

European
Commission

2023 Annual progress report Transition Pathway for the Chemical Industry



EUROPEAN COMMISSION

Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs
Directorate F - Ecosystems I: Chemicals, Food, Retail
Unit F.2 - Bioeconomy, Chemicals and Cosmetics

Contact: Algreit Dume

E-mail: GROW-CHEMTP @ec.europa.eu

*European Commission
B-1049 Brussels*

Manuscript completed in May 2024

First edition

LEGAL NOTICE

This document is intended purely as a guidance document. Neither the European Commission nor any person acting on behalf of the Commission is liable for any consequence stemming from the use or reuse of this publication. More information on the European Union is available on the Internet (<http://www.europa.eu>).

| | | | | |
|-----|------------------------|----------------|--------------------|-------------------|
| PDF | ISBN 978-92-68-15584-4 | ISSN 2812-0477 | doi: 10.2873/78547 | ET-BE-24-002-EN-N |
|-----|------------------------|----------------|--------------------|-------------------|

Luxembourg: Publications Office of the European Union, 2024

© European Union, 2024



The reuse policy of European Commission documents is implemented by the Commission Decision 2011/833/EU of 12 December 2011 on the reuse of Commission documents (OJ L 330, 14.12.2011, p. 39). Except otherwise noted, the reuse of this document is authorised under a Creative Commons Attribution 4.0 International (CC-BY 4.0) licence (<https://creativecommons.org/licenses/by/4.0/>). This means that reuse is allowed provided appropriate credit is given and any changes are indicated.

For any use or reproduction of elements that are not owned by the European Union, permission may need to be sought directly from the respective rightholders.

2023 Annual progress report

Transition Pathway for the Chemical Industry

1. Background

In January 2023, the European Commission published the Transition Pathway for the Chemical Industry¹ (The Transition Pathway). It is an actionable plan co-created by the European Commission with EU Member States, the chemical industry itself, non-governmental organisations (NGOs), and other interested parties. The Transition Pathway identifies **about 190 actions** needed to achieve the green and digital transition of the EU Chemical Industry and improve its resilience, in line with the objectives laid out in the Updated 2021 Industrial Strategy². The Pathway is structured around eight building blocks, based on the blueprint developed by the Industrial Forum Task Force 2³:

Figure 1 – Building blocks of the Transition Pathway



Each building block contains a list of topics and corresponding actions. For each action, the Transition Pathway indicates the timeframe for implementation - **short, medium, and long term** - and the actors – **EU, Member States, and Industry** - that should implement the action. Indicatively, short term actions are activities that should start as soon as possible. Medium term actions are activities that should start by 2030, while long term actions should be started and completed by 2050.

Following the publication of the Transition Pathway, the Commission has started working together with stakeholders on its co-implementation. Over the first year of this process, the most noteworthy developments are the following:

- **Working Group on “Chemical Industry”⁴:** the Commission set up the expert group “Working Group on Chemical Industry” to facilitate the discussions and cooperation with stakeholders on the co-implementation of the Transition Pathway for the Chemical Industry. It comprises Member States’ authorities, trade and business associations, NGOs as well as other interested parties relevant to the green and digital transition of the EU Chemical Industry. It advises the Commission on the key priorities, timeline, and activities of the co-implementation process.
- **Call for Transition Initiatives⁵:** in July 2023, the Commission launched a call for transition initiatives⁵, e.g., investments in green technologies and CO₂ emission reductions, to ask businesses and organisations about their concrete actions to support the twin

¹ https://single-market-economy.ec.europa.eu/sectors/chemicals/transition-pathway_en

² https://ec.europa.eu/commission/presscorner/detail/en/ip_21_1884

³ https://single-market-economy.ec.europa.eu/industry/strategy/industrial-policy-dialogue-and-expert-advice_en

⁴ <https://ec.europa.eu/transparency/expert-groups-register/screen/expert-groups/consult?lang=en&groupID=103712>

⁵ https://ec.europa.eu/eusurvey/runner/Call_for_transition_initiatives




transition and increased resilience of the EU Chemical Industry. The first batch of transition initiatives was published in December 2023⁶. However, the call will remain open during the entire co-implementation process. The Commission plans to continue to review transition initiatives and publish them on its website on an ongoing basis.

- **Task Forces (TFs):** three task forces have been set up under the Working Group on the Chemical Industry to accelerate the co-implementation of **high-priority topics and actions**:
 - analysis of the main challenges and enablers for the implementation of circular feedstocks (TF on Circularity);
 - analysis of long-term energy and feedstock needs of the EU Chemical Industry (TF on Energy).
 - development of a list of indicators to monitor the co-implementation process (TF on International Competitiveness).

The purpose of this report is to review and analyse the main results of the co-implementation process in 2023. Based on the information collected through the call for transition initiatives, the input provided by the working group and the task forces as well as desk research, this paper will:

- Summarise the main results of the call for transition initiatives.
- Analyse the progress made and identify the main achievements under each building block of the Transition Pathway. A qualitative approach has been applied, based on the following criteria:

Figure 2 – State of play: Assessment criteria

| Criteria | |
|---|---|
|  | Finalised: actions which have been completed as of the end of 2023 |
|  | In progress: actions which have been started but non finalised as of the end of 2023 |
|  | Not started: actions are assessed as not started in case: a) evidence collected through the call and on desk research confirms that the action has not been undertaken; b) no evidence on concrete measures has been found |

- Present an updated regulatory roadmap⁷, highlighting the most relevant regulatory developments for the EU Chemical Industry and related indicative timelines for adoption and implementation.
- Present the outcome of the analysis carried out by the three task forces.
- Propose next steps to be carried out during the second year of co-implementation.

The Commission also developed a **Guidance on EU Funding Opportunities**⁸ that can support the co-implementation of the Pathway. It aims to provide more clarity on relevant calls and programmes that can finance investments for the twin transition of the EU Chemical Industry. As the document was published in February 2024, it is not considered among the achievements obtained during the first year of co-implementation.

⁶ https://single-market-economy.ec.europa.eu/sectors/chemicals/transition-pathway/initiatives_en

⁷ The Transition Pathway for the Chemical Industry (see p. 55-57, link: <https://ec.europa.eu/docsroom/documents/54595>), contains a roadmap with an overview of existing legislation and major R&I initiatives relevant to the chemical industry. It includes the timeframes for the correspondent legislative and non-legislative procedures. The roadmap was developed using the best available knowledge at the time of writing. The timelines indicated in the roadmap are purely indicative.

⁸ https://single-market-economy.ec.europa.eu/document/download/43fd74aa-d5ab-4b15-81bb-080d108d3570_en?filename=GROW-2024-00145-00-00-EN-EDT-00.pdf

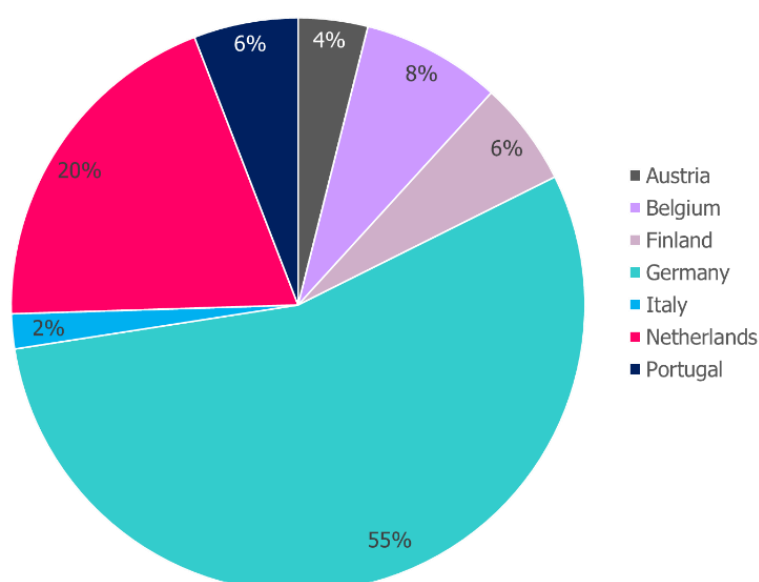
2. Call for transition initiatives: main results

As of 1 March 2024, 112 transition initiatives⁹ have been reviewed and published. Among those, 83 initiatives were collected and already published in December 2023. Only these initiatives have been considered in the results shown in this year's report.

Industry was the largest contributor, making up more than 95% of the initiatives. Large companies and trade and business associations accounted for most of the submissions, representing about 50% and 40% of the total.

At country level, Germany accounted for 55% of the initiatives from stakeholders, excluding trade and business associations, followed by the Netherlands and Belgium, with 20% and 8% respectively.

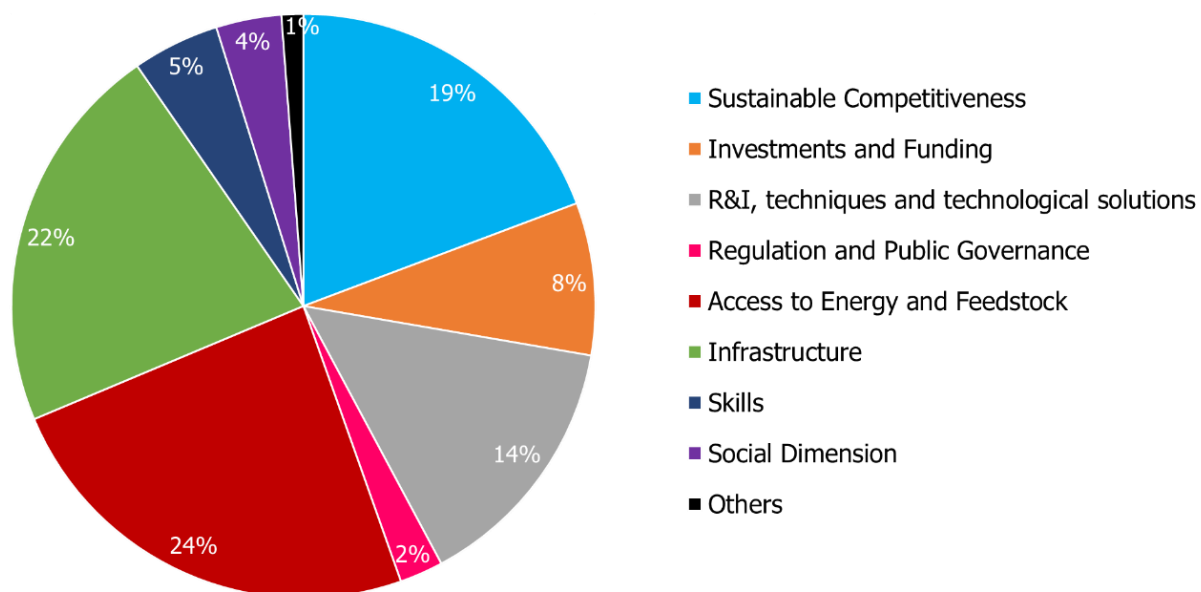
Figure 3: Transition initiatives
(% by country of the submitters)



Almost one quarter of the initiatives focus on replacing fossil fuels with alternative feedstocks and improving energy efficiency, under the building block **Access to Energy and Feedstock**, which holds the highest share. Contributions related to the development of green energy (e.g., hydrogen and electrification) and digital **infrastructure** account for 22% of the total, whereas **Sustainable Competitiveness** accounts for 19% of the initiatives. The latter focuses primarily on chemical substitution and activities to test safe and sustainable by design (SSbD) criteria for the development of chemicals and materials. The pie chart below details the proportions of transition initiatives under each building block of the Transition Pathway.

⁹ https://single-market-economy.ec.europa.eu/sectors/chemicals/transition-pathway/initiatives_en

Figure 4 - Transition initiatives
(% by building block)



The initiatives collected through the call do not reflect the breadth of all activities to achieve the twin transition of the EU Chemical Industry. Instead, they help understanding the types of projects companies and organisations are involved in to support the objectives of the Transition Pathway.

3. State of play co-implementation.

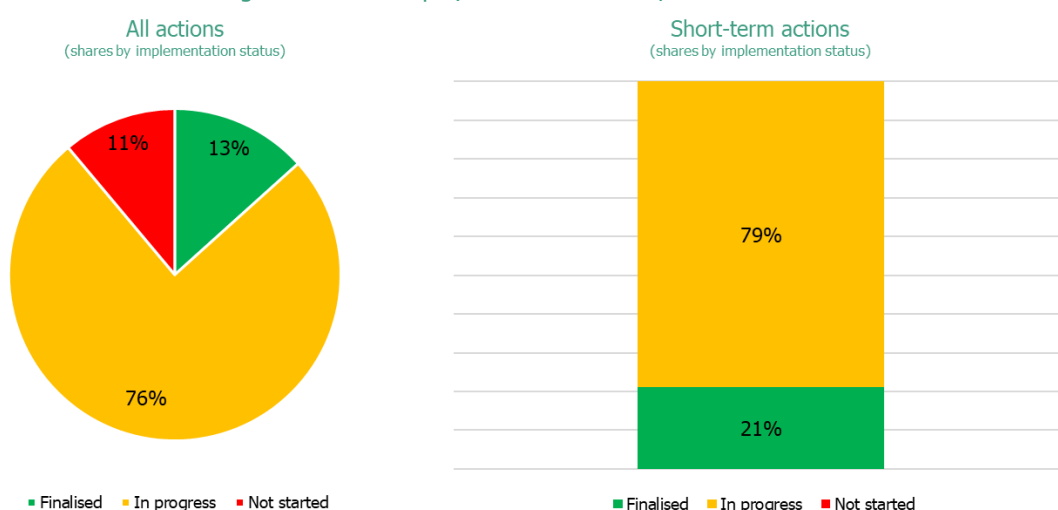
3.1 Sustainable Competitiveness

The Transition Pathway for the Chemical Industry proposes a set of **45 actions** to address the competitive challenges of the EU chemical industry and improve the safety and sustainability of chemicals and materials. To this end, stakeholders identified **five topics** to be addressed during the co-creation process:

- **Topic 1: International Competitiveness**, covering, amongst the others, actions to create a market for sustainable products, promote EU environmental and safety standards globally as well as to measure the competitiveness of the EU's chemical industry and its progress towards the green and digital transition.
- **Topic 2: Reduction of unsustainable dependencies and supply chain vulnerabilities**, by strengthening international cooperation e.g., through Free-Trade Agreements, and further integration of the EU's single market for energy, waste and secondary raw materials.
- **Topic 3: Safety and Sustainability** focusing on substitution to safer chemicals as well as the uptake of SSbD chemicals and materials.
- **Topic 4: Innovation and Growth of SMEs**, representing about 95% of European companies¹⁰. This topic entails actions to unleash the innovation and growth potential of SMEs, including, improved cooperation within the startup ecosystem, and support through the European Innovation Council¹¹ and European Digital Innovation Hubs¹².
- **Topic 5: New Synergies** within the chemical industry and with other value chains to incentivise investments in the circular economy, resource, and energy efficiency.

