

WORKSHOP: TOWARDS A FOSSIL-FREE PROCESS INDUSTRY

Findings and recommendations

CONTENTS

Introduction: Towards a fossil-free process industry	3
Workshop: Workshop outline and data	4
Findings: Summary of the action proposals	6
Findings: National opportunities for action	8
Findings: Impact assessment of national action proposals	10
Summary: Recommendations for implementation pathways	12



Contacts:

Jenna Ruokonen, M.Sc. (Tech.), Project Researcher, LUT University
jenna.ruokonen@lut.fi

Eeva Lähdesmäki, M.Sc. (Econ. & Bus. Adm.), M.Sc. (Tech), Project Researcher, LUT University
eeva.lahdesmaki@lut.fi

TOWARDS A FOSSIL-FREE PROCESS INDUSTRY

The transition of the process industry towards fossil-free production is one of the most important strategic issues for Finland's competitiveness, security of supply, and sustainable economic growth. The Towards a Fossil-Free Process Industry workshop was held on 17 March 2026 at the European Hall of the European Commission Representation in Finland in Helsinki. The workshop brought together industry experts to discuss key solutions and strategic choices for enabling a fossil-free process industry. Participants identified concrete actions to accelerate the transition from the perspectives of feedstocks, technologies, and economic and policy instruments. This report presents the workshop's key findings and the resulting recommendations for different stakeholder groups.

The analysis shows that the proposed actions focus on five key areas: policy and market development, investment risk management, technology deployment, value chain development, and enhanced collaboration among stakeholders. The findings indicate that the conditions for transforming the process industry depend largely on decisions and actions taken in Finland. The majority of the identified measures can be implemented at the national level without requiring EU-level decisions.

According to the proposed actions, the renewal of the process industry requires a predictable operating environment, long-term policy commitment, and close cooperation between the public and private sectors. For companies, the transition to fossil-free production will require active investment, greater utilisation of digital technologies, and closer collaboration across industries and organisational boundaries. The public sector can create favourable conditions for change through policies that support investment, strengthen RDI activities, and promote the utilisation of biogenic carbon dioxide. In addition, the development of electricity and carbon dioxide infrastructure will play a critical role in industrial electrification and the establishment of fossil-free carbon cycles.

The impact assessment indicates that many of the proposed measures are both highly feasible and capable of delivering significant benefits. The findings suggest that Finland has the capability to accelerate the fossil-free transition of its process industry through national cooperation, long-term policymaking, and strategic investments. Achieving this will require close collaboration among industry, public authorities, research organisations, and cross-sectoral ecosystems.





WORKSHOP: WORKSHOP OUTLINE AND DATA

WORKSHOP OUTLINE AND DATA

The workshop focused on three main themes: **raw materials**, **technologies**, and **economic and political factors**, which were further specified through selected topics. The workshop themes and topics were developed based on a pre-workshop survey to ensure that the content addressed the issues and themes considered most important by the participants. In addition, each theme incorporated a perspective on strengthening **cross-sectoral collaboration**.

Participants were divided into three heterogeneous groups, which worked in turn on two different themes. During the group sessions, participants developed **action proposals** to **address the challenges** associated with the workshop topics or to **mitigate their impacts**. The participants presented their proposals and discussed their key elements within the groups. The group facilitators guided the discussions and documented the participants' contributions.

The material collected during the workshop consisted of the action proposals produced by the participants, as well as supplementary notes taken by the facilitators. The material was **anonymised** to ensure that individual participants or organisations could not be identified.

RAW MATERIALS	TECHNOLOGIES
• Strengthening the availability of bio-based and recycled raw materials • Strengthening cooperation in raw material supply	• Improving the maturity of new technologies • Technological solutions to accelerate the renewal of the process industry • Strengthening cooperation in technology development and scaling
ECONOMIC AND POLITICAL FACTORS	
• Improving the revenue logic for renewable products • Reducing demand uncertainty for renewable products • Strengthening national and EU-level policy guidance to support industrial investments • Strengthening cooperation to address economic and political challenges	





FINDINGS: SUMMARY OF THE ACTION PROPOSALS

SUMMARY OF THE ACTION PROPOSALS

The workshop data was analysed thematically. The action proposals were grouped into five main themes, in descending order of prevalence: 1. **policy and markets**, 2. **investment and risk**, 3. **technological solutions**, 4. **value chains and resources**, and 5. **collaboration and ecosystems** (Fig. 1).

