Action 12:

Accelerate the green/digital transition of Europe's key industrial ecosystems

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Member State/associated country/stakeholder[1]: UAS4EUROPE

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[Indicate the organisation, name, position, e-mail address.]

The action includes the following types of activities:
[These are examples of activities, in which the country or organisation could participate in. For more detailed information, including the objectives, please refer to the explanatory document(s) of this action.]

12.1. ERA Industrial technology roadmaps
- Implementation of the ERA industrial technology roadmap for low-carbon technologies in energy-intensive industries - development of integrated low-carbon technology roadmaps/sector-specific programmes in EU Member States, and for example use the Policy Support Facility (PSF) - Country and/or participation in a Mutual Learning Exercise (MLE) (and workshops).
- Development of the ERA industrial technologies roadmap for circular industrial technologies roadmap and business models, addressing the ecosystems of energy-intensive industries, construction and textiles. Cooperation and contributions on national strategies and programmes and policy conclusions/evidence collection on relevant technology infrastructures and business models.

12.2. Technology Infrastructures
- Contribution to the roadmapping of technology infrastructures and to evidence collection on national capacities, strategies, policy initiatives, and relevant technology infrastructures via the ERA Forum subgroup on industrial roadmaps, the EIC Forum and the European Strategy Forum on Research Infrastructures (ESFRI).
- Contribution to the piloting of technology infrastructure strategy through implementation of the provisional activities identified for the pilot areas (e.g., access, training, engagement with stakeholders).

For Activities 12.3, 12.4 and the "processes":
- Contribution to consultation with a view to establishing the scope, workplan and deliverables for the activities of action 12 (esp. designing and planning Member States' input and cooperation);
- Contribution to the implementation of the activities 2023-24 including e.g.
  - Exchange of best practices
  - Participation in workshops
  - Organising events
  - Stakeholder consultations, collecting input and validation of results analysis

Comments, planned or ongoing activities regarding the implementation of the action[1]:
[Activities at the level of countries or organisations can be shared in this box. The activities could include national measures (e.g. reforms, initiatives, studies), the participation in EU-level activities, which are described in the explanatory document, and the engagement in transnational activities with other Member States, associated or third countries. Moreover, any other comments can be added.]

As institutions focused on applied research and skills development that promote the sustainable development of the regions that we serve, we are highly committed to contributing to the acceleration of the green and digital transition of Europe's key industrial ecosystems. This is indeed a core task of our member institutions at the regional level, in particular working with industry to adapt to the twin transitions through knowledge transfer and skills development. We strongly endorse an effort to do so in a coordinated fashion at EU level.

We commit to a strong
- Participation in a Mutual Learning Exercise (MLE) (and workshops),
- Contribution to the road-mapping of technology infrastructures,
- Contribution to the piloting of technology infrastructure strategy through implementation of the provisional activities identified for the pilot areas (e.g., access, training, engagement with stakeholders)
- Contribution to a consultation with a view to establishing the scope, workplan and deliverables for the activities of action 12 (esp. designing and planning Member States' input and cooperation);
- Contribution to the implementation of the activities 2023-24, in particular through
  - Exchange of best practices
  - Participation in workshops
  - Organising events
  - Stakeholder consultations, collecting input and validation of results analysis

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[1] Please fill in these boxes.

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EXPLANATORY DOCUMENT

Action 12. Accelerate the green/digital transition of Europe's key industrial ecosystems

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1. Description	ERA action 12 will develop and put in place key R&I policy tools which connect R&I and industrial innovation strategies. Both the green and digital transitions call for increased R&I investments, notably by industry, and timely scale-up and deployment of results by industry, including SMEs and start-ups.
	The EU develops world-leading research but too often fails in the scale-up and market commercialisation of its most relevant R&I results. In order to improve this, there is a need to focus public investments of key R&I sectors, stimulate private R&I investments and address key challenges for uptake and roll-out. The European Green Deal is the EU's growth strategy and "roadmap for action" to achieve climate neutrality by 2050, but it is also a long-term vision for a greener, fairer, more resilient society with its ambition for significant greenhouse gas emissions reduction by 2030 and promoting efficient and sustainable uses of resources in the EU. It clearly calls for being faster than "business as usual" in order to ensure timely achievement of its goals for climate, environmental protection and the circular economy, combined with the objective of global leadership, technological sovereignty and competitive sustainability. Digitisation and the use of digital technologies by industry needs to accelerate to match the ambitions of the Digital Compass [COM(2021) 118 final] and to maintain competitiveness vis-à-vis non-European market leaders in the digital industrial eco-systems and leaders in R&I investments.
	The needed tools and strategies require strategic and joint engagement by policy-makers, industry and R&I stakeholders. Cooperation among universities and with the industrial ecosystems is mutually beneficial in this respect, with the higher education sector supporting skills development for industry and the business sector.
	ERA Action 12 has a strategic focus on the role of industry and industrial R&I for the twin transitions and increased resilience. This exposé outlines the implementation of this specific action through the set of activities and objectives, as defined in the ERA Policy Agenda.
	The action would require the establishment of an ERA Forum sub-group.
	Objectives:
	• Create a stronger **link** between **research** & **innovation** and **industrial** policies

