

3) SUPPORT TO R&I, TECHNIQUES AND TECHNOLOGICAL SOLUTIONS

According to the International Energy Agency (IEA), if the right technologies reach the market in time for the next 25-year retrofitting cycle – due to start around 2030 – they can prevent nearly 60 Gt CO₂ – or 38% of projected emissions – from existing equipment in energy-intensive industries⁴⁰. This is a once-in-a-generation opportunity to shape the future.

To boost its sustainability – including safety, circularity and resilience – the EU chemical industry also needs to adopt new techniques and technological solutions developed and scaled up through a well-supported policy agenda for R&I and development. The principles of co-creation, diffusion, updating, transformation and directionality should guide this R&I agenda⁴¹. However, there are barriers to the development of this agenda⁴². Specific actions are therefore required to address these barriers at different stages of R&I.

The manufacturing and transport of chemicals is energy intensive, but the industry is constantly innovating to become more energy efficient and to use more low-carbon technologies. Industry representatives report that the EU chemical industry is investing in innovation in advanced materials where the EU must maintain its lead position. They demand regulatory certainty, predictability and incentives to prioritise investments to Europe.

Essentially, there are actions fostering a better conceptualisation of new techniques and technical solutions. Once the conceptualisation is finalised, the development phase follows before the full deployment of new techniques and technological solutions.

A better conceptualisation includes sharing expertise in the implementation of SSbD frameworks considering existing criteria initiatives (e.g. among the IRIS project, the PARC partnership, the OECD, and the World Business Council for Sustainable Development)⁴³ and innovating safety testing and chemical-risk assessment to reduce dependence on animal testing while improving the quality, efficiency and speed of chemical hazard and risk assessments⁴⁴. This should make it possible to promote assessments early on in a chemical's design cycle. Better conceptualisation is also a result of sharing knowledge on and encouraging the use of digital maturity assessment frameworks, such as the European Commission's Digital Maturity Assessment⁴⁵, to support the successful digital transformation of businesses in the chemical industry.

⁴⁰ IEA, 2021. Net Zero by 2050. A Roadmap for the Global Energy Sector.

⁴¹ These principles refer to '[Science, Research and Innovation performance of the EU, 2022 \(SRIP\) Report](#)':

- Co-creation, working and acting together for a better society;
- Diffusion, sharing knowledge across society, territories and people;
- Uptake, turning research into sustainable solutions with social and economic value;
- Transformation, changing the way we consume and produce; and
- Directionality, with R&I leading the way.

⁴² Stakeholders suggest classifying barriers as: (i) financial; (ii) related to legislation; (iii) related to knowledge and digital gaps (e.g. not sufficiently reflecting scientific progress or missing a balanced consideration of gains and risks); (iv) related to technologies; or (v) as related to high barriers to entry.

⁴³ One stakeholder suggests also including the sharing of experiences: (i) on sustainability assessment (including lifecycle assessments); and (ii) on the use of ProScale and UseTOX to assess the toxicological potentials of product systems.

⁴⁴ E.g. predictive toxicology based on improved data and algorithms and increased 'super-performance' or 'high performance' computing power (e.g. leading to the development of virtual human platforms; p.21 [Chemicals Strategy for Sustainability](#)).

⁴⁵ The [Digital Maturity Assessment \(DMA\)](#) framework was developed by the European Commission to support and monitor the digitalisation of businesses using the services of the [European Digital Innovation Hubs network](#). The questionnaire which has

The development of [industrial technology roadmaps](#) could also support the conceptualisation of new techniques and technical solutions. This tool promoted by the Commission aims to accelerate the transfer of research and innovation results into the market for the green and digital transformation of industries across the EU. The roadmaps will address the way forward for research and innovation in the industry in key areas at European and national level. They will have a particular focus on closing the innovation divide between EU countries and making better use of research and innovation results. Stakeholders propose therefore to publish additional technology roadmaps on the circular economy, including roadmaps that focus on the specific needs of the chemical industry as part of [ERA](#); and to develop national roadmaps for a low-carbon or circular chemical sector, where not existing⁴⁶.

A summary of the actions suggested by stakeholders is available in the table below. These actions are grouped by Technology readiness levels (TRLs); which scales the maturity of technologies⁴⁷.

