euro-CASE. As of 21 May, only 7 academies have provided their contributions.

Patrick Maestro will update the Board.

Paris, 28.05.2026

Annex 1

Report: Energy transitions in Europe. Achievements, Situations, and Challenges

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WG leadership

Lead: RAI, M. Larrea (MLB); acatech, R. Hüttl (RH)

Authors:

The Working Group (WG) on Energy Transitions in Europe is composed of representatives from 17 academies from different European countries: Belgium, Czechia, Denmark, Finland, France, Germany, Hungary, Italy, the Netherlands, Norway, Poland, Romania, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom.

Background

Europe has committed to achieving climate neutrality by 2050, first endorsed by the European Council in December 2019 and subsequently made legally binding through the European Climate Law adopted in 2021. In this context, the energy supply and demand play an important role. Since the publication of the Euro-CASE report "Energy transitions in Europe – common goals but different paths" (2019), political, economic, and technological conditions have changed profoundly. The European energy landscape is now shaped by new geopolitical risks, disrupted fossil-fuel markets, unprecedented price volatility, electrification objectives, transformative EU legislation (e.g., Fit for 55 and RePowerEU), advances in hydrogen and other renewable fuels, including synthetic fuels, as well as storage and system-integration technologies.

Within this framework, it was decided to create a WG in Euro-CASE on Energy Transitions with the following objectives.

Objectives of the Working Group

Based on available data and each academy's knowledge of the energy transition process in its country, the objective is to conduct a comparative analysis of the objectives set, achieved, and pending.

- Assess the development of energy transitions in 17 European countries between 2019 and 2026. Analyse and compare the evolution and results of energy transitions in the different countries included in the study.
- Compare current national transition pathways with the expectations, assumptions, and recommendations of the 2019 Euro-CASE baseline and the different baselines of the National Energy and Climate Plans (NECPs).
- Identify cross-country trends, structural barriers, and critical success factors.
- Analyse new geopolitical, technological, regulatory, and economic developments and their potential impact on energy security, affordability, and competitiveness.
- Identify and explain the role of engineering and technology in the development of new technologies and energies and in the different sectors affected by the energy transitions.
- Provide strategic recommendations for policymakers, engineering academies, industry, and society, incorporating a European-wide energy system and overall emissions perspective.
- Develop a targeted communication concept for diverse stakeholder groups and outline practical steps for its implementation.

Index of the report

1. **Executive summary** (3 pages) (RAI and acatech. Revision by the whole WG)
2. **Foreword, scope, and purpose of the paper** (2 pages): including references to the 2019 publication (RAI and acatech)
3. **The context of the European energy transition: key issues related to the energy transition (ET) at the European level** (RAI and acatech) (7 pages)

   3.1. Decarbonised and sustainable energy: from ignorance to environmental awareness and sustainable competitiveness

   3.2. Energy security: defence in the geopolitical context

   3.2.1. European interconnections for the security of supply

   3.2.2. Supply of critical raw materials (CRM) for the energy transition and the circular economy

   3.3. Energy affordability: energy prices

   3.3.1. Industrial competitiveness

   3.3.2. Energy poverty

   3.4. Digitised, distributed, and decentralised energy

   3.4.1.Technological development

   3.4.2.The role of engineering and the skills

   3.5.From the energy trilemma to decarbonisation and back to industry

   3.5.1.Back to industry

4. **Technology and innovation for decarbonization and the ET:** challenges for the ET (faster innovation, scale up), new business models, key technological developments (e.g., green gases, heat networks, etc.), barriers (CRM dependency), and incentives (instruments to support innovation - EU vs. China and USA) (5 pages) (RAI, acatech and NAE)
5. **Assessment of each country's energy transition progress** in the context of the analysis carried out and based on the template[1] (2-3 pages by country from the Country analysis[2])(Each Academy). This assessment should consider:
   a. Current situation and assessment of the evolution.
   b. Effectiveness of the national policy instruments identified in 2019 and others relevant for each country.
   c. Outlook of present European and own strategies.
   d. The role of new technologies in the context of each country.
   e. Main conclusions and learnings from each country's experience. Barriers and successes.
6. **Assessment of paths and trends of energy transitions in the different countries[3].** Review of the 2019 Euro-CASE Report and starting point for the 2030/2040/2050 targets. (8 pages) (RAI and acatech)

[1] See the document Template for the countries´ analysis. Euro-CASE WG 2026

[2] The annex will contain a detailed analysis for each country. This will help us to provide a more coherent and concise document aimed at policy makers, and covering strategic issues.

[3] Based on chapter 5 of this report and on the annex for each country.

   a. The WG will evaluate for each country:
      i. Which 2019 expectations proved accurate in general terms (including an assessment of which expectations have materialised),
      ii. Where and why real-world developments diverged (which have not and have proven difficult), and
      iii. Which new structural drivers and technologies now determine national and European energy transitions (what new developments have emerged since then, and which EU- level developments have altered the energy landscape).
   b. Explicit review of the recommendations and analytical framework of the 2019 Euro-CASE report (objectives, assumptions, and transition pathways presented, and the current situation).
   c. Relationship with other issues and challenges related to ET, such as the expected changes in the petrochemical, steel, and refining industry (e.g., challenges with microplastics) or demand for energy for industry and defense.
   d. Cross cutting and assessment of general trends if detected.
   e. Lessons from countries to other ones.
7. **Concluding remarks** (3 pages) (RAI and acatech)
8. **Effective policy recommendations** for action towards industrialization and competitiveness (2 pages): focusing on groups of interest such as policymakers, universities, engineering academies, industry, and society (RAI and acatech)
9. **Bibliographical references**

Acronyms and abbreviations
Glossary of terms
Members and staff of the WG on Energy Transitions
Annex. Evaluation and perspectives of Energy Transitions in Europe: Country analysis: following the template[4] (each academy)

A. Czechia
B. Finland
C. Romania
D. Slovenia
E. United Kingdom

[4] See the document Template for the countries´ analysis. Euro-CASE WG 2026.

No more than 12 pages per case (see Style criteria and references).

F. ***Work schedule***

	2025	2026														2027						
	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J
Kick off meeting	19-Dec	X																				
Countries´ template and Shared folder			X																			
Countries´ intermediate draft				X	X																	
Countries´ final draft						X																
RAI and acatech revision of the drafts							X															
First review or 360-degree review							X															
Improvement of the chapters following the recommendations received from the reviewers								X														
RAI and acatech second revision									X													
Complete first preliminary draft submission										X												
Presentation of the first draft											X											
External peer review												X	X									
Improvement of the chapters following the recommendations received from external peer reviewers														X	X							
RAI and acatech third revision																X	X					
Executive summary by RAI and acatech																X						
Revision of the executive summary by the whole WG																	X					
Editorial process																		X	X	X		
Final document to be published																						X
General WG meetings and follow-ups		X		X		X		X			X			X			X					X
Leading Academies[5] meetings	X		X		X		X		X		X		X			X		X	X	X		

[5] Members: Eloy Álvarez Pelegry, Reinhard Hütl, Macarena Larrea Basterra, Patrick Maestro, Leon Niemeyer, Nadia Pipunic and Karen Wagner.