- Encourage systematic **transfer of R&I results** into EU industrial ecosystems, also through the development of an appropriate technology infrastructure landscape.
- Mobilise private and public **R&I investments** for a faster development and deployment of key green technologies, technology infrastructures, knowledge, and business solutions to move ahead in the digital and green twin transitions and develop more resilience.
- Foster the **preparedness of the key actors and industrial ecosystems** concerned, to adopt and work with new knowledge, skills, infrastructures and technologies.

Action 12 consists of *four activities* and *two "processes"* as follows:

Activity 12.1: Development of industrial technology roadmaps on low-carbon technologies for energy-intensive industries and on circular industrial technologies and their follow-up to create the basis for a broader policy approach

The 'New ERA' aims to speed up the transfer of research results into EU industrial ecosystems through the development of common industrial technology roadmaps with Member States, industry and relevant stakeholders to include R&I investment agendas from fundamental research to deployment.

The work with Member States is essential to collect and develop targeted R&I strategies for the green and digital transitions. The industrial technology roadmaps:
- Build on the strategic research and innovation agendas of relevant partnerships;
- Provide evidence on relevant technologies from basic research to deployment, with emphasis on cross-cutting approaches;
- Review evidence on investments and support instruments; point to framework conditions for R&I and deployment;
- Aim at facilitating common investment agendas from basic research to deployment, with particular attention to widening countries and SMEs.

The work on industrial technology roadmaps on low-carbon technologies for energy-intensive industries and on circular industrial technologies started in 2021 and continues in 2022 in cooperation with the ERA Forum for Transition sub-group. The first ERA industrial technology roadmap for low-carbon technologies in energy-intensive industries was published on 8 April 2022, whereas the second one on circular industrial technologies and business models is currently in development and envisaged to be published in Q4, 2022.

The roadmaps provide the first steps on Transition Pathways for relevant EU industrial ecosystems under the updated Industrial Strategy [COM(2021)350].

This activity will focus on:

- **Implementation of the ERA industrial technology roadmap for low-carbon technologies in energy-intensive industries, notably by facilitating the development of integrated low-carbon technology roadmaps and/or sector-specific programmes in EU Member States.** The Commission intends to facilitate a deeper exchange of information and experience. This aims at ensuring that European and national support mechanisms and investment agendas work together to mobilise and support the identified R&I priorities, large-scale and first-of-a-kind demonstrators and uptake by industry at the needed pace and in an inclusive manner. **Responsibilities and implementation**: This would require active participation in the exchange of information and experience, interest and commitment of Member States to develop their own roadmaps/sector-specific programmes, and for example use the Policy Support Facility (PSF) - Country and/or participate in Mutual Learning Exercise (MLE) with the aim to develop low-carbon technology roadmaps for their country and participate in MLE workshops to exchange best practices. **Output:** (i) publication of PSF-Country studies and dissemination; (ii) publication of MLE reports and dissemination; (iii) increase the number of national industrial technology roadmaps of EU Member States; (iv) contribute to closing the innovation divide and increasing SME support.

- **Development of ERA industrial technology roadmap for circular industrial technologies and business models, addressing the ecosystems of energy-intensive industries, construction and textiles.** This will continue the ongoing cooperation with Member States to collect and discuss existing national strategies, instruments and supporting schemes. The evidence collection will specifically address the available information on the role of technology infrastructures to foster the development and uptake of the identified key technologies and business models. **Responsibilities and Implementation:** Member States provide and discuss information on national strategies and programmes, which will also be included in the roadmap. Industrial and R&I stakeholders, including relevant Horizon Europe partnerships, will be involved through consultations. A workshop for industry experts is scheduled on 31 May/1 June 2022 and another one is foreseen about a week later. Member States and key stakeholders will be invited to contribute to and validate the analysis of the role of technology infrastructures. **Output:** (i) publication of the ERA industrial technologies roadmap on circular technologies, Q4, 2022; (ii) dissemination and sharing of best practices of EU Member States; (iii) findings of the circular technologies roadmap will develop better understanding of the technology infrastructures and potentially justify the need for establishment of Europe wide-technology infrastructure network (possible pilot area).

The aim is to make more targeted use of existing evidence to enable a continuous transfer of R&I results into the economy, with a focus on closing the

innovation divide in Europe and strengthening the role of SMEs in both development and uptake. Member States and the Commission, as well as key stakeholders, could also assess new concepts for industrial clusters, strengthening development and transfer of R&I in the industrial eco-systems and at national and regional levels.