The proposed actions targeted different sectors, decision-making levels, and time horizons (Fig. 2). **Value chain** development was the **most prominent** theme, including measures to strengthen **collaboration**, launch public-private **initiatives** spanning entire value chains, and improve **risk-sharing** and **governance**. The **availability, continuity**, and funding **conditions** of public **RDI funding** were identified as key enablers of the renewal of the process industry and the transition away from fossil fuels and fossil-based feedstocks.

Electricity is a prerequisite for everything, and its supply must be secured.

Policy and regulatory issues also attracted a large number of action proposals. For example, participants emphasised the importance of maintaining the European Union Emissions Trading System (EU ETS) and **carbon pricing**, as these measures increase the **predictability** of the regulatory environment affecting industry. In addition, measures to support the business environment were proposed, including **tax reforms**, the removal of **regulatory barriers**, and the creation of **demand** for renewable products through regulatory obligations and mandates.

Technology-related solutions included the adoption and utilisation of digital technologies such as **digitalisation**, **artificial intelligence**, and **digital twins**, as well as the **research, development**, and **testing** of new technologies in pilot and demonstration facilities. **Industrial clusters** were also viewed as a means of promoting technology uptake, leveraging industrial synergies, and strengthening collaboration within value chains.

The development of **electrical grid** and **carbon dioxide infrastructure** was identified as an important prerequisite for industrial electrification and the utilisation of biogenic carbon dioxide.

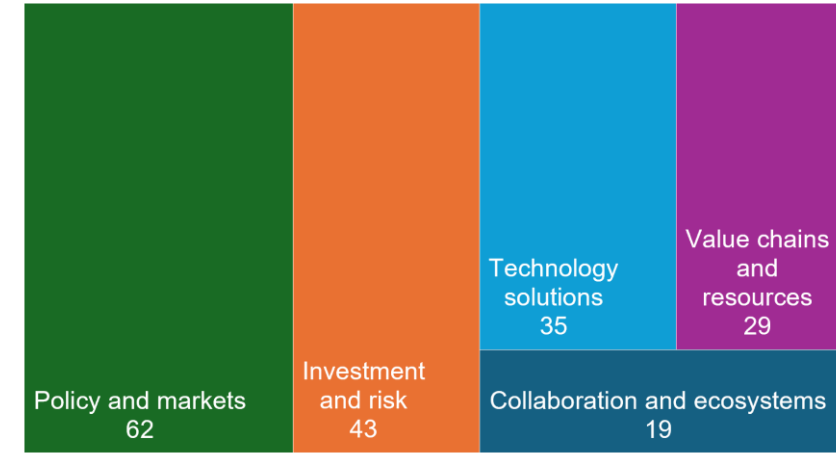


Figure 1. Classification of action proposals into high-level themes (n=188).



Figure 2. The most frequently occurring, harmonised action proposals (n=164).

A close-up photograph of green leaves with several large, clear water droplets resting on their surfaces. The background is blurred, showing more green foliage.

FINDINGS: NATIONAL OPPORTUNITIES FOR ACTIONS

NATIONAL OPPORTUNITIES FOR ACTIONS

Participants' action proposals were classified according to the level of decision-making required for their implementation, distinguishing between **national-level** and **EU-level measures** (Fig. 3). A small number of actions, such as trade agreements, blending mandates, and production subsidies, could be implemented at either the national or EU level.

Actions requiring **EU-level** decision-making were primarily associated with the theme of policy and markets. These proposals included the development of **mandates** to strengthen demand for renewable products, the creation of **incentives** for producers, and the provision of a **stable** and **predictable** regulatory framework. Despite the large number of proposals related to this theme, only **16%** of the identified actions would require changes at the EU level.