- ✓ The initial schedule lasts for a year and a half, although attempts could be made to complete it sooner. It depends on the commitment of the Academies, the peer review, etc. The objective is to produce a high-quality document.
- ✓ An **interim delivery** of the chapters is expected by the end of March (a first draft of the Annex. Evaluation and perspectives of Energy Transitions in Europe: Country analysis following the template). This was initially planned for mid-March, but due to delays in preparing and checking the template, it may be postponed until the end of March.
- ✓ By the end of May at the latest, all Academies will have submitted their **complete final contribution** (Annex. Evaluation and perspectives of Energy Transitions in Europe: Country analysis following the template + Assessment of each country's energy transition progress). A commitment of the Academies to send the document earlier would facilitate and speed up the steps to be taken.
- ✓ To guarantee the quality and accuracy of the study, each Academy will propose, together with the delivery of its chapter, the name and contact information of an expert who will be able to assess the content of the chapter for that particular country, as well as the more general sections of the study. Another potential reviewer could be proposed for this second part.
- ✓ Peer review will be managed by RAI and acatech to centralise all actions and ensure that the process is carried out in the proper order. Each Academy will then notify the experts that leading members will be contacting them by early October. Reviewers will have up to 2 months to complete the peer review.
- ✓ Throughout June, RAI and acatech will review all shared documents.
- ✓ During the first half of July, each Academy will review the comments received on its chapter and submit a new version, along with a brief document explaining the main changes and improvements, as well as any potential corrections.
- ✓ During the second half of July, RAI and acatech will review all chapters again and end chapters 5 and 6.
- ✓ RAI will present a preliminary draft of the integrated document in the first half of September, with all sections.
- ✓ Presentation of the main results at the Euro-CASE meeting in September.
- ✓ In October, the complete draft will be sent to external peer review.
- ✓ The editorial process will begin in March 2027 after the third review has been completed and the executive summary has been finalised, which will be evaluated by all members of the working group.
- ✓ Depending on the questions to be addressed, the meetings of the leading Academies would take between 45 min and 1 h; and those meetings of the whole WG between 1.5 h and 2 h.

Style criteria and references

1. Font type: Times New Roman 11.
2. Multiple line spacing 1.15.
3. Spacing 0 before and 6 after.
4. No indents.
5. Automatic and sequential numbering of chapters:
   1, 1.1, 1.1.1
6. Bullets to be used: -
7. Quotation marks (“ ”) should be used to highlight or emphasise words or phrases within the text and for direct quotations.
8. Terms and ideas shall not be underlined or bolded.
9. Acronyms: The full name of the institution, technology, etc. should always be mentioned in the body of the work, followed by its acronym in brackets the first time it appears in the text. Thereafter, the acronym should always be used (International Energy Agency (IEA), European Union (EU), etc.)
10. The Report will include a glossary of acronyms. Each chapter should include, at the end, a list of the acronyms employed.
11. Cross-referenced elements: Box, Table, Graph (for bar graphs, scatter diagrams, etc.), Figure (to describe models, etc.), and Map. All these elements must be numbered consecutively and automatically, as well as referenced in the text.
12. Table format: editable in Word and without predefined format.
13. Graphs and figures format: graphs accompanying the text must be original, i.e. produced by the authors, even if they come from other sources, to guarantee the final quality. Excel or PPT files shall be attached for final editing. Each file shall be identified with its content.
14. All bibliographical references used must be included, cited in the main body, and listed at the end of each chapter (before the glossary of acronyms). APA 7 style must be used: APA Style Common Reference Examples

Next steps

- M Larrea (RAI) will send a new version of this note as soon as possible and a template for each country´s draft. The team will review it, and Euro-CASE will contact the member academies again, sending them a copy of this new document.
- By the end of March, each academy will share an intermediate draft of the chapter, including the a. section (data) of the template.
- Creating a shared folder (Microsoft) with access to all the WG members that will include, among others, the Scoping paper, the countries´ template, list of members' contact information, list of reviewers, etc.
- Scientific writer (to be discussed later, once we have a draft of all the chapters).
- AOB

Annex 2

Project Proposal and Analysis: Enhancing the European Innovation Ecosystem

1. Project Foundation: Addressing the European Paradox

The "European Paradox" remains the primary structural challenge for the continent's economic competitiveness. It is defined as the systemic disconnect between Europe's world-class scientific research and its chronic inability to translate these advances into marketable innovations, scalable
industrial implementations, and profitable global businesses. While the continent possesses a robust human knowledge base, it lacks the mechanisms to convert R&D investment into commercial
leadership.

This project moves beyond descriptive analysis to address three core research questions designed to rectify this paradox:

- To what extent do current European Innovation Scoreboard (EIS) indicators explain a country's mathematical capacity to translate technology into industrial scale, and where should experts apply "weighting factors" to correct statistical imbalances?
- Which specific stages of the innovation chain—from early-stage research to high-tier industrial implementation—are currently uncaptured or undervalued by the existing AES/EIS framework?
- How do the unique structural characteristics and "selective goodness" of national innovation ecosystems influence performance in ways that are invisible to purely quantitative indicators?

2. The TRL/CRL/IRL Framework (The Horse, the Weapon, and the Money)

To accurately measure innovation readiness beyond technical maturity, the project proposes a three-dimensional framework. Each dimension will utilize a 9-level assessment scale to mirror the existing TRL structure, ensuring methodological consistency across the innovation chain.

1. **Technology Readiness Level (TRL): "The Weapon."** This measures the maturity of the technology itself, from basic science (TRL 1) to full-scale industrial proof-of-concept (TRL 9).
    - Note that it is not reasonable to ask "what is the country's average TRL?" but to clarify how the national innovation system systematically support progression from research (TRL 3–4) to commercial products (TRL 8–9).
    - Are there pilot plants? Is there engineering scale-up infrastructure? Are there industrial demonstrator programs? Do public funding schemes stop at research, or support industrial validation?
2. **Customer Readiness Level (CRL): "The Horse."** This represents market penetration and the environment for marketization. It assesses whether the

customer environment and market infrastructure are ready to adopt the innovation.

- The country-level CRL may focus on the questions like: Is there early public procurement for innovation? Are there regulatory sandboxes? Is domestic industry able to act as first reference customer? Do standards bodies accelerate adoption?

3. **Investment Readiness Level (IRL): "The Money."** This evaluates the availability of risk-tolerant capital, including the banking sector's loan capacity and the presence of venture capital, seed capital, or private equity required to scale.