Activity 12.2: Development of a coordination mechanism to provide industry with the technology infrastructures needed to test, validate and upscale innovations.

The European Research and Technology Infrastructures (RIs and TIs) are essential for functional and efficient European RD&I ecosystems in Europe. TIs play a key role in the ERA policy agenda action 12, in particular for its outcomes one and five[2]. The TIs are the accelerators and enablers for building bridges between excellent science and the market. They are recognised as a key element to accelerate the process *From Lab' to Fab*. Technology infrastructures are understood as *facilities, equipment, capabilities and support services required to develop, test and upscale technology to advance from validation in a laboratory up to higher TRLs prior to competitive market entry. They can have public, semi-public or private status. Their users are mainly industrial players, including SMEs, which seek support to develop and integrate innovative technologies towards commercialisation of new products, processes and services, whilst ensuring feasibility and regulatory compliance* (European Commission Staff Working Document (SWD 2019/158). Examples of TIs can be found from Technical Annex of action 12.

The activity will be based on the (i) ERA policy agenda outcomes for action 12, (ii) key challenges identified in the *Staff Working Document on technology infrastructures* (2019) and (iii) recommendations in the JRC policy brief on *Towards the Implementation of an EU Strategy* for Technology Infrastructures (2021):

- **Analysing TIs in pilot areas:** The Commission will establish a **pilot TI Advisory Board**, following a call for expression of interest, with members from Industry, SME/Business associations, Research Performing Organisations, Universities, RI and TI operators, including the ERIC Forum, and Member States, notably through ESFRI, the ERA Forum Subgroup on industrial roadmaps, and the EIC Forum, to identify **pilot** TI **areas** and advise on relevant support activities. The areas of low carbon technologies for energy-intensive industries and on circular industrial technologies will be part of this pilot. The pilot areas will serve as a model to: (1) *enable a better understanding of the relevant TI landscape and value chains by policymakers and users*, (2) *foster*

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[2] European Research area policy Agenda action 12, the <u>outcome one</u>: Consultation process on R&I-related needs of industries, including skilling/upskilling needs, digitalisation, R&I driven standardisation, common technology roadmaps, and research and technology infrastructures. (European Research area policy Agenda: Overview of actions for the period 2022-2024, page 16).
European Research area policy Agenda action 12, <u>outcome five</u>: Development of a coordination mechanism to provide industry with the technology infrastructures needed to test, validate and upscale innovations. (European Research area policy Agenda: Overview of actions for the period 2022-2024, page 16).

accessibility of TIs and inter-connections between complementary TIs at European level and (3) to *establish synergies with the ERA industrial roadmaps process in view of testing the policy approach in the context of action 12*. The access conditions for TIs will be developed in cooperation with TI managers and users to ensure that access is granted to any interested user on a transparent and non-discriminatory basis and on market terms. Work will take stock of the ongoing landscape analysis methodology of RIs including the revised Charter of access of RIs foreseen in ERA action 8 *Strengthen sustainability, accessibility and resilience if research infrastructures in the ERA*. **Responsibilities and implementation:** EU Member States and stakeholders commit to (i) follow the work of the pilot advisory board and development of access conditions through the ERA forum sub-group on circular industrial technologies, (ii) reflect best practices of access conditions and national and trans/national access needs of SMEs and industry. **Outputs:** (i) Proposal for pilot areas and their selection methodologies, **Q3 2022.** (ii) A roadmapping methodology for TIs reflecting the needs of specific technology and/or industrial areas, **Q1 2023.** (iii) Kick-off development of TI access conditions (including synergies with RIs providing services to industrial users and a framework of enhanced and harmonised access conditions of TIs incl. IPR and data management aspects), **Q3 2023.**

- **Consolidating the European Strategy for TIs:** First, a roadmapping methodology to underpin the European TI landscape will be developed in cooperation with Member States and stakeholders, including users. This will require 1) a stock taking of the policy initiatives and programmes to support TIs at regional, national, and European levels, 2) developing a mechanism to link sectorial roadmaps, prioritisation, and coordination of investments in TIs at EU level (supported by a bottom-up value chain approach for roadmapping and gap analysis with respect to user needs to identify future needs of TIs). **Responsibilities and implementation:** The Commission, supported by the pilot TI Advisory Board, will propose an overview of the current landscape of TIs by using information gathered from Member States and stakeholders. EU Member States will provide examples of best practices and information on current national initiatives and programmes to support TIs. **Outputs:** (i) Report based on stocktaking of policies and programmes in support of TIs, **Q1 2023.** Second, **European Strategy for TIs** will be proposed by the Commission to support sustainability, accessibility, and resilient services of TIs, and facilitate science-based solutions and innovations linked to policy priorities. The strategy for TIs will build on successful European models, such as the ESFRI roadmap process or services developed under the Digital Europe Programme; the results on the pilot areas, the roadmapping methodology developed following consultation of national policies and schemes, and the input of stakeholders (e.g., TI operators, research performing organisations, public and private users). **Responsibilities and implementation:** EU Member States and stakeholders commit to (i) follow-up on the preparation of the Strategy for TIs, (ii) provide feedback and response to Call for Evidence on the Strategy for Technology Infrastructures launched by the Commission. **Output:**