In contrast, **78%** of the proposed actions could be implemented nationally in **Finland**. Proposals related to **technologies** and **value chains** could be implemented **entirely** at the national level. Furthermore, actions aimed at strengthening **collaboration**, **ecosystems**, and **investments** could **largely** be initiated using domestic resources.

Most national-level actions could be undertaken by Finnish **industry** and **the public sector** (Fig. 4). **Industry** could promote the **adoption** of new technologies, strengthen cross-sector **collaboration**, and improve the recovery and **utilisation** of waste and side streams. **The public sector**, in turn, could support industry by increasing **RDI funding**, developing **support mechanisms** and **state guarantees**, and favouring renewable products in **public procurement**. **Ecosystems** could play a key role in developing shared **infrastructure**, particularly where projects are too large for individual actors to coordinate or finance independently. **Academia** would likewise have an important role in education, research, the **dissemination of evidence-based knowledge** to stakeholders, and the **promotion of collaboration** between the public and private sectors.

The findings suggest that Finland has **significant opportunities to accelerate the renewal of the process industry** through national action. Alongside EU-level policy reforms, such as the further development of emissions trading and the introduction of new mandates, Finland can **proactively** drive industrial transformation through its own initiatives rather than merely responding to EU regulation.

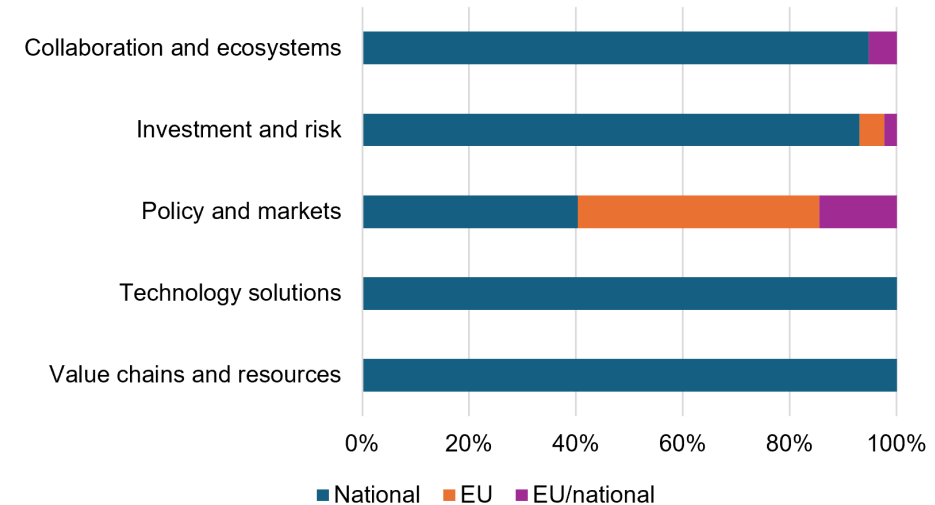


Figure 3. Classification of proposed measures by theme and the level of decision-making (n=188).

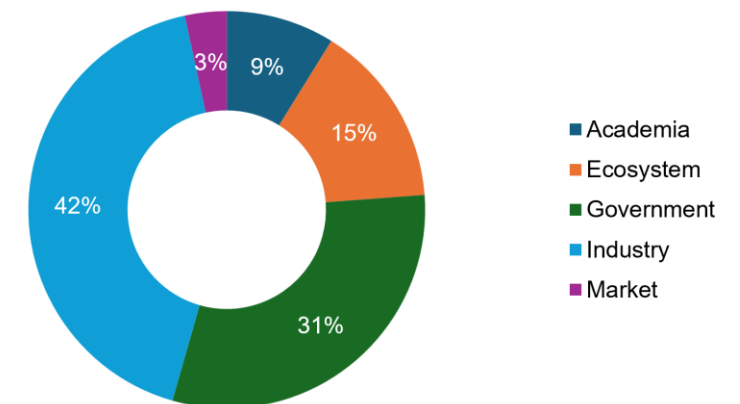


Figure 4. Sectors best positioned to initiate or coordinate the implementation of national measures (n=147).