During the first year of co-implementation, more than 80% of the actions under Sustainable Competitiveness were launched. Most of the actions are in progress, accounting for 76% of the total, as highlighted in the table below.

Figure 5 - State of play: Sustainable Competitiveness



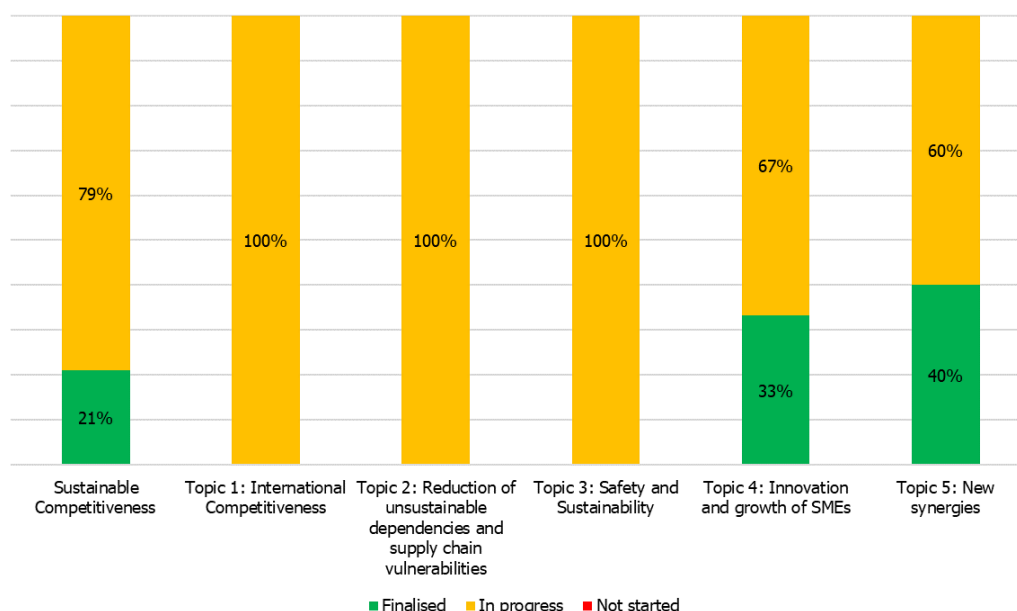
¹⁰ https://single-market-economy.ec.europa.eu/sectors/chemicals/transition-pathway_en

¹¹ https://eic.ec.europa.eu/index_en

¹² <https://european-digital-innovation-hubs.ec.europa.eu/home>

All short-term actions, representing approximately 43% of the actions under this building block, have been started. About 80% of these actions are in progress, whereas the remaining 20% have been finalised. **Topic 5: New Synergies** accounts for the highest share (40%) of finalised actions, followed by **Topic 4: Innovation and Growth of SMEs** and **Topic 1: International Competitiveness**, with 33% and 21% respectively:

Figure 6 - State of play: topics under Sustainable Competitiveness
(shares by co-implementation status of the short-term actions)



EU actions

- The **Critical Raw Materials (CRM) Act**, adopted in March 2023 by the Commission and provisionally agreed by the European Parliament and the Council in November 2023¹³, addresses **topic 2: Reduction of supply chain dependencies and supply chain vulnerabilities** by:
 - **Identifying a list of critical raw materials**, important for the EU economy and with a high risk of supply disruption, and a list of **strategic raw materials**¹⁴ of high strategic importance and projected global supply/demand imbalances¹⁵. The act also sets out 2030 benchmarks for strategic raw materials.
 - **Building up capacities to strengthen the EU's raw materials value chains.** This requires the development of national exploration, more streamlined and predictable approach to permitting procedures, as well as improved access to finance.
 - **Improving resilience** through a) the development of national strategic stocks; b) monitoring CRMs by pooling EU and Member States expertise; c) international partnerships in the framework of the Global Gateway Strategy; d) trade actions, such as a CRM Club for countries willing to strengthen global supply chains, strengthening the World Trade Organization, and combating unfair trade practices.

¹³ Council and Parliament strike provisional deal to reinforce the supply of critical raw materials - Consilium (europa.eu)

¹⁴ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52023PC0160>

¹⁵ https://ec.europa.eu/commission/presscorner/detail/en/fs_23_1663

- In December 2022, the Commission adopted a **recommendation establishing an assessment framework for safe and sustainable by design chemicals and materials**¹⁶. The recommendation is addressed to Member States, industry, academia as well as research and technology organisations. It sets a testing period for the framework to receive input from stakeholders on its applicability and challenges encountered. A revision process of the framework will be launched at the latest by the end of the testing period, expected in 2025. This initiative relates to **topic 1: International Competitiveness** and **topic 3: Safety and Sustainability**, which include actions to develop SSbD criteria and products.
- **The Digital Europe Programme** and **the Single Market Programme** finance the European Digital Innovation Hubs and the European Enterprise Network. These initiatives support **topic 4: Innovation and Growth of SMEs** by encouraging digitalisation of SMEs and fostering cooperation with the startup ecosystem.

In June 2023, the Commission adopted revised **Block Exemption regulations on Research and Development and Specialisation Agreements**¹⁷. As highlighted in the Pathway, the ongoing revision of antitrust rules can facilitate value chain cooperation and the development of **new synergies (topic 5)** to achieve the twin transition.

Stakeholder actions

- **Topic 3** accounted for about **75%** of submissions to the call for transition initiatives under this building block. More than two thirds of the initiatives came from trade and business associations and entail substitution of hazardous chemicals, responsible sourcing, and the development of SSbD processes and criteria. In this regard, different associations reported their involvement in the IRISS EU-funded project. The latter aims to create an SSbD network that involves a broad range of EU stakeholders representing industry, research and innovation institutes, academia and policymakers¹⁸.
- Large companies were reportedly active under **topic 5: New Synergies** and represented all the initiatives submitted under this topic. Relevant actions include joint projects on Carbon Capture and Storage (CCS) and electrification of crackers. For instance, the project Antwerp@C¹⁹ aims to build a shared CO₂ transportation infrastructure for a consortium of emitters located in the Port of Antwerp (BE). It will comprise an open-access system to collect captured CO₂, liquefy, temporarily store and load it onto ships/barges for transport to storage.

¹⁶ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022H2510>

¹⁷ https://competition-policy.ec.europa.eu/document/9693c912-e235-4f0d-93ad-49669ccc9475_en

¹⁸ <https://iriss-ssbd.eu/iriss/about-iriss>

¹⁹ <https://www.portofantwerpbruges.com/onze-haven/klimaat-en-energietransitie/antwerpc>

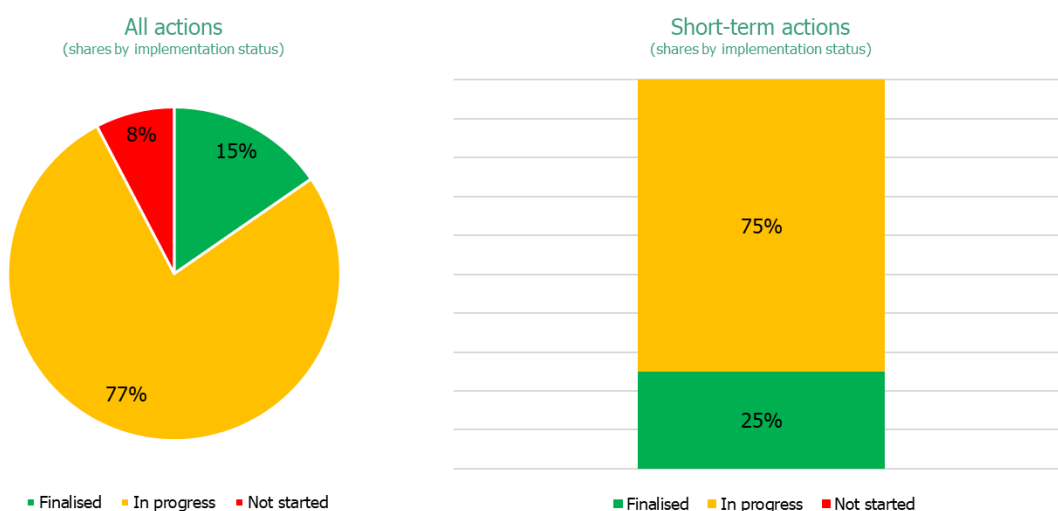
3.2 Investment and Funding

The Chemical Industry would require high capital expenditure (CAPEX) for initial investments, combined with higher operational expenditure (OPEX) to modify its production processes in order to purchase energy and feedstock from alternative sources as well as major R&I investments to develop new safe and sustainable products. The Pathway identifies **13 actions** to increase investors' confidence and improve financial support for the green and digital transition, grouped into two topics:

- **Topic 6: Fund for Green Investments.** This topic includes actions to support the dismantling and retrofitting existing assets, incentivise projects in cross-sectoral low-carbon technologies and implement the EU Taxonomy²⁰ to provide more certainty and predictability in green investments.
- **Topic 7: Access to funding.** Improved assistance to chemical companies, especially SMEs, is needed to better access public and private funding. For this reason, the Transition Pathway suggests strengthening communication channels and improving coordination at EU and national level on funding opportunities.

Significant progress has been made under Investment and Funding, with 77% of the actions in progress and 15% finalised. All non-started actions have a medium timeframe for implementation in the Pathway, while all short-term actions have been launched.

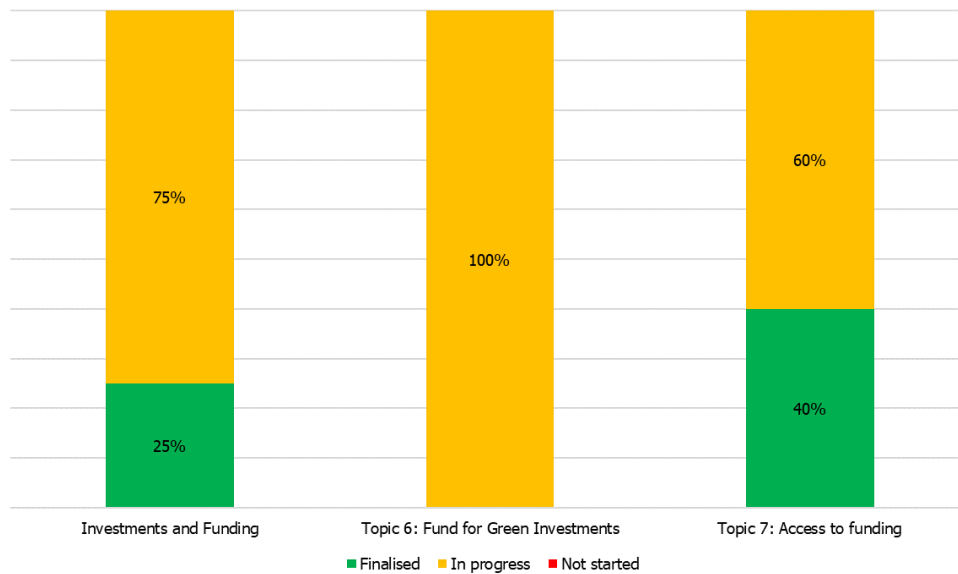
Figure 7 - State of play: Investment and Funding



Topic 7: Access to funding accounts for all finalised short-term actions. These include both EU and Industry initiatives to strengthen communication for European funding opportunities. In contrast, all actions under **topic 6** are in progress.

²⁰ https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en

Figure 8 - State of play: topics under Investment and Funding
(shares by co-implementation status of the short term actions)



EU actions

- The Commission launched a **stakeholder request mechanism**²¹ in October 2023 to collect suggestions from stakeholders regarding **the further development of the EU taxonomy regulation (topic 6)**. The stakeholder request mechanism will be continuously running, allowing respondents to submit their input at any given time.
- The proposal for **Strategic Technologies for Europe Platform (STEP)** seeks to reinforce, leverage and steer EU funds to investments in digital technologies (e.g. AI, advanced connectivity, cybersecurity), biotechnologies (e.g. biomanufacturing) and clean technologies (e.g. renewable energy, electrolyzers, carbon capture utilisation and storage "CCUS"), hence improving access to funding (**topic 7**) for the twin transition.

Stakeholder actions

- Relevant projects related to **topic 6**, particularly for upgrading existing assets were reported through the call for transition initiatives²². These include investments in automation and electrification of existing production processes, as well as issuing green bonds to finance projects for the green transition.
- Different trade and business associations related to the EU Chemical Industry are monitoring and communicating EU funding opportunities to their members (**topic 7**), including, e.g., through IT tools to carry out research on financing opportunities.