Adoption of the Strategy, **Q3 2023.**

Activity 12.3: Develop a robust policy framework to better support industrial R&I from <u>fundamental/low TRLs research</u> at national and European levels to generate breakthrough knowledge and innovation for greener future industries.

This activity can be inspired by best practices at national and regional levels and the work of the European Innovation Council (EIC) which identifies and supports breakthrough technologies and game-changing innovations, both outlined in industrial technology roadmaps. The EIC provides agile support across the full innovation spectrum from early-stage research to the scale-up of genuinely innovative SMEs with the potential to become market leaders. In doing so, it creates valuable links between researchers and innovators, boosting their capacities to create new markets and disrupt the existing ones.

In 2022, EIC introduced a novel scheme for cooperation with national and regional authorities through the EIC pilot Plug in, deployed under the EIC Accelerator. The scheme enables responsible national/regional funding bodies to assess the innovation or market deployment potential of an existing national or regional project and decide whether the project is suitable for support under the EIC Accelerator. This way the proposed projects skip EIC application phase 1 and are directly invited to prepare a full application for the EIC Accelerator to one of the cut-off dates within the next 12 months following initial review. In 2022 there are 36 certified national programmes participating in the Plug in pilot.

For the past years, various topics on green and digital transition have been included in the EIC challenge portfolios and have attracted large number of researchers and innovative start-ups and SMEs. Examples of dedicated 2022 funding, targeted at achieving climate neutrality by 2050, include: carbon dioxide & nitrogen management and valorisation; mid-long-term systems-integrated energy storage; process and system integration of clean energy technologies, decarbonisation of hard-to-abate industries; energy; zero emission mobility solutions. In the digital area, topics such as DNA based digital data storage; green digital devices; quantum technologies, edge computing applications, space and critical security technologies underpinning the EU Open Strategic Autonomy are among the topics funded through the EIC Work Programme 2022.

By providing real solutions to the big environmental, digital and health challenges faced by our societies, EIC creates synergies in different deep technology science-related areas and facilitates the adoption of game-changing innovation opportunities arising from the newest deep tech research. The signals, trends and insights from the EIC funding portfolio can, therefore, support the development of a robust national and European level policy framework fostering breakthrough knowledge and innovation. In addition, the way EIC supports the transition from research to commercialisation can provide

valuable insights and best practices to be followed by the member states.

Based on identified technology trends, roadmaps for research plans and targets are developed. Catalysed by improved and harmonised TI access conditions, technologies are then developed via TIs covering low to high TRLs. This ultimately leads to an accelerated transfer of results to the market.

The activity focuses on transfer of fundamental/low TRL research results:

- **Stocktaking, forecasting and roadmapping of key technologies of the future.** The Commission will provide a portfolio analysis (clustering, trends) on proposals selected for funding with specific focus on green/digital, including on their level of technology readiness, identification of weak signals and Horizon scanning of emerging technologies and breakthrough innovations. **Responsibilities and implementation:** EU Member States commit to (i) contribute to stocktaking and forecasting. **Output:** Identification of new research areas requiring policy support and intervention. (Q tbd)
- **Identifying a European Strategy for transferring results to the market** The Commission will promote the exchange of best practices on technology transfer (TT) in the EU, including Intellectual Property (IP) practices, or scale-up demonstrators, (link to ERA policy agenda action 7 *Upgrade EU guidance for a better knowledge valorisation*) and strengthening European networks dedicated to technology transfer. **Responsibilities and implementation:** EU Members States and stakeholders commit to (i) Promote the dissemination and uptake of best practices and the professionalism of technology transfer intermediaries (e.g., TTOs). **Output:** Better level playing field with increased cohesion among MS and regions. (Q tbd)

12.4: Address the _social adaptation_ of the green (and digital) transitions.

Inclusiveness and a just transition will be key ingredients of success. Further to the analytical and advisory capacity of research, and the human, diversity and gender aspects of the transitions and their impact, this concerns employment, working conditions, the future of work, skills and talent, living conditions, acceptance of and engagement in innovation and changes, welfare and wellbeing, prosperity at large. The concept of Industry 5.0 puts the human together with true sustainability at the heart of industry's role for the society.