    - Availability of venture capital relative to GDP, Growth-stage financing presence, Scale-up investment rounds, Role of development banks, Bank risk appetite for technology

3. Critical Analysis of the European Innovation Scoreboard (EIS)

The existing EIS methodology utilises unweighted statistical averages of input

s and outputs, which may mask the underlying factors influencing innovation. A more robust framework would incorporate expert-driven weighting to distinguish between general activity and high-impact outcomes.
Additionally, measuring R&D as a percentage of GDP can present a misleading representation of actual capacity.

EIS Limitation	**Proposed Expert Correction**
Unweighted Averages	Implement expert-derived weighting factors to identify and prioritize the indicators with the highest impact on industrial success.
Scaling Risks (GDP %)	Complement relative GDP percentages with absolute R&D volume metrics. This prevents penalizing high-output industrial leaders (e.g., Germany) while ensuring small-GDP nations (e.g., Estonia) are not over-ranked based on relative investment alone.
Lack of Business Results	Shift focus from enabling factors to tangible outputs, specifically the number of high-growth STEM companies and market-ready products.
Missing "Industrial Engineering Uptake"	Introduce factors that account for the practical application and absorption of engineering knowledge within the industrial base.

A fundamental error in current policy is the assumption that increasing "inputs" leads linearly to "outputs." **Inputs do not automatically guarantee results.** For instance, a 5% increase in education or R&D funding does not correlate to innovation output without the proper translation mechanisms.

4. Innovation Inputs (Enablers)

- Human knowledge base and primary education systems.
- Excellence of technical universities and national science academies.
- R&D investment levels (Relative and Absolute).

- Basic research funding.

5. Innovation Outputs (Results)

- Marketable innovations and commercialized research.
- Industrial-scale implementation and manufacturing depth.
- High-tech STEM startups and sustainable growth companies.
- Creation of resilient industrial ecosystems (transitioning from a single firm, like the historic Nokia model, to diverse clusters like the "Aura ring" ecosystem).

6. Regional Analysis

European countries should be assessed based on their strengths at various TRL, CRL, or IRL stages, not forced into a single ranking like EIS. EIS shows clusters that need deeper analysis; for instance, the Baltic nations have similar histories but different performances. The Netherlands and Nordic countries perform well in EIS as mid-sized economies, yet Finland faces high unemployment—does EIS account for job creation? Eastern European nations form another cluster, attracting industrial jobs but lacking R&D investment. Germany, France, Italy, and Spain represent the largest country cluster. A single measure like EIS fails to reveal each country's strengths across TRL, CRL, or IRL.

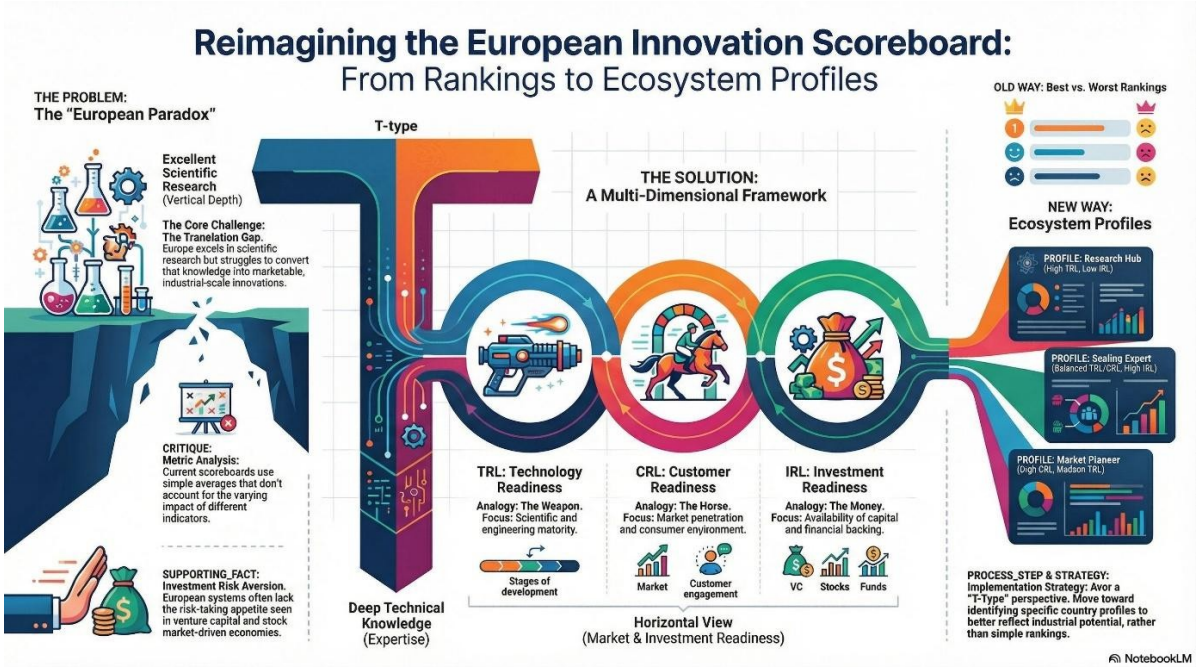
7. Methodology: The 'T-Type' Approach to Scientific Advice

The project working group is modeled on the "Engineer's mindset," utilizing a "T-Type" methodology. Success in the innovation chain requires participants who can "dig deep" (vertical expertise in specific technical fields) while maintaining a "horizontal view" (system-wide awareness of the entire innovation chain).

The working group will organize workshops in connection to euro-CASE board meetings in 2026 and 2027. The workshops will be devoted to different topics. The first one will be organize in Paris on June 4, 2026. The topic of the first workshop is the European Innovation Scoreboard (EIS) and Global Innovation Index (GII). The topics of the next workshops will be decided later.

8. Strategic Goal: Strengthening European Industrialization

The ultimate objective is to transform Europe from a "remote knowledge provider"—where researchers innovate for foreign entities (e.g., innovating for Canadian firms while residing in Hungary)—into a localized "industrial implementation hub." By focusing strictly on **technological innovation** and industrialization, we avoid the conceptual ambiguity of the social innovation "forest." Our goal is to keep "the brains" in Europe by creating an environment where high-value industry, R&D, and investment readiness are vertically integrated, ensuring that European scientific excellence results in European industrial leadership.



Annex 3

Version May 15,2026

How could Euro CASE support Europeans debate on Technological Competitiveness in the perspective of the upcoming FP10 and European Competitiveness Fund to be launched in 2028?

National Academy of Technologies of France

Euro-CASE occupies a specific position within the European research and innovation ecosystem. As a network bringing together national academies of engineering, applied sciences and technology from across Europe, Euro-CASE has the capacity to mobilize high-level interdisciplinary expertise spanning academia, industry, engineering, public policy and technological innovation.