Topic 8: Better conceptualisation of new techniques and technical solutions (TRL 1 to 5)		
Actions	Actors	Timeframe
8.1 Promote safety and sustainability-assessment approaches		
<ul style="list-style-type: none"> Share expertise in the implementation of SSbD frameworks considering existing criteria initiatives 	Industry and MS	M
<ul style="list-style-type: none"> Innovate safety testing and chemical-risk assessment 	Industry and EU/MS	S/M
8.2 Promote the use of Digital Maturity Assessment Frameworks		
<ul style="list-style-type: none"> Share knowledge on and encourage the use of digital maturity assessment frameworks 	Industry and EU/MS	S/M
8.3 Development of an industrial technology roadmap		
<ul style="list-style-type: none"> Publish additional technology roadmaps on circular economy 	Industry and EU/MS	S
<ul style="list-style-type: none"> Consider developing national roadmaps for a low-carbon or circular chemical sector, where not existing 	Industry and MS	S

The next significant stage is the development of new technologies, especially for energy and feedstock sourced from renewable sources and the circular economy. Stakeholders suggest fostering collaboration and partnerships, while also receiving support for the development. For example, by receiving appropriate financial and regulatory support between high TRLs – in particular demonstration and first-of-their-kind plants (e.g. via Innovation Fund) – and lower TRLs (e.g. via Horizon Europe), needed for the development of new breakthroughs.

The table below summarises the conclusions agreed among stakeholders.

been developed, enables the assessment of an SMEs state of digital development before and after the support of the Hub, therefore enabling an identification of the businesses service needs prior to an intervention and the subsequent impact of the support received.

⁴⁶ See executive summary in [ERA Industrial technology roadmap for low-carbon technologies in EIIs](#).

⁴⁷ See https://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/annexes/h2020-wp1415-annex-g-trl_en.pdf

Topic 9: Developing new techniques and technological solutions (TRL 6 to 7)		
Actions	Actors	Timeframe
9.1 Foster collaboration and partnerships		
<ul style="list-style-type: none"> • Increase cooperation between research institutions and universities and industry, fostering applied research and targeting key enabling technologies for industry 	Industry	S
<ul style="list-style-type: none"> • Engage in public-private partnerships (e.g. Processes4Planet, Circular Bio-based Europe) to develop and demonstrate energy efficiency and climate neutral, circularity and zero pollution chemical industry processes (<i>link with topic 5.3.</i>) 	Industry and EU/MS	M
<ul style="list-style-type: none"> • Develop Chemical Data Spaces with the support of the Data Spaces Support Centre to leverage the potential of data exchange for more transparency and manageability 	Industry	S
9.2 Support for development		
<ul style="list-style-type: none"> • Appropriate financial and regulatory support between different levels of technology readiness, including by establishing a community of practice to facilitate the authorisation for first-of-a-kind installations for low-carbon industrial technologies⁴⁸ 	EU/MS	S
<ul style="list-style-type: none"> • Co-implement the strategic research and innovation plan (SRIP) for safe and sustainable chemicals and materials to guide future R&I priorities 	Industry and EU/MS	S

Once technical solutions are demonstrated on an industrial scale, these solutions will need to be efficiently deployed across the industry to meet the objectives of the twin transition. Stakeholders highlighted the role of permitting and commercialisation to this end. In particular, this includes active contribution of the chemical industry in the information exchange organised by the Innovation Centre for Industrial Transformation and Emissions (INCITE) set-up under the revised Industrial Emissions Directive (IED). The Centre will identify emerging techniques worldwide for decarbonisation, depollution and/or increasing circularity in large agro-industrial installations. INCITE will evaluate these new processes and techniques and, if they are deemed ready for use at an industrial scale within a short timescale, will incorporate them in the Best Available Techniques Reference documents drawn up under the Sevilla Process to establish environmental norms for those installations.

Then, stakeholders suggested to assess the potential for cooperation among future potential users to address the investment gap so that innovative low-carbon technologies can timely be brought to the market⁴⁹. Support the development, commercialisation, deployment and uptake (including through 'market pull' and pre-commercial procurement⁵⁰) of new techniques and technological solutions. A summary of the actions suggested by stakeholders is available in the table below.

⁴⁸ As indicated in the ERA Industrial technology roadmap for low-carbon industrial technologies in energy-intensive industries, mentioned above.