Member States and the European Commission need more societal engagement and better understanding of the strengths and weaknesses in development and uptake of key industrial innovations for the twin green and digital transitions and increased resilience as part of industrial value chains and transition pathways, and for taking into account cultural and regional diversity.

Finding skilled labour is rapidly becoming an even bigger concern for all EU industrial ecosystems against the background of the European demography. This is also relevant to the European Commission's initiative on the **Pact for**

Skills, which is a shared engagement model for skills development in Europe. Companies, workers, national, regional, and local authorities, social partners, cross-industry and sectoral organisations, education and training providers, chambers of commerce and employment services all have a key role to play.

Advanced service-driven, digital, green, sustainable and entrepreneurial skills are needed in order to increase the European innovation potential, inter-sectoral mobility, development and market uptake of new technologies. Up-skilling and re-skilling are key elements of ensuring that: (i) companies have sufficient and skilled workforce to respond to their evolving needs, (ii) researchers across Europe have adequate skills for their collaboration with local business, start-ups, SMEs, European level and global industry and, (iii) research performing organisations have capabilities to answer to the growing needs of high quality remote testing, validation and up-scaling services for innovations delivered by research and technology infrastructures across Europe.

This is particularly important for the green transition because people need to feel empowered and informed in order to change their lifestyles and behaviors, while at the same time industrial transformations can impact their work and lives. The EU Missions on Adaptation to C*limate Change*, *Climate neutral and Smart Cities*, *Restore our Ocean and Waters* and *Soil Deal for Europe* are focused on Green Deal goals. They will not only catalyse major research and innovation efforts, but also help to connect with citizens and to inspire confidence in the transitions ahead. Therefore, we propose that this activity links to EU missions.

Specific activities will be co-created with the Member States and stakeholders in the ERA Forum, taking into account other relevant ERA actions (e.g., on the future of work in Action 11 *An ERA for green energy transformation*). In particular, European Universities have a strong role in this action through their research and knowledge on society.

Processes related to all the four activities above:

1) Consultation process on the R&I-related needs of industry, including skilling/upskilling needs, digitalisation, R&I driven standardisation, common technology roadmaps, and research and technology infrastructures related to activities 12.1, 12.2 and 12.3.

The Commission will engage with the ERA forum and stakeholders to define the objective, scope and format of such a consultation process, considering the experience, mechanisms and institutions related e.g., to consultations on European as well as national R&I priorities in different fields (Framework Programme, work programmes, Missions, Partnerships, Industrial technology roadmaps etc.). While the ERA forum can provide one platform to establish a consultation process on these aspects, there are other channels through which consultations could take place and which need to be connected. For example, in the context of technology infrastructures, it will be necessary to have

targeted consultations for specific technology areas to identify needs and capabilities of infrastructure users and operators. These will be an integral part of the work on technology infrastructures. Other aspects to be considered are skilling/upskilling needs, digitalisation or R&I driven standardisation. Consultation will also build on other related activities and consultation processes such as for skills.

2) Development of a policy approach to link industrial and R&I policies, notably on how to accelerate the industrial take-up of R&I results and launch pilots in industrial ecosystems

In line with the mutual references of the ERA to deployment and the Industrial Strategy to the input from R&I, it is timely to develop a policy approach on the links between industrial and R&I policies; in particular, ensure that there is a shared understanding on the objectives and toolkit allowing such links.

There are two complementary strands of action:

- Develop a policy approach in a specific thematic area, bringing all tools together which are addressed under this action; this could for example be done for the areas addressed in the two technology roadmaps. Based on these roadmaps, Member States and key stakeholders commit to the implementation of the identified priorities and investment agendas.
- Develop a policy toolbox to foster industrial R&I and, based on the experience and best practices gained with R&I strategies in different industrial and technological areas. This would be developed in cooperation with Member States and stakeholders in the ERA Forum, with links to the Industrial Strategy and the Industrial Forum, and could take the form of a report, or also manifesto or Council conclusions. During this process, potential pilot areas for applying the policy toolbox could be defined.