An alarming context for European technologies and innovation

The conclusions of the report "*EU Innovation Policy: How to Escape the Middle Technology Trap?" Fuest et al.* (2024), anticipated and contributed to the *Draghi's report* (2024) analysis by focusing specifically on Europe's technological positioning. Those reports drafted alarming conclusions:

- Indicators show that Europe is currently losing the global innovation race, behind the US, but now China. EU industry invests less than its peers in R&D, it lags way behind in software and artificial intelligence, and its pharmaceutical component is at risk. The authors argue that Europe risks becoming trapped between the United States, which dominates frontier innovation and digital platforms; and China, which combines industrial scale, state-driven investment and rapid technological deployment.
- European business R&D is concentrated in mid-tech sectors, like the automotive industry. These sectors compete by applying the latest technological advances to production, but they do not require the same R&D intensity or offer the same growth potential as high-tech industries that produce the newest technologies.
- European specialisation in mid-tech, has persisted for more than two decades. It is named by economists the 'middle technology trap', that wouldn't be able to support growth in the upcoming years. The private R&D expenditure is substantially lower in Europe in many industrial sectors compared to the US,
- Existing EU programmes to foster innovation, including those under the heading of the European Innovation Council (EIC), are far from the gold standard

Despite those alarming signals, Fuest et al. (2024) identify several key European strengths that remain strategically important:

- Industrial depth and engineering excellence: Europe retains strong capabilities in advanced manufacturing, automotive systems, aerospace, robotics, energy systems, chemicals and industrial engineering.
- Research quality and scientific excellence: Europe remains one of the world's largest producers of high-quality scientific publications and advanced research infrastructures.
- Dense innovation ecosystems: Europe benefits from clusters linking universities, SMEs, industrial champions and public research organizations.
- Standards and regulation as strategic assets: European regulation can shape global technological norms ("Brussels effect"), particularly in sustainability, safety and responsible innovation.
- Human capital and technical skills: Europe possesses a strong engineering and technical education base.
- Europe developed some key industrial leadership such as aeronautics, defence, but also Green transition leadership on some specific fields (clean technologies, energy efficiency, circular economy solutions and climate-oriented innovation…).

Why Euro CASE could initiate such a debate ?

In this context, Euro-CASE could strengthen its influence and visibility by organizing a high-level strategic conference between scientists, industry and policy makers ahead of the launch of the next European Framework Programme (FP10) and/or in connection with the future European Competitiveness Fund currently under discussion, to come into force in January 2028.

The objective of the event would be to contribute to that sensitive, but strategic debate and formulate strategic recommendations for European institutions, scientific and industrial communities. The event could address Europe's technological competitiveness, future innovation policy priorities and Europe's positioning in emerging technological domains.

Here are some proposed topics that could be debated:

1. **Is "mid-tech" really a trap for Europe innovation and leadership?** What are the current strength & weaknesses in Europe around that question.
2. **How can Europe move more efficiently from scientific excellence to industrial scaling?**
3. **What are the specific advantages of the European innovation ecosystem compared to the United States and China that should be strengthened? (**engineering quality and industrial reliability, integration of sustainability and societal goals, regulatory credibility, long-term industrial ecosystems…)
4. **Where can Europe realistically take the lead?**

There are areas may include like advanced industrial systems; engineering-intensive industries, digital trust and regulation, critical raw materials and circular economy systems, etc.

5. **Which technological fields can Europe still credibly lead?**
   Aerospace; industrial automation and robotics; energy efficiency systems; green industry and decarbonization technologies; advanced and sustainable materials; engineering for resilience and sustainability;

What kind of event ?

Euro-CASE could organize a European conference-debate in 2027, strategically positioned ahead of the implementation of FP10 and/or in connection with discussions surrounding the future European Competitiveness Fund.

The event could bring together with Euro-CASE members representatives of the European Commission; Euro-CASE members; industrial leaders; research organizations; universities; research and innovation agencies; economists and strategic foresight experts.

The conference could lead to a Euro-CASE strategic position paper with recommendations addressed to the European Commission and Parliament.

Références

Draghi, M. (2024). *The Future of European Competitiveness—A Competitiveness Strategy for Europe*. https://commission.europa.eu/document/97e481fd-2dc3-412d-be4c-f152a8232961_en

Clemens Fuest & Daniel Gros & Philipp-Leo Mengel & Giorgio Presidente & Jean Tirole, 2024. "EU Innovation Policy: How to Escape the Middle Technology Trap," EconPol Policy Reports Report, ifo Institute - Leibniz Institute for Economic Research at the University of Munich. https://www.ifo.de/en/econpol/publications/2024/working-paper/eu-innovation-policy-how-escape-middle-technology-trap

Annex 4

Structural and Skills Gaps in Europe's Critical Raw Materials Ecosystem

Introduction

This note synthesises insights from two Euro-CASE technical workshops focused on Europe's critical raw materials (CRM) ecosystem. While the workshops addressed different aspects of the challenge - one examining system-level and policy considerations, and the other focusing on skills, education, and talent pipelines -common themes emerged across discussions.

The purpose of this note is to bring these insights together in a single, coherent view, highlighting areas of convergence and recurring challenges identified by participants. It is intended as a reflective summary of what was heard across the workshops, rather than a set of recommendations or policy positions.

Cross-cutting insights from the workshops

Insight 1: System capacity and skills capacity are tightly coupled
Across both workshops, participants consistently linked Europe's limited capability in processing, refining, and recycling critical raw materials with weaknesses in the skills pipeline supporting these activities. System-level gaps such as underinvestment in processing infrastructure and fragmented value chains were mirrored by skills-level challenges, including declining enrolments in relevant disciplines and limited hands-on training opportunities.
Discussions suggested that these dynamics reinforce one another: weak industrial capacity reduces demand and visibility for specialised skills, while constrained skills pipelines limit the ability to scale or modernise infrastructure.

Insight 2: Recycling is consistently under-integrated across policy, education, and practice
Recycling emerged as a shared concern in both workshops, but from different angles. At system level, participants noted that existing regulatory and eco-design frameworks give limited attention to end-of-life recovery, particularly for advanced materials such as semiconductors and ceramics. At skills level, recycling was described as peripheral within engineering education, with curricula and training pathways often siloed away from core mineral processing and materials engineering.
Several participants also observed a disconnect between growing student interest in the circular economy and perceptions of mineral processing and metallurgy. While younger cohorts are strongly motivated by sustainability and circularity agendas, mineral processing skills are often perceived as outmoded or associated with an industrial past, rather than recognised as central to enabling recycling, secondary feedstocks, and circular material flows.

This misalignment raises questions about Europe's preparedness to manage future material flows associated with emerging technologies.

Insight 3: Fragmentation characterises the CRM ecosystem
Fragmentation was a recurring theme across discussions. Participants highlighted weak integration between stages of the CRM value chain, disciplinary silos within universities, and reliance on short-term funding instruments that disrupt continuity in both research and teaching.

While many initiatives demonstrate local success, workshop discussions suggested that their cumulative impact is limited by a lack of coordination and sustained structures at system

level.