FINDINGS: IMPACT ASSESSMENT OF NATIONAL ACTION PROPOSALS

IMPACT ASSESSMENT OF NATIONAL ACTION PROPOSALS

The **impact** and **feasibility** of the national action proposals were assessed through an impact analysis. Impact was evaluated against three criteria: reducing **dependence** on fossil fuels and raw materials, enhancing industrial **competitiveness**, and enabling **systemic transformation**. Implementation challenges were assessed from **economic**, **political**, and **coordination** perspectives. Based on their overall scores, the measures were positioned within a matrix of impact and feasibility (Fig. 5).

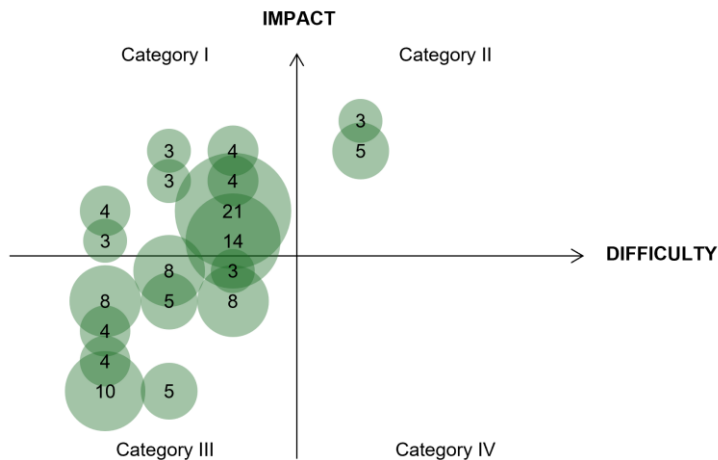


Figure 5. Impact and implementation difficulty of the most frequently occurring national action proposals (n=119).

The analysis showed that **93%** of the proposed measures could be implemented **easily** or with **moderate** effort, while their **overall benefits** ranged from **limited** to **substantial**. Due to their relative ease of implementation, measures in **Categories I** and **III** should be **prioritised** in public and private sector decision-making. Measures in **Category II** should also be incorporated into Finland's **industrial transformation strategy**.

Category I includes measures such as increasing public **awareness** and support, improving value chain development and **governance**, negotiating long-term **offtake agreements**, and establishing **industrial clusters**. Category III includes actions such as advancing industrial **digitalisation**, strengthening **doctoral education**, supporting **research projects** on value chains and emerging technologies, and emphasising **security of supply** considerations in public procurement and policy discussions. The long-term measures in Category II primarily focus on the cross-sectoral development of Finland's **electricity** and **carbon dioxide infrastructure**.

Goals and ambition.