The steps to develop the policy approach will include sharing best practices on:
- a "whole governmental" approach and using the public support toolbox to support the acceleration of the green and digital transitions (e.g., in the field of circularity and decarbonisation of energy-intensive industries), covering R&I from basic research to deployment of new technologies and solutions
- impact of different thematic, European, and national strategies including for dissemination, standardisation, knowledge valorisation and Intellectual Property (IP) practices, or scale-up demonstrators etc.
- partnering with higher education and research performing organisations to help develop the necessary skills and reskilling.
- Developing indicators and key datasets to monitor R&I investments at European and national levels. (For the area of low carbon technologies this consultation would link to the revised SET-Plan and the Energy Union reporting, as well as the Industry Strategy and the ERA policy

	agenda action 11.
2. Actors	The action will involve participants from Member States, Associated Countries, and stakeholders including industry, business associations, research performing organisations, EU technology infrastructures, research infrastructures and universities, through their membership in the ERA Forum, sub-group for action 12 and consultations in the context of this action.
	It is important that adequate links are established with representatives of the Industrial Forum, Horizon Europe partnerships and EU Missions.
	The ERA Forum sub-group of action 12 will establish a bridge with the European Innovation Ecosystems through the EIC Forum Sub-group on data, which will be used as platforms for exchange of best practices and consultation.
3. Timing and milestones	**12.1: Industrial Technology Roadmaps** o Continued preparation of the circular technologies roadmap through consultations with Member States and relevant stakeholders (Q1-4, 2022) o Dissemination of results of the first ERA industrial technology roadmap for low-carbon technologies in energy-intensive industries (Q2, 2022) o Launch ERA Forum sub-group (Q3, 2022) o Publication of the ERA industrial technologies roadmap on circular industrial technologies and business models (Q4, 2022) o Kick-off implementation of the low-carbon industrial technologies roadmap: facilitate development of integrated low-carbon technology roadmaps and sector-specific programmes in EU Member States (Q1, 2023) o Launch discussions on development of indicators and key data sets to monitor R&I investments at European and national levels (Q2, 2023) **12.2: Technology Infrastructures** • Establishment of a small pilot advisory board (Q2 2022) • Selection of pilot areas for technology infrastructures to identify and reflect the needs of key industrial technology and circular economy roadmaps (Q3 2022) • Developing a roadmapping methodology for TIs the at EU level and kicking-off the development of technology infrastructure access conditions (including synergies with research infrastructures) (Q1 2023) • Adoption of a TI Strategy (Q4 2023) **12.3: Transfer of fundamental/low TRL research results to industrial R&I** • Stocktaking and forecasting key technologies of the future. Q (tbd) • Promote exchange of best practices on technology transfer (TT) in the EU (link to ERA policy agenda action 7 on valorisation). Q (tbd) **12.4: Social adaptation of the green (and digital) transitions**. • Contributing to EU missions focused on Green Deal to enhance societal impact and social adaptation of action 12 Q (tbd)

	The timeline for the activities 12.3 and 12.4 will be co-developed with the ERA Forum and stakeholders.
	Consultation process on the R&I-related needs of industry, including skilling/upskilling needs, digitalisation, R&I driven standardisation, common technology roadmaps, and research and technology infrastructures
	• Scope defined – (Q tbd)
	Development of a policy approach to link industrial and R&I policies, notably on how to accelerate the industrial take-up of R&I results and launch pilots in industrial ecosystems
	• Exchange of best practices (Q1-4, 2023)
	• Delivering the policy approach (Q4, 2024)
4. Funding	Monitoring of R&I pipeline for development and uptake:
	• Horizon Europe (ongoing and planned in cluster 4), including own Framework Contract under DG RTD
	• Foresight on Demand Framework Contract used for ERA industrial tech roadmaps (until Q4 2022)
	• DG RTD/JRC EU Industrial R&D Investment Scoreboard
	National roadmaps/implementation:
	• Recovery and Resilience Plans and National Energy Plans of the Member States, national funding schemes (e.g., targeting low-carbon tech and/or circular solutions) with to the Strategic Energy Technology (SET) Plan
	• Participation in/synergies with co-programmed, co-funded and Institutionalised European Partnerships under Horizon Europe
	• Other EU programmes – ESIF, Horizon Europe, Digital Europe, Innovation Fund, InvestEU, etc.
	• Technology infrastructures: There is no dedicated programme for TIs in Horizon Europe or previous Framework Programmes although some activities have partly contributed.
	• Funding sources from Horizon Europe Pillar 2 and at national level may need to be explored to roll out new TI access models, close possible gaps not covered by the existing programmes, and bridge the European innovation divide.
	• Synergies with Cohesion Policy and Recovery and Resiliency Facility as well as links to EIC instruments could be further explored.
5. Expected impact	• Increased private R&I investment into key industrial solutions for the twin green and digital transitions
	• Better understanding of specific RD&I investment needs to develop and take up key industrial technologies in different EU industrial ecosystems
	• Better targeted and synergised national and EU funding to leverage more private R&D&I investment and the uptake of key industrial technologies enabling the twin green and digital transition
	• Strengthened industrial-academia cooperation on the development of technologies and necessary skills