Insight 4: De-industrialisation affects both training capacity and career perception
Participants linked Europe's historical de-industrialisation in mining, metallurgy, and processing regions to current skills challenges. The decline of industrial sites was described as reducing opportunities for practical training and weakening the perceived relevance and attractiveness of CRM-related careers, particularly among younger cohorts. Awareness-raising efforts were seen as helpful but insufficient in isolation, especially where clear industrial pathways are absent.

Insight 5: Policy ambition and delivery mechanisms remain unevenly aligned
System-level discussions reflected broad alignment with EU ambitions on critical raw materials, including the need for greater resilience and circularity. However, participants also pointed to gaps between high-level policy objectives and the mechanisms available to implement them effectively, particularly where skills development, infrastructure, and regulation intersect.

This tension was evident across both workshops, suggesting a shared concern about how strategic intent translates into practice.

Conclusion

Taken together, the workshops point to a set of interlinked challenges shaping Europe's approach to critical raw materials. Participants highlighted the interdependence between system capacity and skills development, the persistent under-integration of recycling across policy, education, and practice, and the effects of fragmentation within value chains, institutions, and funding structures.
Discussions also reflected the longer-term impacts of de-industrialisation on both training capacity and the perceived attractiveness of CRM-related careers, alongside a shared recognition that policy ambition is not always matched by delivery mechanisms on the ground. While the workshops approached these issues from different entry points, the convergence of themes suggests that many of the challenges facing Europe's CRM ecosystem are structural and cross-cutting in nature.

This synthesis is offered as a consolidated record of these shared observations, providing a basis for further reflection and dialogue among stakeholders engaged in strengthening Europe's critical raw materials resilience.

Annex 5

Euro-CASE Seminar project on "Defence Industry in Europe"

1. Objective of the seminar:

Such a seminar would provide a valuable platform for sharing expertise and analyses on the current strategic, engineering, technological, and industrial challenges facing the European defence sector.

It would also foster dialogue between scientists, engineers, policymakers, and industry stakeholders, helping to align research priorities with Europe's security and autonomy objectives.

By encouraging cross-border cooperation and a better understanding of future trends, the seminar would strengthen the role of Euro-CASE academies as key contributors to informed decision-making and long-term planning in the European defence landscape.

Seminar will focus on education and research, engineering, technology and modern types of defence, including innovation in that field with specific/concrete cases and insights. The seminar will not cover the issues related to the organization of industry defence in Europe.

2. Outcome

The outcome of the seminar would be the preparation of detailed Minutes of the seminar and a Euro-CASE Position Paper drafted by 1 or 2 engineers under the supervision the moderators of the 3 sessions who could provide relevant points and recommendations of each session. These 2 documents will have to be approved by the Euro-CASE member academies and the organising committee.

The target audience for this position paper are policy makers and representatives from the industry and education sectors.

3. Tentative programme

9.00 – 9.30	Opening session (RAI, Euro-CASE)
9.30 – 11.15	First session: "*The role of education and research in the Defence Industry in Europe"*
11.15 – 11.30	Coffee break
11.30 – 13.15	Second session "*Engineering and technology in the Industry Defence in Europe*"
13.15 – 14.30	Break/informal lunch
14.30 – 16.15	Third session: "*Modern types of defence and time to operation technologies*"
16.15 – 16.45	Closing session

Each session will involve 3 to 4 speakers (15 minutes each). A significant time will be devoted to Q&A and discussion with the audience.

Euro-CASE Member academies will be invited to propose speakers.

4. Participants:

The number of participants is limited to 100:

- Representatives from all Euro-CASE member academies which are particularly interested in this topic
- Representatives from Industries concerned by the issue
- National and European Policy makers

The seminar will not be open to the public and will be strictly by invitation only. Remote access is being considered, but only by invitation and subject to strict access controls.

5. Foreseen Budget

Minutes + position paper secretary
Catering
Speakers' travel expenses will not be covered by RAI or Euro-CASE.
…

6. Organisation

The Real Academia de Engenieria, RAI (Madrid, Spain) should help in the organisation of the seminar to be organised preferentially in person in the premises of RAI in Madrid.

Tentative date: February 2027 (date to be determined by RAI)

21.05.2026

Annex 6

Euro-CASE
Academies of Engineering Sciences

Euro-CASE Survey on relationship between academies and Industry

1. General Information

- Name of the academy:
- Country:

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2. Membership Composition

What is the total number of members in your academy?

2.1. Distribution by Professional Background

- What proportion of your members come from academia versus industry?
- Please provide an approximate percentage breakdown of members from:
  - Academic institutions :
  - Industry/private sector :
  - Public sector or government :

2.2. Membership Fees

- Do members of your academy pay a membership fee?

If yes, What is the amount (or range)?

- What proportion of your academy's budget is covered by membership fees?

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3. Activities and Work Programme

3.1. Activities

- What are the main types of activities conducted by your academy (e.g., reports, advisory work, studies, events)?
- What are the main thematic areas currently addressed?

3.2. Origin of Work

- How are topics for your academy's work identified?
- What proportion of your work is:
  - Self-initiated
  - Requested by national ministries or government bodies
  - Requested by industry or private sector organizations

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4. Funding and Financial Resources

4.1. Industry Funding

- Does your academy receive funding from industry or private sector organizations?
- If yes:
  - What forms does this funding take (e.g., sponsorship, project-based funding, donations)?
  - What activities or missions does it support?
- What proportion of your total funding comes from industry?
- Are there any conditions attached to this funding?

4.2. Governance and Transparency

- Are there formal agreements governing industry funding?
- How is transparency ensured?
- What measures are in place to safeguard independence and integrity?

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5. Interactions with Industry

- What types of interactions does your academy have with industry?
- Do you collaborate with industry on:
  - Research or studies
  - Policy advice
  - Innovation initiatives
  - Organisation of seminars and workshops on topics related to industry
- What are the main benefits and challenges of these interactions?
- What kind of arrangements does your academy have with industry (e.g. MoU)?

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6. Additional Comments

- Please provide any additional information you consider relevant regarding your academy's structure, activities, or partnerships.

16.04.2026

Annex 7

General survey

Fields marked with * are mandatory.

1 Respondent background information

Before responding to the survey, please read the following documents (see links in the sidebar):

1. **Guidance Document**
2. **Use Mapping**
3. **Privacy Statement**

Your text here 1

- I have read and understood the information in the **Guidance Document** and **Use Mapping**.
- I agree to the privacy policy as set out in the **Privacy Statement**.

* 1.1 **[Q2.0]** Select the EU language in which you will respond to the questions (the questions themselves will be in English only).

English

* 1.2 **[Q2.1]** Which of the following best describes you or your affiliation?

Select Citizen/individual if you are responding in a personal capacity.

Select Organisation if you represent an organisation (e.g. company) or other official role.