²¹https://finance.ec.europa.eu/sustainable-finance/overview-sustainable-finance/platform-sustainable-finance/stakeholder-request-mechanism_en

²² https://ec.europa.eu/eusurvey/runner/Call_for_transition_initiatives

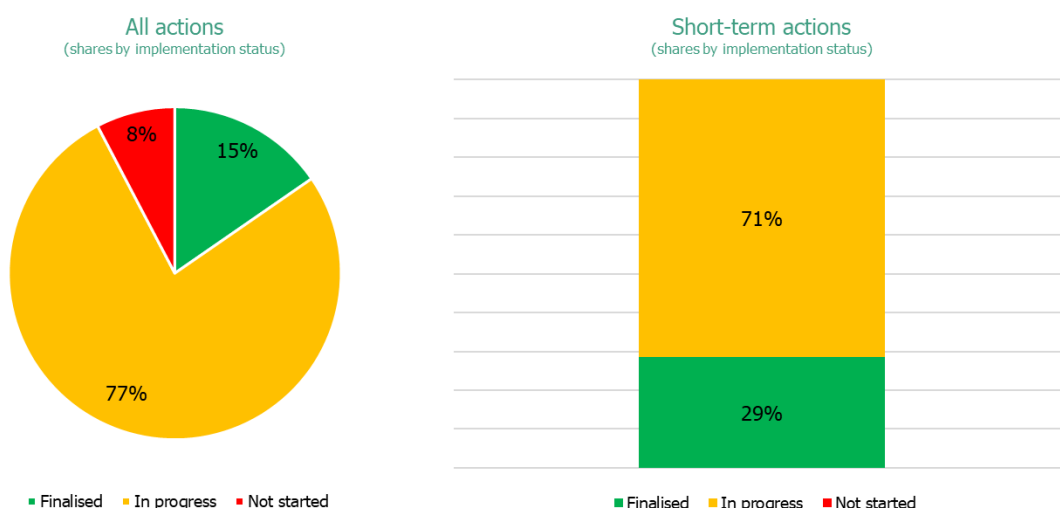
3.3 Research and Innovation

The EU chemical industry needs to adopt and scale up new techniques and technological solutions to achieve its green and digital transition. For this reason, the Transition Pathway, suggests a set of **13 actions** to develop an effective policy agenda and address Research and Innovation barriers (R&I) in the chemical industry. These actions are grouped by technology readiness levels (TRLs) under three topics:

- **Topic 8: Better conceptualisation of new techniques and technical solutions (TRLs 1 to 5)** includes sharing expertise in the implementation of SSbD frameworks, innovating safety testing and chemical risk assessment, and developing new industrial technology roadmaps.
- **Topic 9: Development of new techniques and technological solutions (TRLs 6 to 7).** Once conceptualisation is finalised, the development phase follows. During the co-creation process, stakeholders suggested that fostering collaboration and partnerships as well as financial and regulatory support are key to developing new technologies, particularly in the areas of renewable energy and feedstock, as well as the circular economy.
- **Topic 10: Deployment of new techniques and technological solutions (TRLs 8 to 9),** includes amongst other things, improved permitting, market pull measures as well as active contributions by the chemical industry to the information exchanges organised by the Innovation Centre for Industrial Transformation and Emissions set up under the revised Industrial Emissions Directive²³. The centre will be launched in Seville, Spain, on 21 June 2024²⁴.

To date, 92% of the actions under this building block have started. 77% are in progress, whereas 15% are finalised. All short-term actions have been started:

Figure 9 - State of play: Research and Innovation

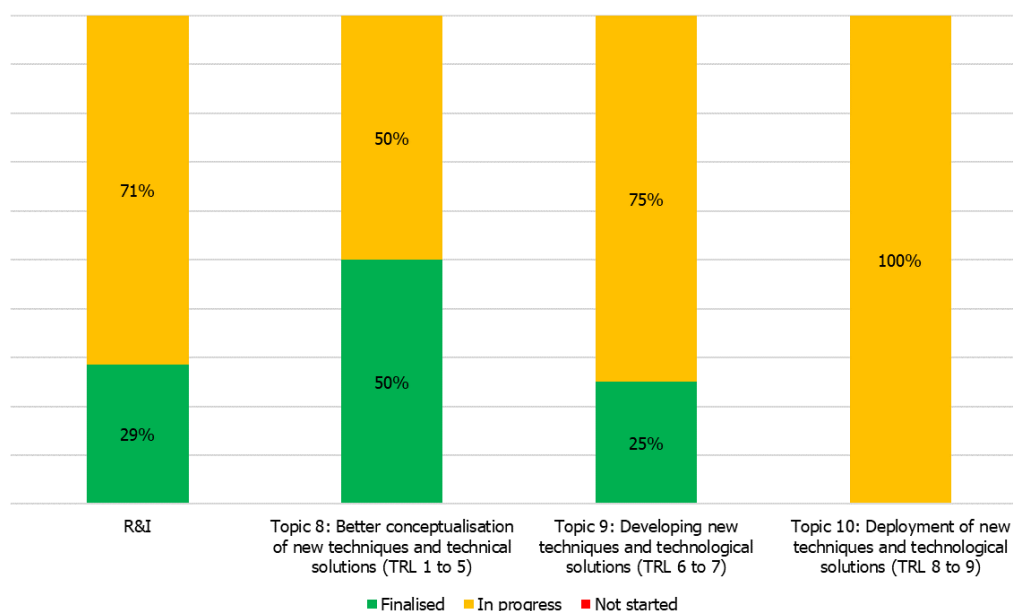


²³ https://environment.ec.europa.eu/topics/industrial-emissions-and-safety/industrial-emissions-directive_en

²⁴ <https://eippcb.jrc.ec.europa.eu/innovation-centre-for-industrial-transformation>

Topic 8 presents the highest share of finalised short-term actions, corresponding to 50% of the total. These include, for instance, the development of sectorial and national roadmaps by trade and business associations. Conversely, all the short-term actions under **topic 10** are still in progress.

Figure 10 - State of play: topics under Research and Innovation
(shares by co-implementation status of the short term actions)



EU actions

- Different **EU funding programmes** can finance research and innovation projects across different TRL levels, thereby covering **all the topics** within this building block. **Horizon Europe** supports the development of new concepts in chemical risk assessment, e.g. through the Partnership for the Assessment of Risks from Chemicals (PARC), as well as investments in the development of circular and bio-based materials, particularly through the Process4Planet Partnership, the Made in Europe partnership, and Circular Based Europe Joint Undertaking (CBE JU)²⁵. In parallel, The **Innovation Fund** and the **Connecting Europe Facility**²⁶ target projects to deploy decarbonisation technologies and sustainable energy networks in the EU (**topic 10**).

Stakeholder actions

- **Topic 8** accounted for most of the transition initiatives under the Research and Innovation chapter, representing more than 65% of the initiatives of this building block. Large

²⁵ The Processes4Planet (P4Planet) Partnership aim is to transform the European process industries to achieve circularity and overall climate neutrality at the EU level by 2050 while enhancing their global competitiveness. P4Planet is a European co-programmed public-private Partnership established between A.SPIRE – as the private entity – and the European Commission in the context of the Cluster 4 (Digital, Industry and Space) of Horizon Europe funding programme. Link: <https://www.aspire2050.eu/p4planet/about-p4planet>.

Made in Europe will run for 7 years with a budget of EUR 1.8 billion in total. The European Factories of the Future Research Association (EFFRA) represents the private side in the partnership. Link: <https://www.effra.eu/>

The Circular Bio-based Europe Joint Undertaking (CBE JU) is a EUR 2 billion public-private partnership between the European Union and the Bio-based Industries Consortium (BIC) that funds projects advancing competitive circular bio-based industries in Europe²⁷.

²⁶The Connecting Europe Facility (CEF) (budget 2021-2027: EUR 20.73 billion) is a key EU funding instrument to promote growth, jobs and competitiveness through targeted infrastructure investment at European level. It supports the development of high performing, sustainable and efficiently interconnected trans-European networks in the fields of transport, energy and digital services. CEF investments fill the missing links in Europe's energy, transport and digital backbone.

companies and trade and business associations accounted respectively for half of the initiatives under this topic. They both reported projects focusing on the development of New Approach Methodologies (NAMs) for chemical hazard and risk assessment. Trade and business associations also provided examples of sectorial and technological roadmaps.

- Large companies submitted most of the initiatives under **topic 9**. They focus on a variety of demonstration projects on alternative feedstocks and renewable energy. These entail, in particular, the use of sugars from wood, agro-residues and municipal solid waste as well as the electrification of crackers.

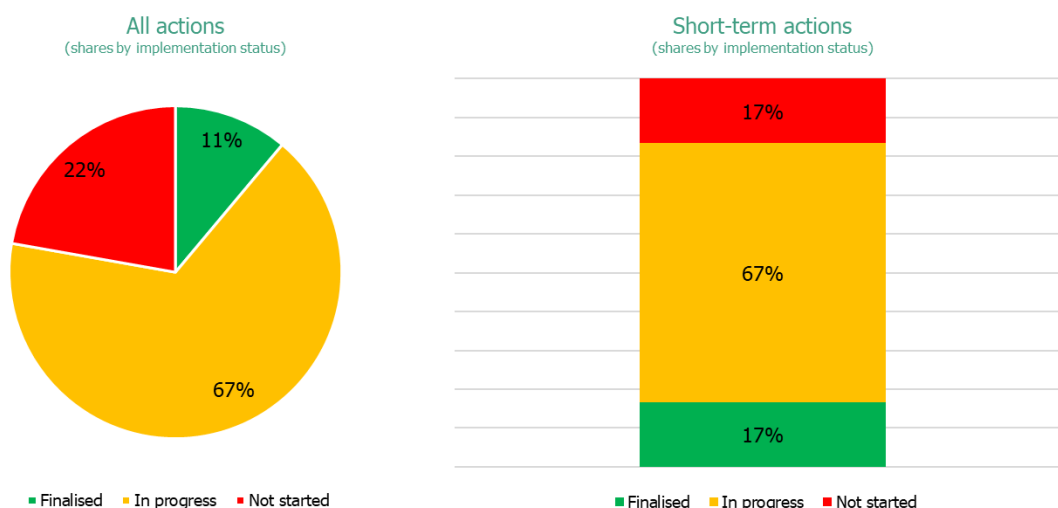
3.4 Regulation and Public Governance

Regulation and public governance are a key enabler to achieve the twin transition and increased resilience of the EU chemical industry. During the co-creation, stakeholders suggested that legislative barriers to this transformation relate to three main topics:

- **Topic 11: More effective and predictable legislation.** To this end policymakers and industry can act on defining concepts, definitions, and methods under chemical legislation.
- **Topic 12: Vertically and horizontally coherent legislation.** The first refers to coherence and consistency between EU legislation and national legislation. The latter entails legislative harmonisation across entire economic sectors or entire value chains.
- **Topic 13: Effective and efficient enforcement,** through a broad set of actions focusing, amongst the others, on the development of analytical methods especially for imported products and online sales of consumer products as well as the use of digital tools to support market surveillance and custom authorities.

Most actions under this building block (78%) have already started, with 11% of them already completed. The progress reported is in line with the expected timeframe for implementation indicated in the Pathway as more than 70% of the started actions are short term.

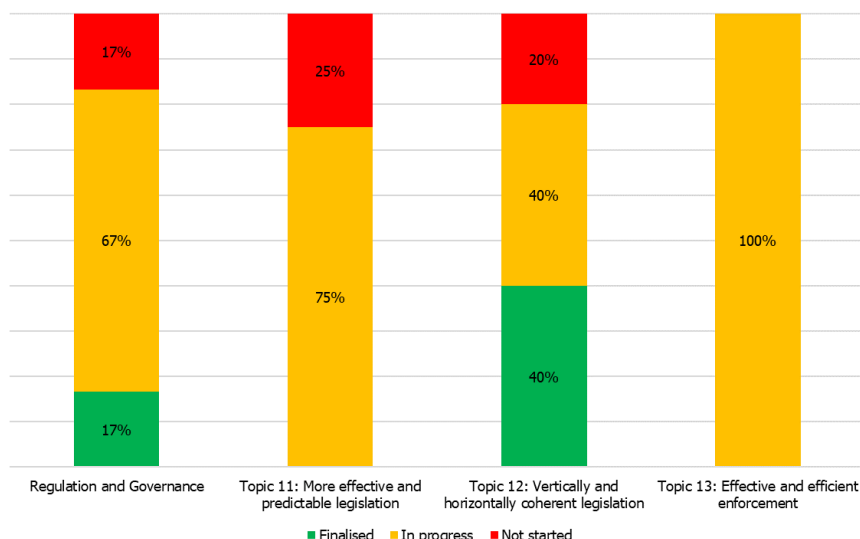
Figure 11 - State of play: Regulation and Public Governance



All finalised short-term actions of this building block fall under **Topic 12**. These include the development of a regulatory roadmap to provide an integrated view of the EU regulatory

framework applied to the chemical industry (see section 4). Instead, around 70% of the actions under **topic 11** and all the actions under **topic 13** are in progress.

Figure 12 - State of play: topics under Regulation and Governance
(shares by co-implementation status of the short term actions)



EU actions

- On 7 December 2023, the Commission issued a **proposal for a regulation establishing a common data platform** managed by the European Chemicals Agency (ECHA)²⁷. The proposal can improve horizontal coherence across chemical legislation (**topic 12**) laying down rules to ensure that the data contained in the platform are findable, accessible, interoperable and reusable.
- ECHA continues to update **the Public Activities Coordination Tool**²⁸ to provide an up-to-date overview of all planned and ongoing initiatives on chemicals by authorities across different pieces of legislation, as requested by an action under **topic 12**.

Stakeholder actions

- Industry associations are working on the creation of national pathways with national policy makers and submitted transition initiatives on the development of sectoral roadmaps (**topic 11**).
- Trade and business associations submitted transition initiatives that focus on the development of technical guidance on the safe handling of chemicals at the workplace by facilitating the sharing of good practices such as training, risk management and monitoring (**topic 12**).