	• Acceleration of the process from lab' to fab' • Improved support structures to increase uptake of low-carbon technologies and circular technologies by companies (incl. SMEs and Start-ups) across the EU and in particular in widening countries • Better accessibility and understanding of European research and technology infrastructures and their services to users across the EU. • A mechanism for further investments in existing and new technology infrastructures, reflecting the evolving R&I landscape and forefront science and priority areas. These individual impacts will together lead to increased excellence, competitiveness and inclusiveness of the ERA and an acceleration of the transfer of R&I results "from lab to fab" and key industrial solutions for the twin green and digital transitions.
6. Monitoring	As regards the part following up industrial technology roadmaps: • Increased number of national R&I strategies for development/uptake of cross-sectoral and sectoral industrial solutions for the twin transitions • Increased public and private R&D&I investment into sustainable and digital industrial solutions • Increased number of meetings for exchange of best practice of industrial solutions for the twin transition • Increased number of best practices adopted in different Member States • Increase of breakthrough technologies developed by start-ups and SMEs • Strengthened adoption of breakthrough technologies and uptake of key industrial solutions in widening countries. As regards the part following up on technology Infrastructures, the preliminary thoughts for observations and monitoring are: • Reports of Advisory board (incl. implementation plans, methods and tools to roll out the pilot policy areas identified by the advisory board and selected by the European Commission). • Explore how the ERA scoreboard could support the monitoring and how practical indicators could be included. • Monitoring of inputs from Member States and stakeholders including through links with the ESFRI process. • Funding schemes as indicators (interest of MSs across Europe), number of funding and access schemes in place? • Deliverables and outputs of monitoring for implementation of ERA policy agenda 12 actions Each planned outcome consists of one or more specific milestones, as indicated under point 3 above. Achievement of these milestones will enable monitoring of the implementation of action 12. Monitoring of activities 12.3 and 12.4 will be co-designed together with the Member States. At the same time, several qualitative and quantitative elements will contribute to this monitoring.

7. Communication	**Communication actions scheduled for 2022 – 2023 (incl. Actions and events already implemented):** o **Technology Infrastructures in European Innovation Ecosystem event** organised by TNO and Neth-ER **(Q1 2022)** o **Industry Days 2022** (energy-intensive industries ecosystem, R&D investment and EU green technologies leadership, Q1 2022). o **First ERA Industrial Technology Roadmap event in Berlin (June 3, 2022).** Other events across Europe will be scheduled throughout 2022-2023, including potential participation in ERA Tour de Capital. o **Upcoming event on technology infrastructures under the French Presidency on 23 June 2022** organised together by the European Commission, EARTO and the CEA. Outcomes of this event will be presented at the INDTECH 2022 conference in Grenoble the week after. o **R&I Days, end-September 2022** o **Industry Days (Q1 2023)** o **INDTECH** presidency **conference 27-29 June 2022** o Reach out to regions (work with JRC/DG GROW/DG REGIO o **CONCORDi conference in 2023** Other communication activities (not scheduled yet): o Communication and launch of an advisory board for pillar II activities for technology infrastructures to support with recommendations and reviews and to promote technology infrastructures. o Development of access conditions for European TIs in close cooperation with TI managers, operators, and users to enhance services for SMEs in the field of data management, open science and IPR. o Targeted communication towards (potential) TI users in specific technology domains. o Communication, which will accompany the publication of the ERA industrial technology roadmap on circular industrial technologies.
8. Additional information	**Key publications and sources:** • ERA industrial technology roadmap on low-carbon technologies in energy-intensive industries (April 8th, 2022), https://ec.europa.eu/info/publications/era-industrial-technology-roadmap-low-carbon-technologies-energy-intensive-industries_nl • Circular industrial technologies roadmap (factsheet), March 2022, https://op.europa.eu/en/web/eu-law-and-publications/publication-detail/-/publication/a6ba8896-afd5-11ec-83e1-01aa75ed71a1 • ERA Common Industrial Technology Roadmaps https://ec.europa.eu/info/research-and-innovation/research-

	area/industrial-research-and-innovation/era-common-industrial-technologies-roadmaps_en • Low Carbon Technologies for Industries in Europe (factsheet), August 2021, https://op.europa.eu/en/publication-detail/-/publication/8d41b32e-fa51-11eb-b520-01aa75ed71a1/language-en/format-PDF/source-search • Pilot, Industrial technology prospect report, June 2021 https://op.europa.eu/en/publication-detail/-/publication/f59d2692-cf12-11eb-ac72-01aa75ed71a1/language-en • European Commission, Staff Working Document on Technology Infrastructures SWD(2019)158 https://ec.europa.eu/transparency/documents-register/detail?ref=SWD(2019)158&lang=en • JRC Policy Brief: Towards the Implementation of an EU Strategy for Technology Infrastructures, European Commission, Brussels, 2021, Taucer, F., Grande, S., Kert, K. and Jenet, A., JRC127798 https://publications.jrc.ec.europa.eu/repository/handle/JRC127798 • JRC Conference and Workshop Report - Towards the Implementation of an EU Strategy for Technology Infrastructures Sophie Viscido, Fabio Taucer, Sergio Grande, Andreas Jenet Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-46502-7, doi:10.2760/761184, JRC128007 https://publications.jrc.ec.europa.eu/repository/handle/JRC128007 • EARTO Paper: Setting-up a European Strategy for Technology Infrastructures 31 July 2020 https://www.earto.eu/wp-content/uploads/EARTO-Paper-Setting-up-a-European-Strategy-for-Technology-Infrastructures-Final.pdf • Commission report on Industry 5.0