- Citizen/Individual
- Organisation

* 1.3 **[Q2.2]** What type of organisation are you responding for?

- ○ Government organisation
- ◉ Non-governmental organisation
- ○ Academic institution
- ○ Industry association
- ○ Company

* 1.4 **[Q2.3]** What is the name of the organisation you are reporting for?

Text of 1 to 300 characters will be accepted

Euro-CASE

* 1.5 **[Q2.4]** Please name a point of contact ECHA can contact if needed.

Text of 1 to 100 characters will be accepted

A point of contact is needed for seeking clarification or justification for the consultation responses if considered necessary by SEAC.

For individual respondents, the contact's name is always kept confidential.

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Patrick MAESTRO

* 1.6 **[Q2.5]** What is the email address for that contact point?

mail@euro-case.org

1.7 **[Q2.6]** If you submitted comments in the previous consultation on the Annex XV restriction proposal (Mar-Sep 2023), please list the comment numbers (e.g. #1234, #5678).

300 character(s) maximum

* 1.8 **[Q2.7]** Is your organisation national or international?

Organisations having activities in several countries (in EEA or globally) should choose "international".

- ○ National
- ◉ International

* 1.9 **[Q2.8]** What country are you (or your organisation) based in?

Individuals should choose the country where they permanently reside.

Respondents representing organisations, such as companies, should select the country where the largest share of their PFAS related activities occur.

Respondents representing other organisations may choose the country where the organisation is based in.

France (FR)

2 General survey questions

Instructions

Please do not include links to particular websites or source literature in the response fields. For security reasons, links to external sources will not be opened.
If you wish to cite a third-party source (e.g. research paper), you can reference it in the response field. This allows SEAC to note the source and request it from you if necessary.

For more information, please see the Guidance document.

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* 2.1 **[Q2.17]** Choose all sectors that are relevant or covered by your responses in this general survey.

Minimum 1 selection(s)

Select the sector(s) for which you will provide information. You can choose PFAS manufacturing and 22 sectors (14 sectors covered by SEAC sector-specific evaluation and additional eight sectors identified in the Background Document).

You can select as many sectors as you see fit. Information provided will apply to all selected sectors unless you specify otherwise in your answers. If you prefer to do it so, you can submit one survey for each specific sector of use your answers apply to.

If your use is not covered by any of the identified sectors, choose “other” and specify it in the next question.

- [x] **[01] PFAS manufacturing**
- [x] **[02] Textiles, upholstery, leather, apparel and carpets (TULAC)**
- [x] **[03] Food contact materials (FCM) and packaging**
- [x] **[04] Metal plating and manufacture of metal products**
- [x] **[05] Consumer mixtures and miscellaneous consumer articles**
- [x] **[06] Cosmetics**
- [x] **[07] Ski wax**
- [x] **[08] Applications of fluorinated gases**
- [x] **[09] Medical devices**
- [x] **[10] Transport**
- [x] **[11] Electronics and semiconductors**

- [x] **[12] Energy**
- [x] **[13] Construction products**
- [x] **[14] Lubricants**
- [x] **[15] Petroleum and mining**
- [x] ***[16] Printing applications***
- [x] ***[17] Sealing applications***
- [x] ***[18] Machinery applications***
- [x] ***[19] Other medical applications***
- [x] ***[20] Military applications***
- [x] ***[21] Explosives***
- [x] ***[22] Technical Textiles***
- [x] ***[23] Broader industrial uses***
- [x] **[24] Other sector**

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* 2.2 **[Q2.18]** Please provide a general description of the use(s) of PFAS (or alternatives) you are providing comments on

Text of 1 to 2000 characters will be accepted

Briefly describe the use(s) of PFAS (or alternatives) in this sector(s).

The comments provided focus primarily on fluoropolymers with a fluorinated backbone, which are used in a range of critical applications requiring high chemical resistance, thermal stability and durability. Examples include applications in medical devices, semiconductor manufacturing, sealing elements for cars and aircrafts engines, energy systems (lithium batteries, green hydrogen devices) and high-performance industrial equipment.

These materials act as enabling components in applications where performance and reliability are essential. Based on available evidence, fluoropolymers do not exhibit degradation under environmental conditions leading to the formation of low molecular weight PFAS.

This distinguishes them from non-fluorinated polymers with fluorinated side chains, which may release fluorinated fragments under environmental conditions, particularly at end-of-life.

This distinction is relevant when considering lifecycle emissions and the potential contribution to environmental accumulation.

An effective PFAS restriction requires both a scientifically sound framework and an operationally feasible implementation approach.

Integrating a chemistry-based screening step with SEAC's lifecycle assessment would improve consistency, scalability and robustness, while maintaining the objectives of reducing emissions and protecting human health and the environment.

2.3 **[Q2.19]** Please provide your comments on section 1.2. SEAC opinion

Text of 1 to 5000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

SEAC's conclusion that a broad restriction under REACH is an appropriate risk management option for PFAS as a group is acknowledged, particularly in light of the persistence-driven concern and the need to prevent regrettable substitution.

At the same time, the implementation of such a broad approach requires an efficient and consistent method to assess a large number of substances and uses.

A chemistry-based pre-screening step could support this objective by grouping PFAS into families with similar environmental behavior. This would not replace the group approach but would help operationalize it by enabling prioritization of assessment efforts.

Such an approach could improve the socio-economic evaluation by focusing detailed analysis on those substances and uses that contribute most significantly to emissions and environmental accumulation.

2.4 **[Q2.20]** Please provide your comments on section 2.2. Summary of the opinion and 2.2.2. SEAC opinion summary

Text of 1 to 5000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

The comments provided focus primarily on fluoropolymers with a fluorinated backbone, which are used in a range of critical applications requiring high chemical resistance, thermal stability and durability. Examples include applications in medical devices, semiconductor manufacturing, sealing elements for cars and aircrafts engines, energy systems (lithium batteries, green hydrogen devices) and high-performance industrial equipment.

These materials act as enabling components in applications where performance and reliability are essential. Based on available evidence, fluoropolymers do not exhibit degradation under environmental conditions leading to the formation of low molecular weight PFAS.

This distinguishes them from non-fluorinated polymers with fluorinated side chains, which may release fluorinated fragments under environmental conditions, particularly at end-of-life.

This distinction is relevant when considering lifecycle emissions and the potential contribution to environmental accumulation.

2.5 **[Q2.21]** Please provide your comments on section 3.2. Justification that action is required on a Union-wide level

Text of 1 to 5000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

2.6 **[Q2.22]** Please provide your comments on section 3.3.1 Availability and technical and economic feasibility of alternatives

Text of 1 to 5000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

The availability and feasibility of alternatives vary significantly across PFAS uses.

In some applications, particularly those requiring high chemical resistance, thermal stability or durability, alternatives may not yet provide equivalent performance.

In this context, it is important to distinguish between different categories of PFAS based on their functional role and emission profile.