⁴⁹ See [ERA Industrial technology roadmap for low-carbon technologies in EIIs](#), action 7.2. ('broad and open platform') above, and the German proposal at COMPET 29 September 2022 to set up a 'platform for transformation technologies'.

⁵⁰ Pre-commercial procurement (PCP) is an approach to public procurement of research and development (R&D) services that is outlined in the [PCP communication](#).

Topic 10: Deployment of new techniques and technological solutions (TRL 8 to 9)

Actions	Actors	Timeframe
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10.1 Permitting and commercialisation

<ul style="list-style-type: none">Active involvement of INCITE on emerging processes or techniques for decarbonisation, depollution and/or increasing circularity in the sector	Industry and EU/MS	S
<ul style="list-style-type: none">Assess the potential for – and design the scope of – cooperation among future potential users to address the investment gap so that innovative low-carbon technologies can timely be brought to the market	Industry and EU/MS	M
<ul style="list-style-type: none">Support the development, commercialisation, deployment and uptake (including through ‘market pull’ and pre-commercial procurement) of new techniques and technological solutions	EU/MS	M/L

4) REGULATION AND PUBLIC GOVERNANCE (LEGISLATION)

The new legislation adopted and soon to be adopted under the European Green Deal covers all aspects of the industry's operating environment. It is an example of how, for the twin transition to be successful and to lead to increased resilience for the EU chemical industry, legislation plays a fundamental enabling role. The '[better regulation](#)' agenda already ensures evidence-based and transparent EU law-making that considers the views of those that may be affected by new legislation. The Commission continuously evaluates and improves EU laws, focusing on changes to laws that will have the greatest impact. Existing and future legislation can address some of the major barriers that currently prevent the twin transition from proceeding. Stakeholders say that these barriers include: (i) the lack of predictability for the timelines of new legislative proposals; (ii) the lack of coherence and consistency between EU legislation and national legislation ('vertical' coherence); and (iii) the lack of legislative harmonisation across entire economic/industrial sectors or across entire value chains ('horizontal' coherence).

More effective and predictable legislation could address these barriers, according to stakeholders. To this end, policymakers and the industry could act on definitions, concepts, and methods. For example, stakeholders appreciated the information on chemical legislation available in the EUCLEF portal⁵¹ and suggested to continuously update the information. Industry also pledges to continue to actively engage in the work of EU public authorities, such as the participation to public stakeholder consultations and expert groups, so that definitions of new concepts recently introduced in the EU legislation can be made available and applied. Meanwhile, stakeholders invited EU and national policymakers to define and explain new concepts introduced by recent EU legislation and policy documents. Finally, stakeholders proposed to develop a sectoral roadmap towards achieving the climate-neutrality objective⁵². Specific actions on more effective and predictable legislation that stakeholders suggested are presented in the table below.

Topic 11: More effective and predictable legislation		
Actions	Actors	Timeframe
11.1 Definitions and concepts		
<ul style="list-style-type: none">Continuously update the EUCLEF portal with information on chemicals legislation	EU	M/L
<ul style="list-style-type: none">Continue to engage actively in the work of public authorities proposing the definition of key concepts mentioned in recent EU legislation and policy documents (CSS, IED, etc.)	Industry	S
<ul style="list-style-type: none">Define and explain new concepts introduced by recent EU legislation and policy documents⁵³	EU/MS	S

⁵¹ The EU Chemicals Legislation Finder (EUCLEF) is a tool funded by COSME and powered by the ECHA (European Chemicals Agency) that helps to identify which pieces of legislation apply to each substance. It consists of a search engine for regulatory information on chemicals enabling companies, and especially SMEs, to find out how their substances are being regulated in the EU and what their legal obligations are: <https://echa.europa.eu/legislation-finder>.

⁵² In line with Article 10 of the European Climate Law: 'The Commission shall engage with sectors of the economy within the Union that choose to prepare indicative voluntary roadmaps towards achieving the climate-neutrality objective set out in Article 2(1). The Commission shall monitor the development of such roadmaps. Its engagement shall involve the facilitation of dialogue at Union level, and the sharing of best practice among relevant stakeholders'. <https://europa.eu/!b9jcXm>.

⁵³ A stakeholder suggested some examples: definition of 'recycled content' and definition of 'end-of-waste'.