²⁷ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52023PC0779>

²⁸ <https://echa.europa.eu/pact>

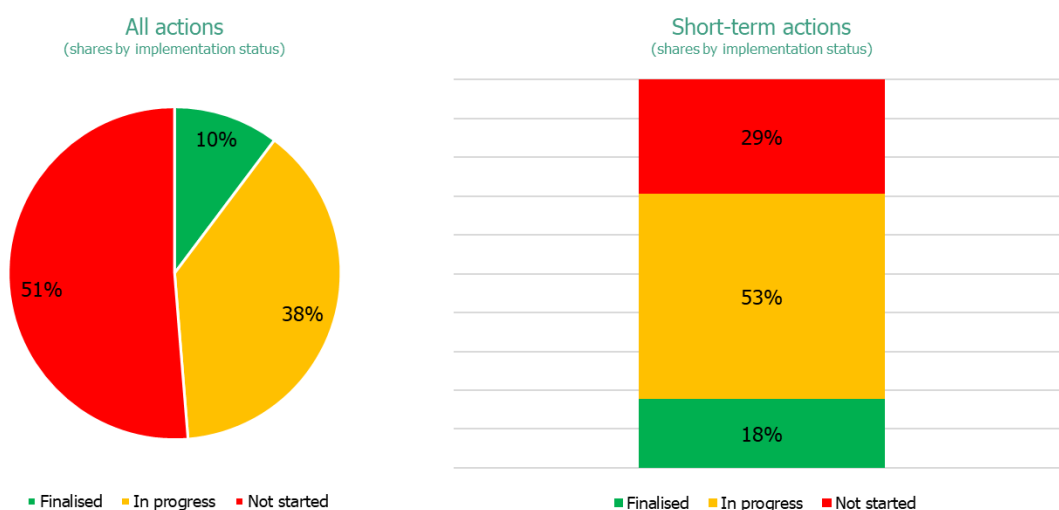
3.5 Access to Energy and Feedstock

The EU chemical industry has already made progress towards net-zero. Despite an increase in production of more than 47% since 1990, greenhouse-gas (GHG) emissions from EU-27 chemical production have decreased by 54% in comparison to 1990 levels²⁹. However, it is still the third largest emitter in the EU. The main reason why is because around half of the chemical sector's energy input is consumed as feedstock³⁰. The chemical industry should, therefore, move progressively away from primary fossil-based feedstocks to reach net-zero. To this end, the Pathway lists **23 actions** grouped under four topics:

- **Topic 14: Anticipate long-term needs for the supply of energy and feedstock resources**, including a quantitative assessment of such needs and the related impacts of energy prices.
- **Topic 15: Economically viable purchases of clean energy**, particularly cost competitive climate neutral electricity and hydrogen with a low carbon footprint.
- **Topic 16: Feedstock substitution**. This topic covers a set of actions aimed at identifying new and sustainable sources of feedstock as well as further developing feedstocks such as biomass, waste, and CO₂.
- **Topic 17: Process and resource efficiency**, through new business models, separation technologies, novel catalysis and by promoting industrial symbiosis.

Since the beginning of the co-implementation process, stakeholders agreed that this building block has the highest priority in the transition agenda. As almost two-thirds of the actions under this building block have a medium or long timeframe for implementation, only 38% and 10% are progressing and have been finalised respectively.

Figure 13 - State of play: Access to Energy and Feedstock



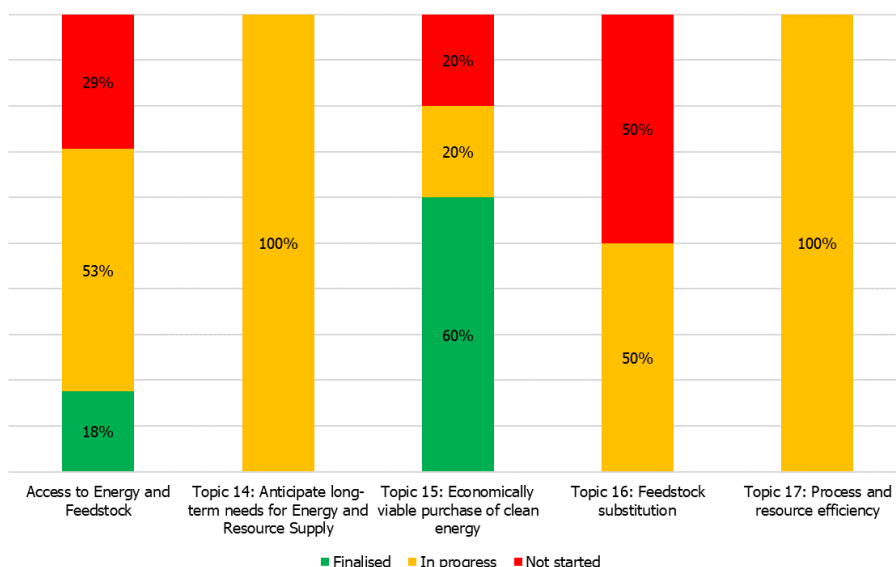
Conversely, significant progress has been reported on short-term actions. **Topic 15** shows the highest share (60%) of finalised short-term actions. These primarily relate to EU funding opportunities to support investments in clean technologies. In parallel, most of the short-term actions under **topic 14 and 17** have been launched. On the contrary, only 50% of the short-term actions under **topic 16** have been started. They entail the development of harmonised

²⁹ <https://ec.europa.eu/docsroom/documents/53754>

³⁰ https://single-market-economy.ec.europa.eu/sectors/chemicals/transition-pathway_en

international certifications and standards to promote alternative feedstocks as well as the assessment of the economic and technical potential of third generation biomass.

Figure 14 - State of play: topics under Access to Energy and Feedstock
(shares by co-implementation status of the short term actions)



EU actions

- **The Social Climate Fund (SCF)**, adopted and published in the Official Journal of the EU in May 2023³¹, will provide Member States with financial support for measures and investments in efficiency and renovation of buildings, clean heating and cooling and integration of renewable energy, as well as in zero and low-emission mobility solutions. As highlighted in the Transition Pathway, the SCF can support in particular small businesses in the green and digital transition (**topic 15**) by mobilising at least EUR 86.7 billion over 2026-2032. The SCF will pool revenues from the auctioning of allowances from the EU Emissions Trading System 2 (ETS 2), covering emissions from fuel combustions in buildings and road transport sectors, as well as the existing ETS³².
- The Commission presented a proposal on 14 March 2023 to revise the **rules for electricity market design**. The aim is to better protect consumers, accelerate the deployment and better integration of renewables in the energy system, and enhance the competitiveness of the EU³³, in line with **topic 15** of the Pathway (link also **with topic 18 under Infrastructure**). The proposal concerns revisions to several pieces of EU legislation, notably **the Electricity Regulation, the Electricity Directive and the Regulation on wholesale energy market integrity and transparency (REMIT)**. In terms of specific measures, the new proposed rules include:
 - wider contractual choice for consumers, with the possibility to lock in long-term prices but also to take advantage of dynamic pricing contracts;

³¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2023:130:FULL>

³² https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/social-climate-fund_en

³³ https://ec.europa.eu/commission/presscorner/detail/en/fs_23_1594

- new requirements for suppliers on price risk management and the establishment of suppliers of last resort by Member States, so that no consumer ends up without electricity;
- improved access to more stable longer-term contracts such as Power Purchase Agreements (PPAs);
- public support for new renewable energy investments through two-way Contracts-for-Difference (CfDs).
- obligations to facilitate integration of renewables into the system.

The proposed reform will also enhance the ability of **the Agency for the Cooperation of Energy Regulators (ACER)** and national regulators to monitor wholesale energy market integrity and transparency.

- Several EU funding programmes can finance projects on clean energy and feedstocks in the EU Chemical Industry. Among them, **Horizon Europe, the Innovation Fund, Invest EU, LIFE** and **the Just Transition Mechanism** provide funding opportunities for investments in bio, waste and CO₂ based chemicals (**topic 16**), optimisation of production processes, energy and resource consumption (**topic 17**).
- Additionally, the Commission published the **Industrial Carbon Management Communication (ICM)**³⁴ to provide a strategy for creating an EU single market for carbon management. The ICM covers transport, utilisation and storage of CO₂ captured from fossil fuel, biogenic and atmospheric sources. It therefore supports the use of circular CO₂ as alternative feedstock in the EU chemical industry (topic 16). As it was adopted in February 2024, the ICM is not included in the results of this annual progress report.

Stakeholder actions

- Different trade and business associations have developed quantitative analysis estimating emissions reduction potential, renewable energy and feedstock needs based on different technological pathways for producing chemicals (**topic 14**).
- Large companies reported approximately 75% of the initiatives under **topic 15**. These entail the use of power purchase agreements (PPAs) to purchase green electricity, as well as investments in the electrification of production processes (e.g. electric boilers to produce steam, local electricity generation from photovoltaic systems).
- **Topic 16** accounted for the highest share of initiatives submitted under this building block, standing at about one third. Both large companies and SMEs were particularly active in reporting their investments in alternative feedstocks to fossil fuels and represented more than 70% of the initiatives. Businesses are focused in particular on using plastic waste and different sources of biomass, such as vegetable oils, grains, and sugar to produce chemicals.
- Conversely, Trade and business associations represented the remaining proportion of initiatives under **topic 14 and 16**. They focus on the developing certification schemes and labels for low carbon products.

³⁴ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2024:62:FIN>

Large companies submitted several transition initiatives published under **topic 17**, including projects to reduce steam consumption, waste generation, and improve raw materials tracking across the value chain through block chain technologies.

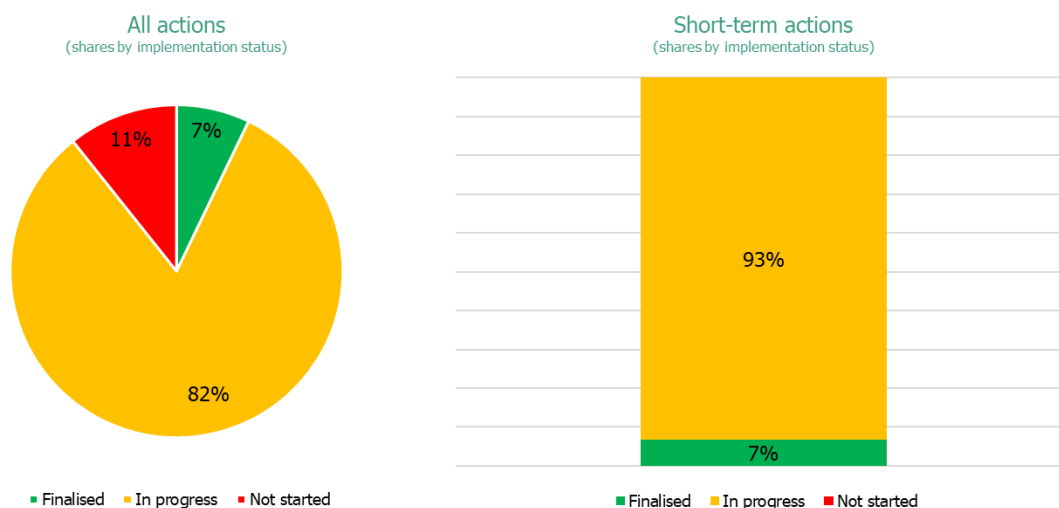
3.6 Infrastructure

The EU Chemical Industry will require the deployment of the necessary infrastructure to access renewable energy and alternative feedstocks to fossil carbon. The Pathway lays out **28 actions** to build the infrastructure needed for the twin transition under the following topics:

- **Topic 18: Large scale electricity and hydrogen infrastructure** to access clean energy from all chemical sites. Cross-boarder interconnectors, new storage capacity, and new and retrofitted pipelines are key to providing the industry with renewables.
- **Topic 19: Development of new and sustainable production facilities**, e.g. recycling facilities and bio-refineries. Accelerated and simplified approval procedures can provide security planning for new infrastructure projects.
- **Topic 20: Sustainable transport of raw materials and chemical products**, e.g. through a pan-European rail infrastructure. Financial and regulatory support to green freight transport would be needed, together with an increase in the availability and capacity of multi-modal terminals to industrial clusters.
- **Topic 21: Deployment of digital technologies**, such as Internet of Things (IoT), big data, artificial intelligence, smart sensors, digital twins and robotics. Partnerships between the chemical industry and digital solution providers, data platforms and standards for data interoperability are fundamental for the digitalisation of chemical manufacturing.
- **Topic 22: Circularity: recycling and re-use of infrastructure**. Stakeholders recommended a set of regulatory actions, such as the implementation of the Waste Framework Directive and Waste Shipment Regulation, as well as funding support to develop the infrastructure for the uptake of waste as feedstock and CCUS technologies.

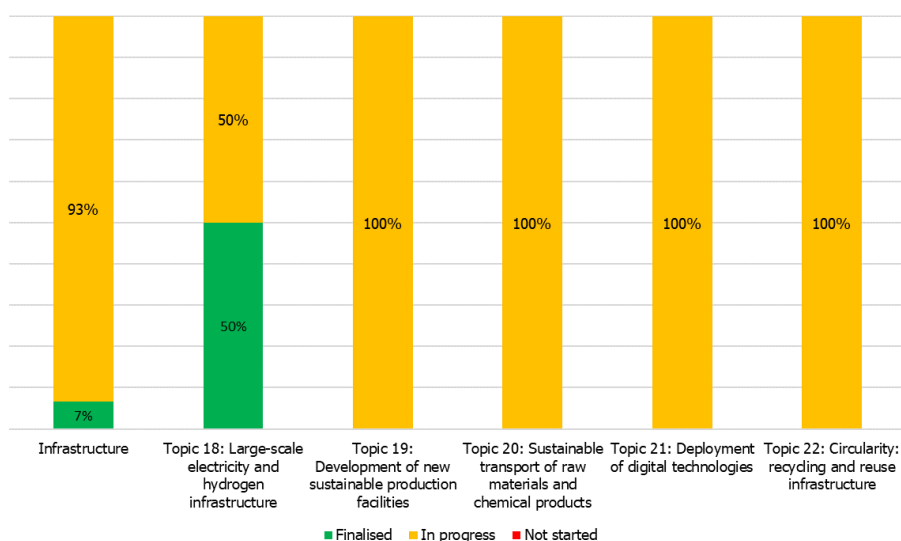
The co-implementation of more than 80% of the actions of this building block is under way, with 7% finalised. Around one tenth have not started. These are only medium and long term.