For example, fluoropolymers with a fluorinated backbone are typically used in applications where performance requirements are critical and where alternatives may not be technically feasible at present.
A differentiated assessment could support identification of uses where substitution is currently not achievable and where transitional measures or derogations may be necessary.

2.7 **[Q2.23]** Please provide your comments on section 3.4.1. Regulatory risk management options other than restriction

Text of 1 to 5000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

The effectiveness of the proposed restriction depends on the ability to consistently identify and prioritise sources of emissions.

Given the diversity of PFAS, a purely case-by-case evaluation may not ensure consistent identification of priority substances or uses.

A structured grouping based on chemical structure and related behavior (e.g. degradation pathways or emission profiles) could improve effectiveness by enabling prioritization and more consistent application of the restriction.

2.8 **[Q2.24]** Please provide your comments on section 3.4.2.2.1. Socio-economic analysis: Approach

Text of 1 to 5000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

The approach applied by SEAC, based on lifecycle emissions and socio-economic assessment, is scientifically appropriate. However, its implementation appears challenging given the very large number of PFAS and the limited availability of robust, coherent data across sectors.
A purely case-by-case assessment of uses and substances is likely to result in significant analytical burden, inconsistencies across sectors and delays in decision-making.

To address this, a two-tier framework could improve the robustness and efficiency of the assessment:

(i) a preliminary grouping of PFAS based on structural and mechanistic similarities relevant for emissions and degradation behavior;

(ii) a subsequent SEAC evaluation based on lifecycle emissions, substitution feasibility and socio-economic impacts.
The use of chemical structure as a first-level screening criterion is consistent with established regulatory approaches, where structural similarity is used to infer behavior and reduce data requirements. Integrating such a screening step would support SEAC evaluation by reducing complexity and enabling a more targeted and efficient process.

2.9 **[Q2.25]** Please provide your comments on section 3.4.2.2.2. Socio-economic analysis: Costs

Text of 1 to 5000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

2.10 **[Q2.26]** Please provide your comments on section 3.4.2.2.3. Socio-economic analysis: Benefits

Text of 1 to 5000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

The assessment of benefits could be further complemented by considering the contribution of PFAS to product durability and performance in certain applications.

PFAS-based materials may enable longer service life, resistance to extreme conditions and reduced failure rates. These characteristics can support resource efficiency and reduce the need for frequent replacement. Where such benefits are present, they should be assessed alongside potential emissions, taking into account whether appropriate waste management and end-of-life measures are in place to minimise environmental releases.

2.11 **[Q2.27]** Please provide your comments on section 3.4.2.2.4. Socio-economic analysis: Other relevant impacts

Text of 1 to 5000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

In addition to the impacts already considered, it is important to recognise the role of PFAS in enabling material durability and performance, which can support circular economy objectives.

In certain applications, the persistence and stability of PFAS contribute to extended product lifetimes and improved performance under demanding conditions.

These characteristics can support reuse and recycling processes, provided that end-of-life stages are appropriately managed.

A key consideration is therefore not only the presence of PFAS in materials, but how waste streams are handled. With appropriate end-of-life management, including controlled collection, separation and treatment, it may be possible to limit emissions while preserving functional benefits.

2.12 **[Q2.28]** Please provide your comments on section 3.4.2.2.5 Socio-economic analysis: Proportionality

Text of 1 to 5000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

The assessment of proportionality requires consistent comparison of costs and benefits across a wide range of uses and sectors. In the absence of a structured prioritization mechanism, proportionality assessments may be influenced by uneven data availability and differences in sector-specific information.
A grouping-based pre-classification of PFAS could support a more consistent proportionality assessment by enabling prioritization of evaluation efforts and ensuring that similar substances are assessed under comparable assumptions.
This would be particularly relevant for identifying uses where derogations may be justified due to lack of alternatives or high socio-economic impacts.

2.13 **[Q2.29]** Please provide your comments on section 3.4.2.3. Practicality, including enforceability

Text of 1 to 5000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

The practicality and enforceability of the proposed restriction depend on the ability to consistently assess a large number of PFAS uses across multiple sectors.

The current approach, which relies on detailed case-by-case evaluation, may present challenges in terms of scalability and implementation, particularly where data are limited or heterogeneous.

Introducing a structured grouping of PFAS based on relevant chemical and functional characteristics could facilitate implementation by:

- reducing complexity;
- improving consistency across sectors;
- supporting enforcement activities.

In addition, the use of chemical structure as a basis for grouping provides a practical and scientifically grounded means to reduce the complexity of the assessment. Structural similarities are often linked to similarities in environmental behavior, including persistence, degradation pathways and emission potential.
Using such relationships to pre-classify PFAS into homogeneous groups[HM1.1] could significantly reduce the need for molecule-by-molecule and application-by-application assessment.

The proposed Tier 1 pre-classification of PFAS based on chemical structure represents a practical and powerful simplification tool that could significantly improve scalability and consistency of the assessment. At the same time, such an approach may create potential loopholes if classification criteria are not regularly reviewed and updated.

Classification criteria should therefore be actively and periodically reassessed in light of emerging scientific evidence. The current data basis available to support such criteria is generally recognized as limited, particularly regarding long-term effects, combined exposures and multiple-agent toxicity. Strengthening the scientific basis through coordinated large-scale research initiatives, including representative European cohort studies, would support the robustness and long-term reliability of any grouping-based approach.

2.14 **[Q2.30]** Please provide your comments on section 3.4.2.4. Monitorability

Text of 1 to 5000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

SEAC highlights important challenges related to data availability and monitoring of PFAS emissions across sectors. These challenges are likely to be amplified by the large number of substances and uses covered by the restriction.

A chemistry-based grouping of PFAS could help improve monitorability by reducing complexity and enabling a more structured approach to data collection and interpretation.

Grouping substances with similar environmental behavior would facilitate the use of representative indicators, support read-across and allow monitoring efforts to focus on key substance groups rather than individual substances.

This could contribute to addressing data gaps in a systematic way and improve the overall robustness and consistency of monitoring and compliance activities.

2.15 **[Q2.31]** Please provide your comments on section 3.4.3.2.1. Conclusion whether the suggested restriction is the most appropriate EU-wide measure: (i) PFAS definition

Text of 1 to 1000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

The assessment of proportionality requires consistent comparison of costs and benefits across a wide range of uses and sectors. In the absence of a structured prioritization mechanism, proportionality assessments may be influenced by uneven data availability and differences in sector-specific information.

A grouping-based pre-classification of PFAS could support a more consistent proportionality assessment by enabling prioritization of evaluation efforts and ensuring that similar substances are assessed under comparable assumptions.

This would be particularly relevant for identifying uses where derogations may be justified due to lack of alternatives or high socio-economic impacts.