Category I: Low difficulty and high impact
→ Strategic priorities

Category II: High difficulty and high impact
→ Beneficial long-term measures

Category III: Low difficulty and low impact
→ Low-hanging fruits

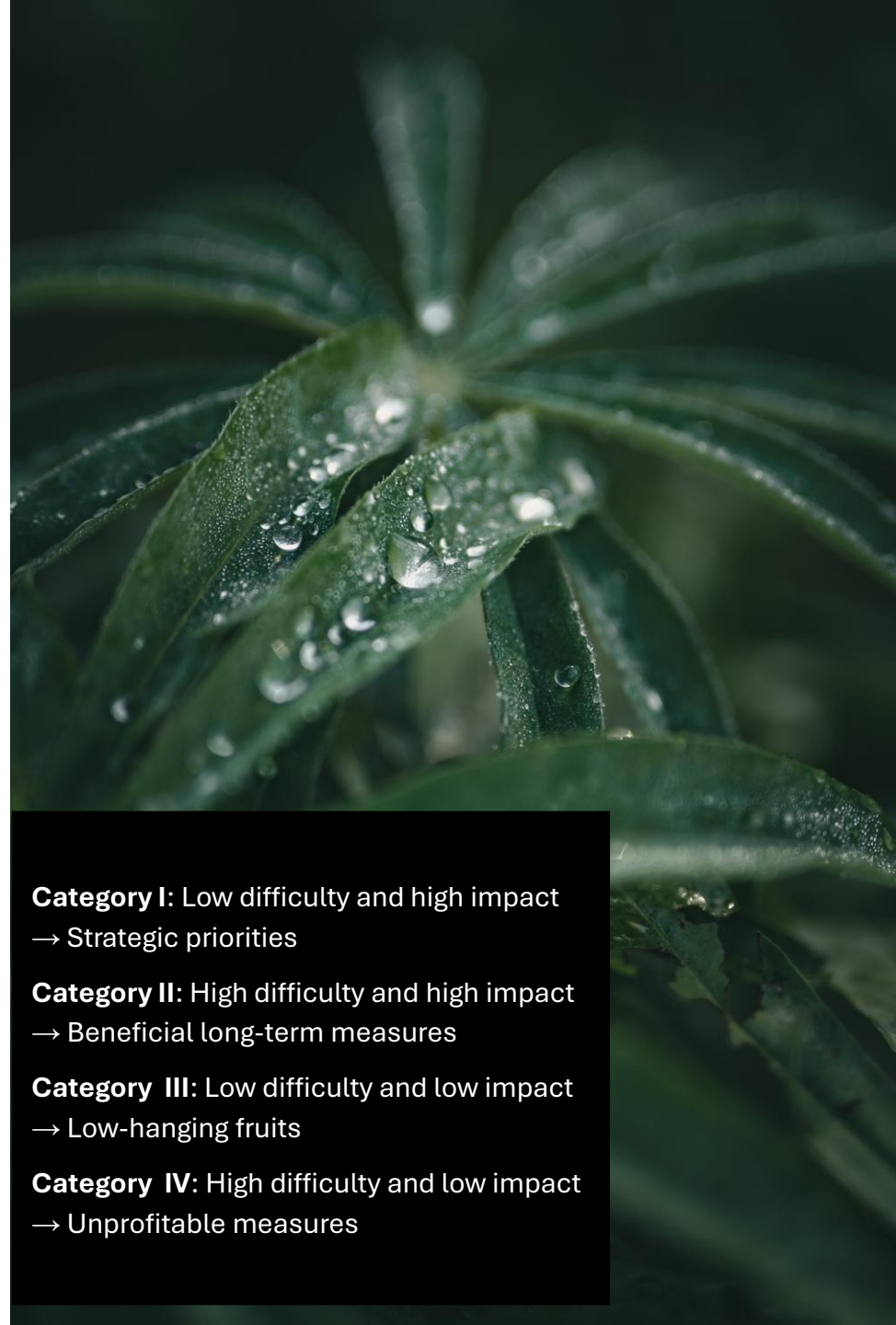
Category IV: High difficulty and low impact
→ Unprofitable measures

SUMMARY: RECOMMENDATIONS FOR IMPLEMENTATION PATHWAYS

RECOMMENDATIONS FOR IMPLEMENTATION PATHWAYS

The analysis of the workshop action proposals indicates that Finland has strong capabilities to support the transformation of its process industry. Enhancing the international competitiveness of Finnish industry will require coordinated and proactive efforts, in which public authorities, research organisations, and collaborative networks play a key role in supporting industrial actors and facilitating industrial renewal.

INDUSTRY	GOVERNMENT	ACADEMIA
Category I - More efficient utilisation of side streams and the development of industrial symbioses - Promotion of the deployment and scale-up of technologies utilising renewable feedstocks Category III - Wider adoption of digital solutions - Electrification of heat production currently based on combustion	Category I - Stronger public RDI funding support for joint projects, industrial investments, and the commercialisation of innovations - Strategic and consistent policymaking to achieve long-term objectives Category III - Creation of favourable national conditions for carbon dioxide utilisation	Category I - Effective dissemination of research-based knowledge to the public and private sectors, as well as the wider public Category III - Support for the research and development needs of industry
ECOSYSTEMS		
Category II - Development of electricity and carbon dioxide infrastructure under the leadership of transmission system operators Category III - Cross-sectoral joint initiatives to strengthen collaboration and value chains		



Category I: Low difficulty and high impact
→ Strategic priorities

Category II: High difficulty and high impact
→ Beneficial long-term measures

Category III: Low difficulty and low impact
→ Low-hanging fruits

Category IV: High difficulty and low impact
→ Unprofitable measures