Examples of Technology Infrastructures across a variety of technology areas (non-exhaustive list):

- **Clinatec healthcare platform (Grenoble, France) -** a partnership of CEA, the Grenoble teaching hospital (CHU), INSERM (French Institute of Health and Medical Research) and the Joseph Fourier University - uses a multidisciplinary approach to drive innovation in micro and nanosystems for healthcare, speeding up proof-of-concept testing and transferring new medical technologies to manufacturers.

- **Tecnalia (Spain): Harsh Lab 1.0 -** an advanced floating platform 1 mile off Armintza's coast (Bay of Biscay, Spain) designed for the evaluation of materials and components against corrosion, ageing and fouling phenomena in real offshore environment. Harsh Lab allows the evaluation of standardised probes and components both in splash and immersion zones. It focuses on the extension of the lifecycle of the components and equipment in harsh environments. This offshore laboratory can handle up to 125 samples in atmospheric zone and 600 in splash/immersion. The development of HarshLab has been supported by the Basque Government and by the European Union through the Operative Program ERDF (European Regional Development Fund) of the Basque country 2014-2020.

- **The Brandenburg Innovation Centre for Modern Industry (IMI) (Germany) -** IMI is a Digital Innovation Hub that provides local businesses with information on the transition towards Industry 4.0. The Centre operates a model factory with demonstrators of key technologies that are shaping the new manufacturing environment. Services include workshops and round-table discussions to analyse the modernisation needs and innovation potential of individual SMEs, support the implementation of these businesses' projects, as well as information activities.

- **Imec (Belgium): The FAB3 300mm Cleanroom -** facility comprises of state-of-the-art tools supporting the research towards further scaling integrated circuit technology used to develop and produce ultra-small chips. Apart from that, Imec has state-of-the-art semiconductor 300mm research cleanroom (7,200m^2) and a (5,200m^2) 200mm cleanroom as a flexible platform to fabricate prototypes by using process steps that are not available off-the-shelf in a foundry. Various specialised labs are on-site.

- **DTI (Denmark): Centre for Industrial 3D-printing facility** (over 1,400m^2) **-** gathers all the processes around 3D printing production, developed over many years via, amongst others, FP7 and H2020 projects. The centre's focus is to demonstrate and develop the industrial potential of 3D printing in production in Denmark and there are four metal printers. Danish companies can thus have items printed in metal and at the same time have access to test a full production line for the development and 3D printing of components and parts that can later be implemented directly in their own production.

- **Łukasiewicz - ITEE (Poland): Centre for Sustainable Technologies and Circular Economy -** supporting small and medium-sized enterprises in the field of innovative industrial technologies as well as technical and environmental safety. The Centre is equipped with unique, independently developed research systems and technological installations, which ensure effective and efficient execution of research and application tasks in the field of mechatronics and optomechatronics, advanced plasma technologies, passive building support, circular economy, technical safety and environmental protection. The Centre for Sustainable Technologies and Circular Economy is supplemented by the Prototype Centre, which enables the transformation of the developed model solutions to higher TRLs - up to a verified and tested prototype.

- **RISE (Sweden): AstaZero - Active Safety Test Area -** the world's first full-scale test environment for future road safety. A unique feature of the facility is the different traffic environments that make it possible to test advanced safety systems and their functions for all kinds of traffic and traffic situations. Built in the frame of Swedish Strategic Innovation programme for Vehicles (FFI) allowing SMEs, start-ups and universities to use the infrastructure. AstaZero is mainly used by larger

companies, Swedish and international, even though SMEs and start-ups are increasingly using the facility.

- **VTT (Finland): Bioruukki Pilot Centre** (10.000m^2) - a unique innovation and demonstration platform for bio- and circular economy process concepts and businesses. Bioruukki supports solving technology and innovation challenges e.g., in low carbon energy solutions, efficient biomass refining, new biomass-based products, recycling and waste utilisation and sustainable chemicals. All the required expertise, modelling and piloting capability is under one roof. Bioruukki combines the expertise of more than 500 specialists and works in partnership within an innovation ecosystem composed by companies, start-ups and researchers in the Otaniemi Technology Hub of Finland and internationally.