Figure 15 - State of play: Infrastructure



All finalised short-term actions are under **topic 18** and include the identification of hydrogen infrastructure needs, whereas all the actions under **the remaining topics**, are in progress.

Figure 16 - State of play: topics under Infrastructure
(shares by co-implementation status of the short term actions)



EU actions

- In November 2023, the Commission adopted the first **list of Projects of Common Interest (PCIs) and Projects of Mutual Interest (PMIs) as a delegated act under the Trans-European Networks for Energy Regulation (TEN-E)**³⁵, which supports the development of cross-border energy infrastructure (**topic 18**). The list includes both projects within the EU territory (PCIs) and projects that connect the EU to other countries (PMIs). Out of 166 projects, over half are electricity, offshore and smart electricity grid projects. The list also includes hydrogen, CO₂ networks and electrolyser projects.
- The Net Zero Industry Act**³⁶, adopted by the Commission in March 2023 and voted by the European Parliament in April 2024³⁷ aims to stimulate manufacturing and investments in net-zero technologies, such as hydrogen and grid technologies, thereby contributing to **topic 18** of the Pathway. The act proposes:
 - **Net-zero strategic projects**, which are essential for strengthening the resilience and competitiveness of EU net-zero technologies.
 - **A CO₂ injection capacity target** of at least 50 million tonnes of CO₂ by 2030 to support Carbon Capture and Storage (CCS) projects.
 - Facilitating access to market through **sustainability and resilience criteria in procurement processes** and auctions to boost demand of renewables.
 - **Net-Zero Industry Academies** to provide training and education on net-zero technologies and create quality job.
 - **Cutting red tape and accelerate permitting**, through a lower administrative burden for developing net-zero manufacturing projects and simpler and faster permitting procedures, especially for strategic projects.

³⁵ <https://eur-lex.europa.eu/eli/reg/2022/869/oj>

³⁶ https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/green-deal-industrial-plan/net-zero-industry-act_en

³⁷ <https://www.europarl.europa.eu/news/en/press-room/20240419IPR20568/meps-adopt-plans-to-boost-europe-s-net-zero-technology-production>

- **Regulatory sandboxes** to help develop and test innovative net-zero technologies.
 - **A Net-Zero European Platform** to bring Member States and the Commission together with relevant financial institutions to discuss private sources of financing, investment needs existing financial instruments and EU Funds.
 - **Net-Zero Acceleration Valleys** (territories that concentrate several companies involved with a certain technology) to create clusters of net-zero industrial activity and increase the attractiveness of the EU as a location for manufacturing activities and further streamline the administrative procedures for setting up net-zero manufacturing capacity. They will contribute to the reindustrialisation of regions.
- **The European Hydrogen Bank**, a financial instrument managed by the Commission to support the uptake of renewable hydrogen (**topic 18**) within the EU as well as imports from international partners³⁸. The first Hydrogen Bank pilot auction of EUR 800 million under the Innovation Fund was launched in November 2023 for the domestic production of renewable hydrogen for European consumers³⁹.
 - In July 2023, the Commission adopted a **Greening Freight Package** to make freight transport more efficient and sustainable (**topic 20: sustainable transport of raw materials and chemical products**). The package includes:
 - a proposed regulation⁴⁰ to optimise the use of rail capacity, improve cross-border coordination, and increase punctuality and reliability.
 - the “CountEmissions EU” Regulation for a harmonised framework to calculate greenhouse gas emissions from transport services, across modes and national networks⁴¹;
 - a proposal for a revision of the Weights and Dimensions Directive⁴² to allow additional weight for vehicles using zero-emission technologies, as they tend to increase a vehicle’s weight.

Moreover, in November 2023, the Commission adopted a proposal for a revised Combined Transport Directive⁴³, providing a support framework for intermodal and combined transport operations⁴⁴. This proposal complements the Greening Freight Package.

- **The Digital Europe Programme** currently finances **Common European Data Spaces**⁴⁵. These can support the deployment of digital infrastructures in the Chemical Industry as highlighted in the Transition Pathway (**topic 21**).
- **The EUR 4 billion Innovation Fund 2023 call** supports decarbonisation projects⁴⁶, cleantech manufacturing and pilot innovative projects. Cleantech manufacturing projects can include the manufacturing of components for renewable energy, energy storage, heat pumps and hydrogen production. Pilot projects can include highly innovative projects

³⁸ https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/green-deal-industrial-plan/net-zero-industry-act_en

³⁹ https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen/european-hydrogen-bank_e

⁴⁰ https://transport.ec.europa.eu/document/download/9393e22e-72ee-440d-a983_e2ee116e11ba_en?filename=COM_2023_443_0.pdf

⁴¹ https://transport.ec.europa.eu/document/download/6fd194f0-1618-45c8-822e-1b13e808eb23_en?filename=COM_2023_441.pdf

⁴² https://transport.ec.europa.eu/document/download/6d96dca5-11f2-4499-81cd-b3d44b67a73d_en?filename=COM_2023_445_0.pdf

⁴³ https://transport.ec.europa.eu/news-events/news/european-commission-adopts-new-proposal-combining-transport-modes-more-sustainable-freight-2023-11-07_en

⁴⁴ **Intermodal transport** is a type of multimodal freight transport, in which goods are carried within a closed loading unit such as container, swap-body or semi-trailer, and the closed loading unit is transhipped between different transport modes without the goods themselves being handled. **Combined transport** is a type of intermodal transport that meets specific conditions set out in this Directive; in particular it concerns operations that reduce by 40% the negative externalities compared to road-only operations. This essentially means operations for which the major part of a transport operation is carried out by rail, inland waterways or sea (short sea shipping), while the much shorter initial and final road legs act as feeders for the loading units between and place of loading/unloading and the terminal.

⁴⁵ Common European Data Spaces are common data infrastructures and governance frameworks, which facilitates data pooling, access and sharing.

⁴⁶ This call for projects is divided into five different categories: large (CAPEX above EUR 100 million), medium (CAPEX between EUR 20 million and EUR 100 million) and small (CAPEX between EUR 2.5 million and EUR 20 million) decarbonisation projects; cleantech manufacturing; and pilot projects.

focused on CCUS. This call is relevant for the co-implementation of different topics under the Infrastructure building block, particularly **topics 18, 19, and 22⁴⁷**.

Stakeholder actions

- Large EU chemical companies reported investments in CO₂-free hydrogen production through different technologies, e.g., methane pyrolysis, water electrolysis, as well as in the electrification of production processes. They accounted for all the transition initiatives submitted under **topic 18**.
- Large businesses were the most active stakeholder in reporting projects related to the development of digital technologies (**topic 21**). Examples from the call for transition initiatives include applications of blockchain technologies to trace the carbon footprint across the value chains, as well as the use of Digital Twins to model production plants and processes.
- Both large businesses and SMEs reported projects on the development of waste recycling facilities (**topic 22**), entailing mainly plastics and battery waste.
- Trade and business associations also contributed to this building block through their initiatives, accounting for 22% of the total. In particular, they provided examples of tools to assess the impacts of chemical transport (**topic 20**), the potential of digital technologies – e.g., robotics, Internet of Things (IoT) and artificial intelligence – in manufacturing processes, as well as greenhouse gas emissions associated to chemical products.

3.7 Skills

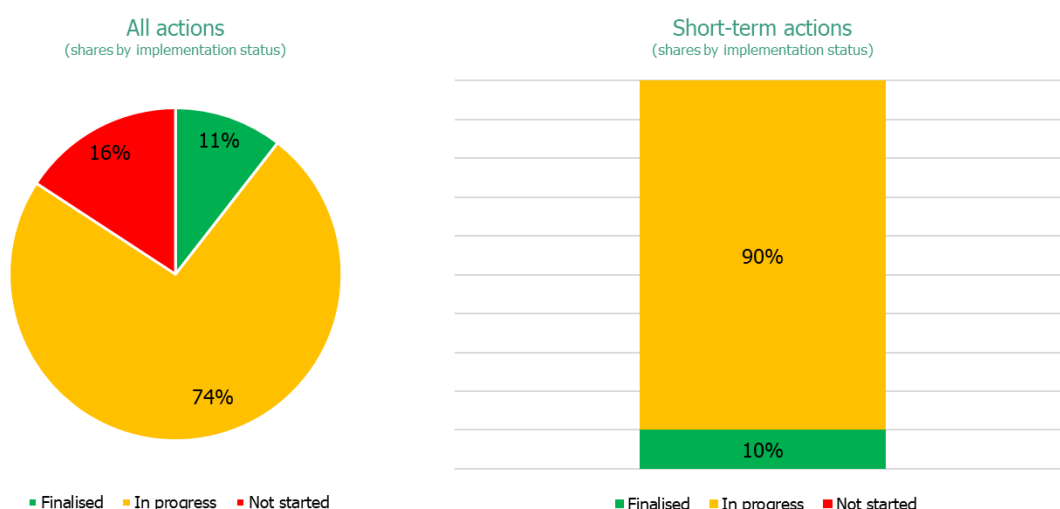
Green skills, digital skills and competences to produce SSbD chemicals will be required to support the transformation of the EU Chemical Industry. SMEs in particular often lack the skills capacity to make the necessary organisational changes for the twin transition. The Transition Pathway highlights the main topics to be addressed for skills:

- **Topic 23: Up-skilling and re-skilling of the workforce** across all levels of seniority in the industry to meet the demands of both regulators and society for achieving a more sustainable chemical industry. Sectorial roadmaps for skills as well as education support would be needed to bridge the gap between the fast-changing new skills demands by the companies.
- **Topic 24: Sufficient supply of jobs at technical level** through corporate training, recruiting and retaining strategies to attract and keep talents in the chemical industry.

More than 70% of the actions under this building block have been launched, with 11% finalised. Instead, 16% of the actions have not been started. These include only medium-term actions. The state of play of the skills building block is shown in the following figures:

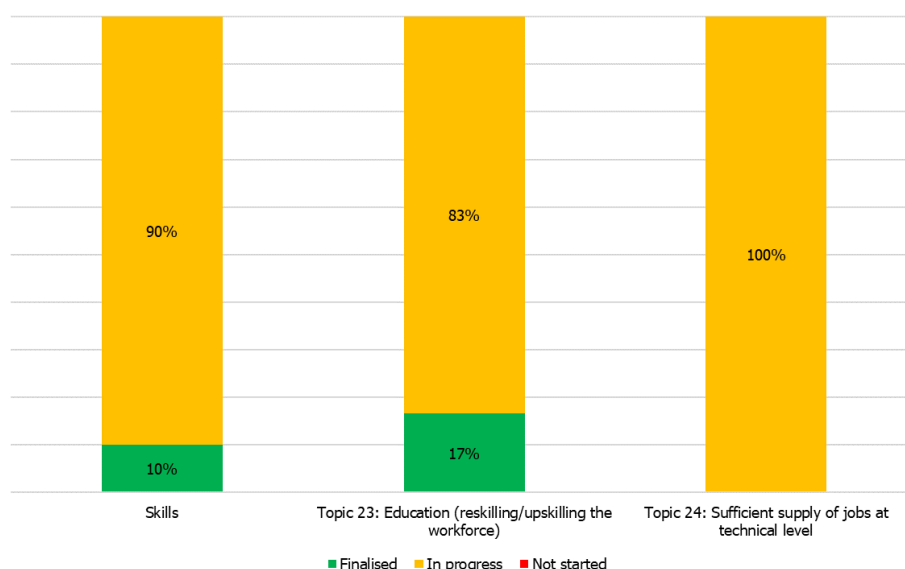
⁴⁷ Pilot projects can include highly innovative projects focused on deep decarbonisation of sectors listed in Annex I and III to the EU ETS Directive 2003/87, including environmentally safe carbon capture and utilisation, and products substituting carbon-intensive ones produced in sectors also listed in Annex I to the Directive.

Figure 17 - State of play: Skills



Short-term actions on sectoral specific training have been finalised. These account for 17% of **topic 23**. The remaining short-term actions are in progress, which shows that the lack of green and digital skills to realise the full potential of clean-tech and digital solutions still needs to be fully addressed. According to the European Monitor of Industrial Ecosystems (EMI) report on Energy Intensive Industries ⁴⁸, around 6% of the professionals have skills relevant for the green transition. Instead, 4% have advanced digital skills, e.g. in technologies such as artificial intelligence, cloud computing, robotics, Internet of Things etc.