2.16 **[Q2.32]** Please provide your comments on section 3.4.3.2.1 Conclusion whether the suggested restriction is the most appropriate EU-wide measure: (ii) Exclusion of PFAS from the scope

Text of 1 to 1000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

The current case-by-case evaluation of PFAS uses is difficult to scale and apply consistently, especially when data are scarce. Grouping PFAS by chemical and functional characteristics could simplify assessments, improve coherence across sectors, and support enforcement. Structural grouping is scientifically justified, as similar structures often imply similar environmental behavior.

A Tier 1 pre-classification would reduce the need for molecule-by-molecule analysis. Classification criteria should therefore be actively and periodically reassessed in light of emerging scientific evidence. Given limited data on long-term and combined effects, large-scale coordinated research, including European cohort studies, is essential to strengthen the scientific basis of this approach.

Classification criteria should therefore be actively and periodically reassessed in light of emerging scientific evidence.

2.17 **[Q2.33]** Please provide your comments on section 3.4.3.2.2 Conclusion whether the suggested restriction is the most appropriate EU-wide measure: Scope of the proposed restriction

Text of 1 to 1000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

SEAC highlights important challenges related to data availability and monitoring of PFAS emissions across sectors. These challenges are likely to be amplified by the large number of substances and uses covered by the restriction.

A chemistry-based grouping of PFAS could help improve monitorability by reducing complexity and enabling a more structured approach to data collection and interpretation.
Grouping substances with similar environmental behavior would facilitate the use of representative indicators, support read-across and allow monitoring efforts to focus on key substance groups rather than individual substances.

This could contribute to addressing data gaps in a systematic way and improve the overall robustness and consistency of monitoring and compliance activities.

2.18 **[Q2.34]** Please provide your comments on section 3.4.3.2.3. Conclusion whether the suggested restriction is the most appropriate EU-wide measure: Concentration limits

Text of 1 to 1000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

2.19 **[Q2.35]** Please provide your comments on section 3.4.3.2.4. Conclusion whether the suggested restriction is the most appropriate EU-wide measure: General 18-month transition period

Text of 1 to 1000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

2.20 **[Q2.36]** Please provide your comments on section 3.4.3.2.5. Conclusion whether the suggested restriction is the most appropriate EU-wide measure: Derogations

Text of 1 to 5000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

2.21 **[Q2.37]** Please provide your comments on section 3.4.3.2.6.1. Conclusion whether the suggested restriction is the most appropriate EU-wide measure: Reporting requirements

Text of 1 to 1000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

2.22 **[Q2.38]** Please give an indication of the costs related to the reporting requirements.

Consult the SEAC draft opinion section 3.4.3.2.6.1. Conclusion whether the suggested restriction is the most appropriate EU-wide measure: Reporting requirements.

Provide an estimate of the magnitude of the costs for the implementation of the reporting requirements, from very low when the impacts are estimated to be insignificant to very high when they may result in a decision to discontinue your business activities.

- Very low or none
- Low
- Moderate
- High
- Very high
- I do not know

2.23 **[Q2.39]** Please provide your comments on section 3.4.3.2.6.2. Conclusion whether the suggested restriction is the most appropriate EU-wide measure: Site-specific PFAS management plan

Text of 1 to 1000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

2.24 **[Q2.40]** Please give an indication of the costs related to the implementation of a site-specific PFAS management plan

Consult the SEAC draft opinion, section 3.4.3.2.6.2. Conclusion whether the suggested restriction is the most appropriate EU-wide measure: Site-specific PFAS management plan.

Provide an estimate of the costs for monitoring of emissions at industrial sites. Use the scale from very low (minimal impact) to very high (may result in a decision to discontinue business activities).

- Very low or none
- Low
- Moderate
- High
- Very high
- I do not know

2.25 **[Q2.41]** Please give an indication of the costs related to monitoring of PFAS emissions at industrial sites

Consult the SEAC draft opinion, section 3.4.3.2.6.2. Conclusion whether the suggested restriction is the most appropriate EU-wide measure: Site-specific PFAS management plan.

Provide an estimate of the costs for monitoring of emissions at industrial sites. Use the scale from very low (minimal impact) to very high (may result in a decision to discontinue business activities).

- Very low or none

- Low
- Moderate
- High
- Very high
- I do not know

2.26 **[Q2.42]** Please provide your comments on section 3.4.3.2.6.3. Conclusion whether the suggested restriction is the most appropriate EU-wide measure: Additional conditions considered by RAC

Text of 1 to 1000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

2.27 **[Q2.43]** Please give an indication of the costs related to the additional conditions considered by RAC

Consult the SEAC draft opinion, section 3.4.3.2.6.3. Conclusion whether the suggested restriction is the most appropriate EU-wide measure: Additional conditions considered by RAC.

Provide an estimate of the costs for implementing these conditions. Use the scale from very low (minimal impact) to very high (may result in a decision to discontinue business activities).

- Very low or none
- Low
- Moderate
- High
- Very high
- I do not know

2.28 **[Q2.44]** Please provide your comments on section 3.4.3.2.7. Conclusion whether the suggested restriction is the most appropriate EU-wide measure: Interaction with other relevant legislation

Text of 1 to 1000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

2.29 **[Q2.45]** Please provide your comments on section 3.5.2. Uncertainties evaluated by SEAC

Text of 1 to 5000 characters will be accepted

Consult the SEAC draft opinion and provide your comments relevant to this specific section of the opinion.

Significant uncertainties exist regarding data availability, emission estimates and socio-economic impacts. A structured grouping approach could help manage these uncertainties by enabling read-across between similar substances and focusing data collection efforts on representative cases.

The relationship between chemical structure, environmental [L2.1]behavior and health outcomes (when available) can be used to reduce uncertainty in a systematic way, rather than relying on isolated data points.

A chemistry-based grouping approach can significantly improve scalability and consistency of the assessment, but its robustness depends on the continuous reassessment of classification criteria as scientific knowledge evolves.

Current data on long-term effects, combined exposures and multiple-agent toxicity remain limited for many PFAS. Strengthening the scientific evidence base through coordinated European research initiatives and representative cohort studies would improve the reliability of future grouping and prioritization approaches.

3 Confidentiality and submission

3.1 **[Q2.46]** Indicate each section for which your response contains confidential information.

Select all the questions for which you consider your responses confidential. The options below include all questions in the survey.

- ☐ Respondent background information
- ☐ General survey questions

Useful links

Guidance Document (https://echa.europa.eu/documents/10162/17091/upfas-seac-do_consultation_guidance-for-respondents_en.pdf/68d5b13b-d7d6-f14b-2c3e-9b3c07c98113?t=1765956675386)

Use Mapping (https://echa.europa.eu/documents/10162/17091/pfas_use-mapping_annex_to_guidance_for_respondents_en.pdf/e242dcf0-0aab-2619-234e-09445bb181c5?t=1765893415372)

Background Documents

Privacy Statement

Contact

https://comments.echa.europa.eu/comments_cms/Contact_REACH.aspx