Figure 18 - State of play: topics under Skills
(shares by co-implementation status of the short term actions)



EU actions

- The **European Year of Skills (EYS)**⁴⁹ was launched in 2023 with the objective to support companies, especially SMEs, in addressing skills shortages in the EU. To this end, it promotes reskilling and upskilling opportunities to help people get the right skills for quality

⁴⁸ <https://monitor-industrial-ecosystems.ec.europa.eu/sites/default/files/2023-12/EMI%20EII%20industrial%20ecosystem%20report.pdf>

⁴⁹ <https://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=10431&#navItem-relatedDocuments>

jobs and the green and digital transition. The EYS also supports the co-implementation of both **topics 23 and 24**, through many EU initiatives, including:

- The **European Skills agenda**, the framework for EU skills policy cooperation.
 - The **Pact for Skills**⁵⁰, one of the flagships of the European Skills Agenda. This provides public and private organisations with partnership opportunities, knowledge, and advice on relevant skill needs.
 - The **Structured Dialogue**⁵¹ with the Member States to design EU policy actions on digital education and Skills.
 - The **New European Innovation Agenda**⁵², which aims to train 1 million deep tech talents, increase support for women innovators, and innovate start-up employees' stock options.
 - The **European strategy for universities**⁵³ which proposes 50 actions that to develop high level and future-proof skills for a wide range of learners.
 - The European **Digital Skills and Jobs Platform**⁵⁴. It offers information and resources on digital skills, as well as training and funding opportunities.
 - The **EU Digital Skills and Jobs Coalition**⁵⁵ which brings together Member States, social partners, companies, non-profit organisations and education providers to encourage digital skills training.
- Moreover, several EU funding programmes support investments in up- and reskilling and the objectives of the EYS. These include: **The European Social Fund +, the Digital Europe Programme, Horizon Europe and Erasmus +**.
 - Introduced in 2016 by the Skills Agenda for Europe⁵⁶, **the Blueprints for sectoral cooperation on skills** represent a flagship EU initiative to support skills development, upskilling and reskilling. Funded by the Erasmus+ programme⁵⁷, Blueprint Alliances bring together businesses, trade unions, research institutions, education and training authorities, and public authorities to develop and implement strategies to address skills gaps in specific sectors/ecosystems, therefore supporting the co-implementation of both **topics 23 and 24** under this building block.
 - The **Erasmus + Centres of Vocational Excellence** (CoVE) support reforms in Vocational Education and Training (VET)⁵⁸. They provide opportunities to train young professionals as well as up-skilling and re-skilling of the existing workforce in the context of the green and digital transition (**topic 23**). They act as catalysts for local business development, by working with companies, on applied research projects, creating knowledge and innovation hubs, as well as supporting entrepreneurial initiatives.

Stakeholder actions

- Trade and business associations submitted all the initiatives under **topic 23**. These include training courses for the safe handling of chemicals by manufacturers, professionals, and

⁵⁰ https://pact-for-skills.ec.europa.eu/index_en

⁵¹ <https://digital-skills-jobs.europa.eu/en/structured-dialogue-digital-education-and-skills>

⁵² https://ec.europa.eu/commission/presscorner/detail/en/IP_22_4273

⁵³ https://ec.europa.eu/commission/presscorner/detail/en/IP_22_365

⁵⁴ <https://digital-skills-jobs.europa.eu/en>

⁵⁵ <https://digital-skills-jobs.europa.eu/en/about/digital-skills-and-jobs-coalition>

⁵⁶ <https://ec.europa.eu/social/main.jsp?catId=1223&langId=en>

⁵⁷ <https://erasmus-plus.ec.europa.eu/>

⁵⁸ <https://erasmus-plus.ec.europa.eu/programme-guide/part-b/key-action-2/centres-vocational-excellence>

consumers, as well as projects to develop the skills needed for the twin transition. For instance, the **Chemskills project**⁵⁹, an Erasmus + Blueprint project, aims to gather skills intelligence, identify gaps between industry needs and education currently offered, develop a sector-specific skills strategy and design concrete education and training solutions for quick take-up at regional and local levels, and for new occupations.

- The **Skill Alliance for Industrial Symbiosis (SPIRE-SAIS)**⁶⁰ focuses on identifying the most demanded skills in the Energy Intensive Industries, including the chemical sector (**topic 24**). The project, started in February 2020 and due to be finalised by June 2024, is part of the of the Blueprints for sectoral cooperation on skills.

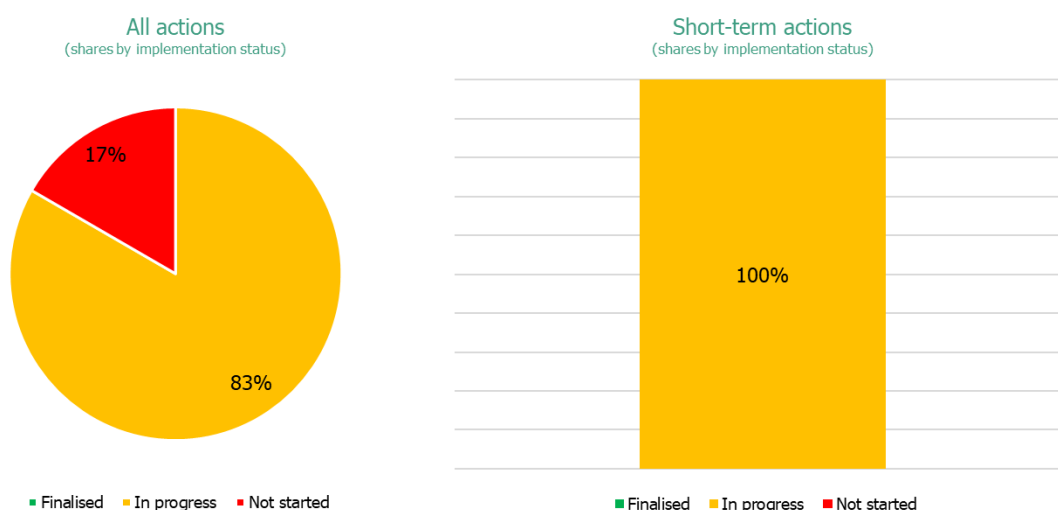
3.8 Social Dimension

The twin transition can potentially create employment opportunities in some sectors, while shifting jobs from others. The Pathway highlights the importance of ensuring a fair and inclusive transformation of the EU Chemical Industry, paying particular attention to supporting workers, households and consumers facing the major challenges. To this end, the Social Dimension building block proposes two topics:

- **Topic 25: Impact on workers and consumers:** social dialogues and communication on the risks linked to the twin transition, as well as regional labour market policies are key measures to avoid negative social consequences.
- **Topic 26: Improve gender diversity and equality in the sector.** This topic underlines a set of actions to address shortcomings in the historical lack of gender balance in the sector. These include the implementation of the EU gender equality strategy and encouraging women to a career in chemistry and chemical engineering programmes.

The co-implementation of 83% all actions of this building block is under way, with 17% not yet started:

Figure 19 - State of play: Social Dimension

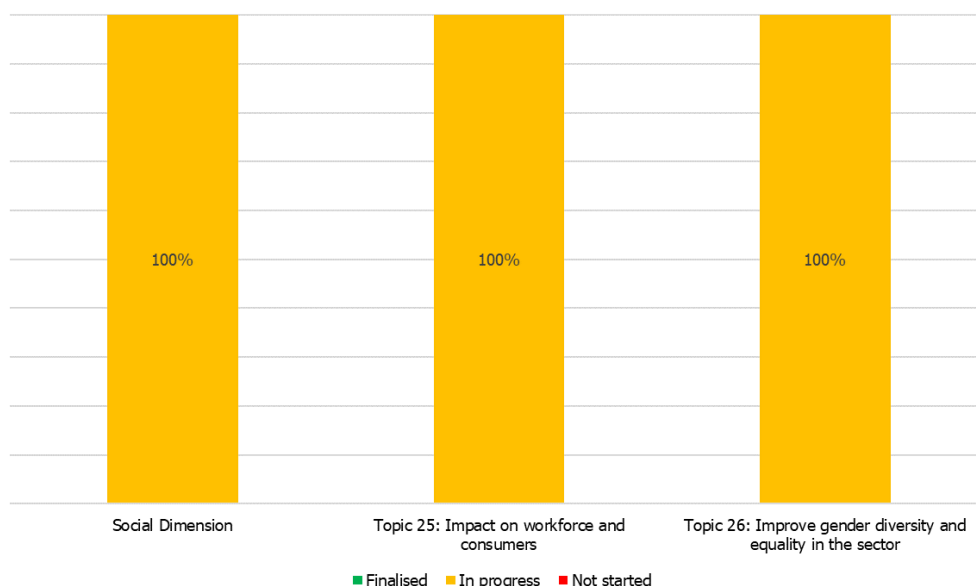


⁵⁹ <https://www.chemskills.eu/>

⁶⁰ https://pact-for-skills.ec.europa.eu/document/download/f394988d-7c7c-48e9-8940-489d93958bcf_en?filename=PfS_ST1.1.2_Blueprints%20paper_final%20update.pdf

Only medium and long-term actions are classified as non-finalised, whereas all short-term actions under **topics 25 and 26** are in progress.

Figure 20 - State of play: topics under Social Dimension
(shares by co-implementation status of the short term actions)



EU actions

- The **Directive on gender balance on corporate boards**⁶¹ provides that, by 2026, listed large companies (with more 250 employees) will need to have 40% of the underrepresented sex among non-executive directors or 33% among all directors of their boards. It is therefore supporting **topic 26** under this building block.
- The **European Social Fund + (ESF +)**⁶² provides Member States with financial support to achieve high employment levels and fair social protection as well as cultivate a skilled and resilient workforce that is ready for the transition to a green and digital economy. The ESF+ finances the implementation of the principles of the **European Pillar for Social Rights**⁶³ through actions in employment, education and skills, and social inclusion.

Stakeholders' actions

- Initiatives received under this building block include the development of analytical tools to assess the environmental and social impacts of chemical production (**topic 25**) as well as career fairs to promote female leadership (**topic 26**).

⁶¹ <https://eur-lex.europa.eu/eli/dir/2022/2381/oj>

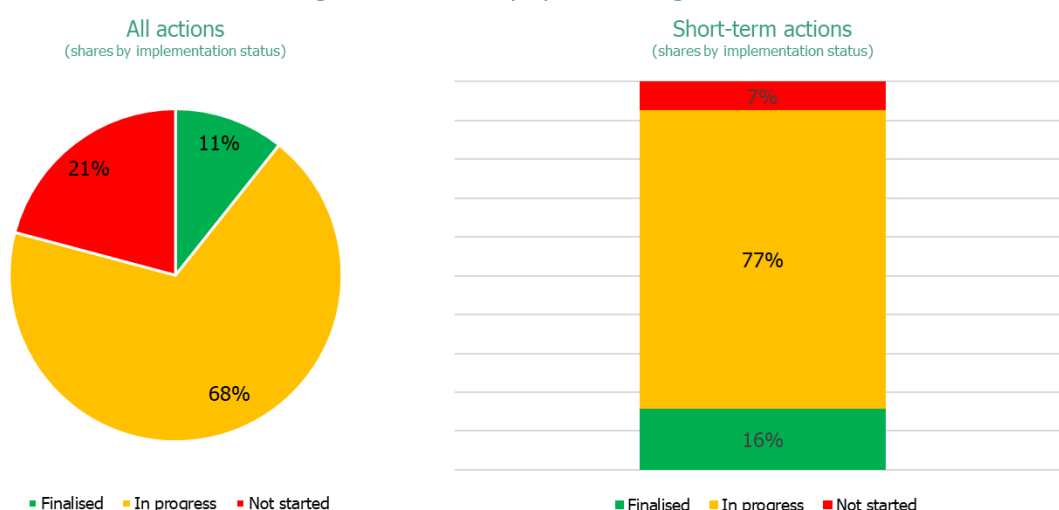
⁶² https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/european-social-fund_en

⁶³ The European Pillar of Social Rights (EPSR) contain 20 key principles and rights intended to build a fairer Europe. It is built around three main sections: equal opportunities and access to the labour market, fair working conditions, and social protection and inclusion. Link: <https://ec.europa.eu/social/main.jsp?catId=1606&langId=en>

3.9 Summary of the results

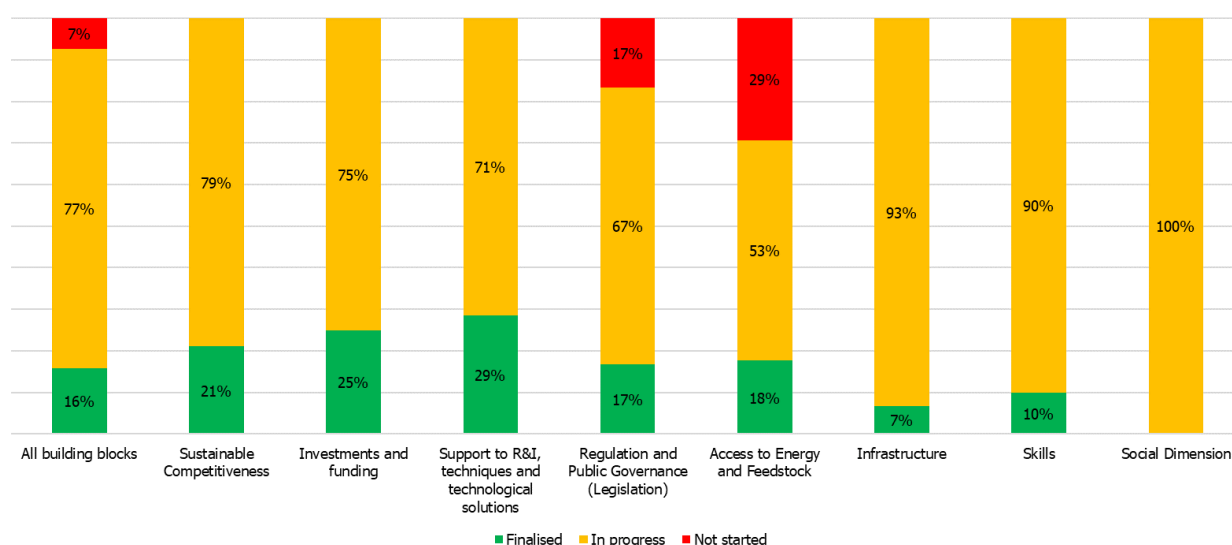
Significant progress has been achieved during the first year of co-implementation. More than three quarters of the 187 actions of the Transition Pathway have been started. 11% have been finalised, while 68% are in progress. In line with the expected timeframe for implementation highlighted in the Pathway, 75% of the finalised actions are short term, whereas 80% of the non-started actions are medium or long term. The main results of the co-implementation process are summarised in the table below:

Figure 21 - State of play: All building blocks



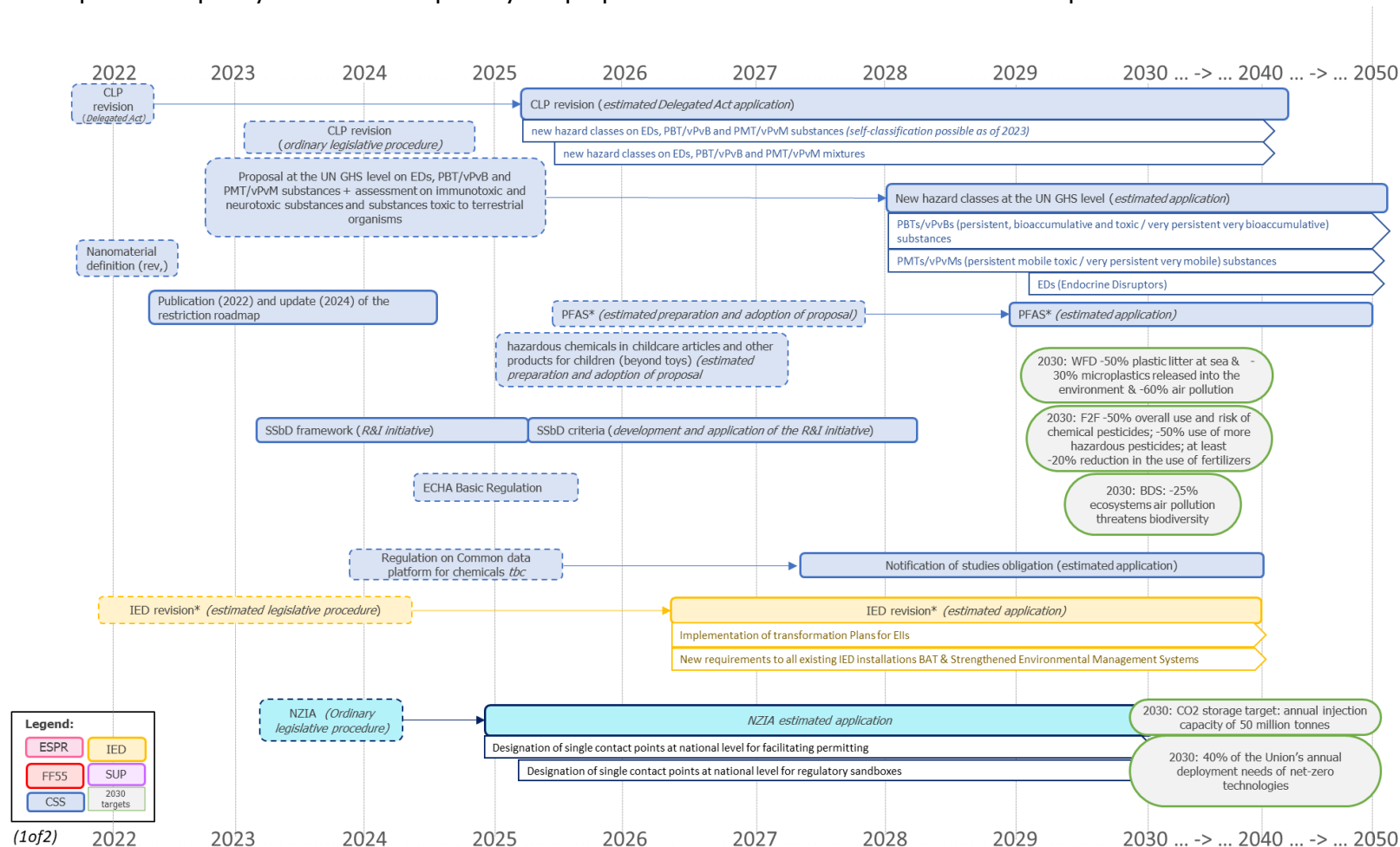
The building block on **Research and Innovation** accounts for the highest share of finalised short-term actions at almost 30% of the total. These actions include the conceptualisation (TRL 1-5) and development (TRL 6-7) of new technological solutions, covered **by topic 8 and 9 respectively**. **Investment and Funding** as well as **Sustainable Competitiveness** have more than 20% of the short-term actions finalised, whereas none of these actions under the **Social Dimension** has been concluded. On the other hand, **Access to Energy and Feedstock** presents the highest proportions of non-started actions. This is mainly because 50% of the actions under topic **16: feedstock substitution** have not been started yet.

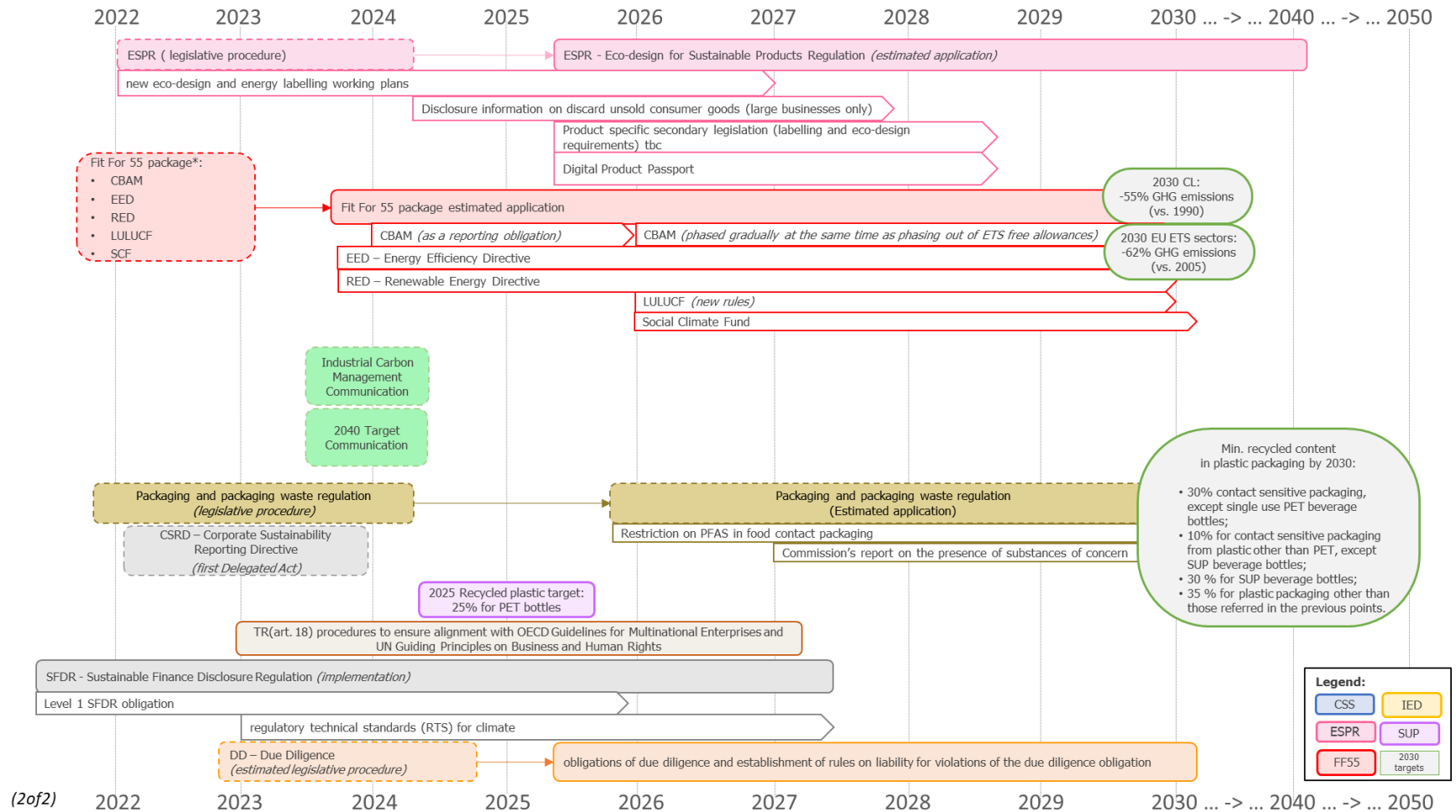
Figure 22 - State of play: All building blocks
(shares by co-implementation status of the short term actions)



4. Updated regulatory roadmap

The regulatory roadmap provides an overview of existing legislation and major R&I initiatives relevant to the EU Chemical Industry. It has been developed using the best available knowledge at the time of writing. This roadmap includes the latest publicly available information and best-scenario assumptions about the ongoing legislative and non-legislative procedures, as proposed by the Commission. However, the timeline shown in the roadmap remains purely indicative – especially for proposals whose content is still under development.





5. Task Forces

5.1 Task force on Circularity

This task force explored possible challenges and enablers to implement alternative feedstocks in the EU Chemical Industry, focusing particularly on carbon capture utilisation to use CO₂, recycled waste through both chemical and mechanical recycling, and biomass. The task force's members identified a set of barriers to implement these alternative feedstocks, including:

- the need for an enabling policy framework and incentives to support the development and uptake of alternatives to virgin fossil fuels;
- the need to create an open single market for plastics waste, secondary raw materials and CO₂ used in the production of chemicals;
- high investments requirements for both R&D and deployment;
- sufficient availability and accessibility of bio feedstocks at competitive conditions.

Stakeholders also suggested possible actions needed to address these challenges mapped in the table below:

Figure 23 – Enablers to implement circular feedstock based on the feedback from the TF's members

| Feedstock | Enablers |
|-----------------|---|
| CO ₂ | <ul style="list-style-type: none">• Promoting carbon capture utilisation (CCU) under the Emissions Trading System and the Taxonomy Regulation.• Improve permitting on CCU projects.• Support, including financial support through existing instruments e.g. Innovation Fund and Horizon Europe, for the deployment of CCU infrastructure as well as ensure access to renewable hydrogen.• Development of market pull measures for CO₂ based-products. |
| Waste | <ul style="list-style-type: none">• Development of methodologies to calculate chemical recycled content to provide certainty for investments in chemical recycling technologies.• Recognition of credit mass-balance chain of custody with a fuel use exempt model.• Ensure regulatory consistency between waste and product regulations by clarifying the rules at which end of waste status is reached in the chemical recycling process.• Harmonisation between the Waste Shipment Regulation and End of Waste Framework to create a market for waste as a feedstock. |
| Biomass | <ul style="list-style-type: none">• Developing life cycle analysis methodologies for biomass-derived products to improve the comparison with non-renewable products.• Targets for bio-based content in products• Green public procurement criteria for bio-based products.• Strengthen the Circular Based Europe Joint Undertaking (CBE-JU)⁶⁴• Ensuring compliance with the cascading use principle• Ensuring that a single set of sustainability criteria is applied to biomass. |

⁶⁴ <https://www.cbe.europa.eu/>

5.2 Task force on Energy and Feedstock

This task force is focusing on the co-implementation of the action on estimating the future needs for energy and alternative feedstock to ensure the continued production of chemicals under **topic 14**.

Figure 24 – Topic 14

| Topic 14: Anticipate long-term needs for the supply of energy and feedstock resources | | |
|--|--------------------|-----------|
| Actions | Actors | Timeframe |
| <ul style="list-style-type: none"> Estimate the future needs for energy and alternative feedstock to ensure continued production of chemicals | Industry and EU/MS | S |
| <ul style="list-style-type: none"> Evaluate the impact of increases in energy prices | Industry and EU/MS | S |
| <ul style="list-style-type: none"> Consider developing a strategy for the competitive supply of clean energy and strategic raw materials to the EU that takes geopolitical factors into consideration (REPowerEU). Consider evaluating the potential role of eliminating tariffs for supplies of key resources <p><i>(Linked to Topic 2.3 and 15.2)</i></p> | EU/MS | S |

The task force members agreed to use the European Chemical Industry Council (CEFIC)'s iC2050 model to estimate the energy and feedstock needs of the EU Chemical Industry. The model presents the following main characteristics:

- It is a cost optimisation model that considers **18 main chemical products** representing around 66% of the scope 1, scope 2 and upstream scope 3 emissions in the EU Chemical Industry, along with their respective production technologies. Remaining products are treated as an aggregated variable.
- Specifically, **the emission categories covered** by the model are defined as follows: direct process emissions (scope 1); utilities and electricity related emissions (scope 2); upstream feedstock related and utilities related emissions (scope 3); downstream emissions for five polymers included within the scope of the model (scope 3).
- The timeframe of the model is from 2019 until 2050**, with the former being considered as the baseline year to make the estimations.

The model allows to simulate scenarios on the energy and feedstock needs of the EU Chemical Industry, based on a set of input parameters currently under discussion by the TF's members:

- General options:** e.g., emission caps each year; CO₂ prices; economic parameters (such as weighted average cost of capital, discount rates); technology deployment.
- Sectoral data,** e.g., demand for the 18 chemical products in scope; import and export of such chemicals; mechanical recycling rates.
- Industrial data,** e.g., CAPEX; cost of renovation; feedstock, heat and electricity consumption of technologies.
- Feedstocks,** e.g., availability of feedstocks, their costs and GHG footprint.
- Electricity data,** e.g., prices; availability and GHG footprint.
- CO₂ capture, storage and use,** e.g., capture rate; CO₂ transport cost and capacity; CO₂ storage costs and capacity.

- **End of life**, e.g., share of managed waste; lifetime of polymers by use category; incineration of landfilling caps; incineration; share of mechanical recycling share.

Some task force's members pointed out that the model limitations on the inclusion of alternative feedstocks and new technologies are relevant for the twin transition of the EU Chemical Industry. Other members suggested to consider planetary boundaries in the assessment.

5.3 Task force on International Competitiveness

This task force worked on a mandate to develop a set of indicators to support the monitoring and evaluation of the co-implementation of the Transition Pathway for the Chemical Industry.

Based on the suggestions and input provided by the task force's members, the Commission developed an initial list of **29 indicators** with corresponding data sources. These focus on two dimensions:

- 1) **Competitiveness:** it is directly related to productivity growth. The following drivers are likely to affect sectoral competitiveness of the EU Chemical Industry:
 - The sector's capacity to produce products at lower costs, including costs of inputs (e.g., costs of resources such as raw materials and energy) and compliance costs.
 - The technological development and innovation to produce superior products with regards to sustainability and functionality for industrial and final customers. Technological development and innovation are also of primary importance for the costs of inputs.
 - International trade and the attractiveness of the EU Chemical Industry for investments.
- 2) **Twin transition of the EU Chemical Industry:** this dimension covers indicators used to monitor progress against the digital and green transition of the EU Chemical Industry. These indicators relate to the building blocks, topics and actions outlined in the Transition Pathway.

Specifically, the competitiveness dimension comprises **13 indicators**:

Figure 25 –Indicators on Competitiveness

| Competitiveness area | Indicator | Description | Data Sources |
|----------------------|----------------------------------|--|---|
| Market Size | EU 27 chemicals sales | EU 27 chemicals sales both in absolute terms, as a share of the global chemicals markets and vis-à-vis chemical sales in global competing regions | CEFIC's facts and figures |
| | EU27 chemicals sub-sectors sales | EU 27 sales related chemicals sub-sectors, particularly petrochemicals, basic inorganic chemicals, polymers and speciality chemicals and consumer chemicals. | CEFIC's facts and figures |
| | Downstream sectors market value | This indicator aggregates the market value of different downstream sectors, including cosmetics and detergents to aerosols, paints, inks, toners, pressroom chemicals, adhesives and sealants, construction chemicals, | DUCC |

| | | | |
|------------------------------|--|--|---|
| | | fragrances, disinfectants, lubricants and chemical distributors industries. | |
| Costs | Electricity prices | Electricity prices (in €/KWh) by 7 different consumption bands for industrial customers | Eurostat |
| | Natural gas prices | Natural gas prices (in €/KWh) by 7 different consumption bands for industrial consumers | Eurostat |
| | Feedstock prices | Market prices of fossil and non-fossil-based feedstocks ⁶⁵ | European Commission DG AGRI only for EU 27 sugar prices (monthly basis) |
| Innovation | Research and Innovation in the EU 27 Chemical Industry | R&I spending in absolute terms, and as a share of added value in the EU 27 Chemical Industry, and vis-à-vis global competing regions. | CEFIC Sustainable Development Indicators |
| | Number of Patent Applications | Number of chemistry related patents applications (including the following technical fields: organic fine chemistry, biotechnology, pharmaceuticals, polymers, food chemistry, basic materials chemistry, materials and metallurgy, surface technologies, micro-structural and nano-technologies, chemical engineering and environmental technologies). | European Patent Office |
| Trade and Investments | Extra EU 27 chemicals trade balance | Extra EU 27 exports – imports related to chemicals (in value and volume terms, both globally and vis-à-vis competing regions. | CEFIC's facts and figures |
| | Extra EU 27 chemicals subsectors trade balance | Extra EU 27 exports – imports related to chemicals subsectors (petrochemicals, basic inorganic chemicals, polymers and speciality chemicals and consumer chemicals) | CEFIC's facts and figures |
| | Export and imports of chemical products | EU27 exports and imports, both in price and volumes, of chemical products. | Eurostat |
| | Export intensity | Extra EU 27 exports out of sales related to the chemical industry (also vis-à-vis the main competing regions (e.g., China, USA, Japan, Latin America) | CEFIC's facts and figures |
| | Capital spending | Capital spending both in absolute terms and as a share of added value in the EU 27 chemical industry. | CEFIC's facts and figures |

⁶⁵ The Competitiveness TF also suggested the [Independent Commodity Intelligence Service](#) (ICIS) as a data source for feedstock prices. This data source is subscription based. As only easily available datasets have been included in figure 25, the ICIS database has not been directly factored in the list of competitiveness indicators.

Instead, 16 indicators for the twin transition were identified. They cover six out of eight building blocks of the Pathway, as no indicator for Skills and Infrastructure was included.

Figure 26 –Indicators for the twin transitions

| Twin transition indicators ⁶⁶ | | | Interlinkages with the TP | |
|---|---|--|---|--|
| Indicator | Description | Data sources | Topics | Building blocks |
| Accidents at work in the EU 27 Chemical Industry | Number of non-fatal and fatal accidents at work in the EU Chemical Industry | Eurostat (fatal accidents and non-fatal) | Topic 25: Impact on workforce and consumers | Social Dimension |
| Added value as proportion of GDP | Contribution of the EU Chemical Industry as a share of the overall gross domestic product in EU27 | CEFIC Sustainable Development Indicators | Topic 25: Impact on workforce and consumers | Social Dimension |
| Bio-based chemical production | Share of bio-based chemicals turnover (or value added) out of total chemicals turnover (or value added) | CEFIC Sustainable Development Indicators | Topic 2: Reduction of unsustainable dependencies and supply chain vulnerabilities | Sustainable Competitiveness |
| | | | Topic 16: Feedstock substitution | Access to energy and feedstock |
| Employment in the EU Chemical Industry | Number of employees in the EU Chemical Industry | CEFIC Sustainable Development Indicators | Topic 25: Impact on workforce and consumers | Social Dimension |
| Energy Efficiency | Production of chemicals over energy consumption in the chemical sector | CEFIC Sustainable Development Indicators | Topic 2: Reduction of unsustainable dependencies and supply chain vulnerabilities | Sustainable Competitiveness |
| Energy consumption by source | Shares of total energy consumption by different energy sources, including gas, electricity, oil and petroleum products (excluding biofuel portion), heat, solid fossil fuels, non-renewable waste as well as renewables and biofuels. | Eurostat | Topic 15: Economically viable purchase of clean energy | Access to Energy and Feedstock |
| Industrial pollutant releases to air in Europe | Releases into the atmosphere of 91 selected pollutants, which are reported by industry operators to the European Pollutant Release and Transfer Register (E-PRTR). | European Environmental Agency | Topic 10: Deployment of new techniques and technological solutions (TRL 8 to 9) | Support to R&I, techniques and technological solutions |
| Industrial pollutant releases to water in Europe | Releases of pollutants into water of 91 selected pollutants, which are reported by industry operators to the European Pollutant Release and Transfer Register (E-PRTR). | European Environmental Agency | Topic 10: Deployment of new techniques and technological solutions (TRL 8 to 9) | Support to R&I, techniques and technological solutions |
| GHG emissions scope 1 | GHG scope 1 emissions in the chemical industry include emissions resulting from the on-site combustion of fuels to generate energy and emissions directly from production processes. | CEFIC Sustainable Development Indicators | Topic 10: Deployment of new techniques and technological solutions (TRL 8 to 9) | Support to R&I, techniques and technological solutions |
| Generation of waste by waste category (hazardous and non hazardous) | Hazardous and non-hazardous waste generated by the "Manufacture of chemical, pharmaceutical, rubber and plastic products" (NACE C20-C22). | Eurostat | Topic 2: Reduction of unsustainable dependencies and supply chain vulnerabilities | Sustainable Competitiveness |

⁶⁶ Stakeholders also suggested that an indicator on "Sustainable Portfolio Management" defined as the number of companies adopting the World Business Council for Sustainable Development methodology for Portfolio Sustainability Assessment. Such indicator could potentially interlink with the following topics of the Transition Pathway: topic 1: International Competitiveness and topic 3: Safety and Sustainability; No data sources for that indicator have been found.

| | | | | |
|---|--|--|--|--|
| Uses of animals in research and testing | Number of uses of animals in research and testing including for regulatory purposes | ALURES Animal use reporting – EU system | Topic 8: Better conceptualisation of new techniques and technical solutions (TRL 1 to 5) | Support to R&I, techniques and technological solutions |
| Production and consumption of hazardous chemicals | Production and consumption of hazardous chemicals to health and the environment in EU27. | Eurostat | Topic 3: Safety and Sustainability | Sustainable Competitiveness |
| REACH and CLP enforcement indicators | A set of 12 indicators measuring compliance, enforcement actions, training and forum activities related to REACH and CLP as well as a composite indicator aggregating information from all other indicators. | European Commission | Topic 13: Effective and efficient enforcement | Regulation and Public governance |
| Recycled content in plastics | Absolute amount in weight and share of recycled content in new plastic products | CEFIC Sustainable Development Indicators | Topic 2: Reduction of unsustainable dependencies and supply chain vulnerabilities | Sustainable Competitiveness |
| | | | Topic 16: Feedstock substitution | Access to energy and feedstock |
| Research and innovation spending in the EU 27 Chemical Industry | R&I spending in absolute terms and as a share of added value in the EU 27 Chemical Industry. | CEFIC Sustainable Development Indicators | Topic 7: Access to funding | Investments and funding |
| Suppliers in the chemical sector audited for sustainability performance | Number of suppliers with a valid SQAS (Transport Service, tank cleaning stations, warehouse, distributors) or TFS audit (Packaging, raw materials, technical goods, logistics services). | CEFIC Sustainable Development Indicators | Topic 16: Feedstock substitution | Access to Energy and Feedstock |

6. Conclusion and next steps

The report summarises the progress achieved during the first year of co-implementation of the Transition Pathway for the Chemical Industry. The analysis does not reflect in detail each of the 187 actions highlighted in the Pathway. Instead, it aims to provide a general overview of the state of play of the twin transition of the EU chemical industry under the main building blocks of the Pathway based on the best available information at the time of writing.

The analysis shows that concrete initiatives to support the co-implementation of most of the topics of the Pathway have already been undertaken by the EU and Industry. At Member State level, a number of **national transition pathways** have been developed. National roadmaps have already been published for France⁶⁷, Belgium⁶⁸ and Greece⁶⁹ and more are expected to be completed in 2024. Engagement with Member States will be key to ensuring policy coordination at national and EU level.

In parallel, the need to achieve the twin transition while strengthening the competitiveness and resilience of EU industries, such as chemical manufacturing, is becoming a focal point in public discussions. For instance, the European Council Conclusions of 18 April⁷⁰ and the Antwerp Declaration⁷¹ highlighted the importance of a strong approach to reinforce Europe's industrial base and reduce its strategic dependences.

⁶⁷ <https://www.francechimie.fr/plan-de-transition-de-la-chimie-en-france>

⁶⁸ <https://www.essenscia.be/transitieplan/>

⁶⁹ https://iobe.gr/docs/research/en/REP_05_C_16042024_REP_EN.pdf

⁷⁰ <https://www.consilium.europa.eu/media/m5jlwe0p/euco-conclusions-20240417-18-en.pdf>

⁷¹ <https://antwerp-declaration.eu/>

The Commission will continue supporting the co-implementation of the Transition Pathway through the Working Group on Chemical Industry, the call for transition initiatives and the task forces addressing high priority topics.

New transition initiatives will be reviewed and possibly published in 2024. All submissions collected before 18th October 2024 will be considered for the next Annual Progress Report, planned in in Q1 2025.

Moreover, the task forces on **Energy and Feedstock** and **International Competitiveness** will continue to discuss high priority actions of the Pathway. The analysis on long-term energy and feedstock needs is expected to be finalised by autumn 2024. Instead, the Competitiveness task force has started working on a mandate to develop market pull measures to boost demand for sustainable products, particularly those made from alternative feedstocks to fossil fuels. In the view of this new mandate, the analysis done by the **task force on Circularity** on the implementation of CO₂, bio and waste-based inputs in the EU Chemical Industry will be taken over by the task force on International Competitiveness.

The Commission also intends to build on the list of 29 indicators developed by the Competitiveness task force to better support the monitoring on the co-implementation of the Pathway. To this end, the 29 indicators will inform **the European Monitor for Industrial Ecosystems (EMI) project**⁷². Its purpose is to monitor and assess trends as regards of the implementation of the green and digital transition across industrial ecosystems. The first set of industrial ecosystems reports under the EMI was published in Q1 2024. This includes a report focusing on Energy-Intensive Industries (EII) ecosystem. For the next set of reports to be published next year, the Commission will consider developing a more targeted analysis for each of the EIIs, including the EU chemical industry.

Furthermore, the Commission plans to launch a **stakeholder support platform** by 2024: a one-stop-shop for all industrial ecosystems to find the necessary resources and work together on solutions to implement the different transition pathways. The platform will enable stakeholders from the chemical industry and other industrial ecosystems to access a range of content tailored to their interests, including learning opportunities and resources, information on funding and best practices. Stakeholders will also have the opportunity to engage in discussions and collaboration spaces. In parallel, the platform will be used to gather transition initiatives and chart their progress.

⁷² <https://monitor-industrial-ecosystems.ec.europa.eu/about/monitoring-framework>

GETTING IN TOUCH WITH THE EU

In person

All over the European Union there are hundreds of Europe Direct information centres. You can find the address of the centre nearest you at: https://europa.eu/european-union/contact_en

On the phone or by email

Europe Direct is a service that answers your questions about the European Union. You can contact this service:

- by freephone: 00 800 6 7 8 9 10 11 (certain operators may charge for these calls),
- at the following standard number: +32 22999696, or
- by email via: https://europa.eu/european-union/contact_en

FINDING INFORMATION ABOUT THE EU

Online

Information about the European Union in all the official languages of the EU is available on the Europa website at: https://europa.eu/european-union/index_en

EU publications

You can download or order free and priced EU publications from: <https://op.europa.eu/en/publications>. Multiple copies of free publications may be obtained by contacting Europe Direct or your local information centre (see https://europa.eu/european-union/contact_en).

EU law and related documents

For access to legal information from the EU, including all EU law since 1952 in all the official language versions, go to EUR-Lex at: <http://eur-lex.europa.eu>

Open data from the EU

The EU Open Data Portal (<http://data.europa.eu/euodp/en>) provides access to datasets from the EU. Data can be downloaded and reused for free, for both commercial and non-commercial

