Action 12. Accelerate the green/digital transition of Europe's key industrial ecosystems	
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1. Description	**Background** The **European Green Deal** 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. Research and innovation, which helps to bring new clean industrial solutions to the market, is key to achieve these goals. Cooperation between universities and research performing organizations (RPOs)/RTOs and industry in industrial ecosystems is mutually beneficial in this respect, given their respective roles in basic and industrial research, and education and skills development for industry and the business sector, as well as for personal development purposes [COM(2022)16]. Moreover, the digitization and use of digital technologies by industry needs accelerating in order 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. This exposé sets out how DG R&I proposes to implement this action through a set of objectives and a package of complementary activities, in line with the specific action points of the ERA Policy Agenda. **Objectives of the action 12:** • Create a stronger **link** between **research** 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 technology infrastructures, knowledge, technologies and solutions to move ahead in the digital and green twin transition and develop more resilience. • Foster **preparedness of the key actors and industrial ecosystems** concerned, to adopt and work with new knowledge, skills, infrastructures and technologies. This action consists of four activities underpinned by two processes as follows: **Activities:**

	(1) Development of industrial technology roadmaps on low carbon technologies for energy-intensive industries and on circular industrial technologies. • Finalise the ongoing work for the two roadmaps, addressing a number of industrial ecosystems, which are critical for the green transition (energy-intensive industries, construction, textiles). Continue consultations under the ERA forum (sub-group) and stakeholders. • Following completion of these two roadmaps, the follow-up would address the lessons learned as well as the responses of the European Commission and governments to the findings and conclusions of the roadmaps, including exploration of possible common follow-up actions, such as: • Exchange best practices on a whole governmental approach for R&I priorities and the link to industrial policy. • Work towards an agreement on key indicators for monitoring industrial R&I in the context of EU industrial ecosystems and with regard to deployment, including investments at European and national levels, with the aim of identifying needs to close gaps and accelerate the uptake of R&I results. **2) Development of a coordination mechanism to provide industry with the technology infrastructures needed to test, validate and upscale innovations.** • The coordination mechanism will be developed, based upon the experience gathered from the work on pilot areas that will be selected by a small advisory board to kick-off the development of the technology infrastructure landscape in areas where strong links can be established to the existing work of the industrial forum and the common industrial roadmaps. **3) Develop a robust policy framework to better support industrial R&I from fundamental/low TRLs research at national and European levels to generate breakthrough knowledge and innovation for greener future industries.** • This development can be inspired by the EIC, including its link to basic research results. The development of relevant technology infrastructures and a broader innovation ecosystem should aim at strengthening links between technical universities, research performing organisations and industry at European as well as at national level. **4) Address the social adaptation of the green (and digital) transitions.** Member States and the European Commission need more societal engagement and more detailed and better geographical 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. 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. **Processes**: These processes are 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.** 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 consider are skilling/upskilling needs, digitalisation or R&I driven standardisation. Consultation will also built 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 transport and energy industrial ecosystems.** Although there is a strong legacy of activities at policy or programme level as well as at national and European levels, 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.

	This 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 European and national strategies including fordissemination, standardisation, knowledge valorisation and Intellectual Property (IP) practices, or scale-up demonstrators etc. • partering with higher education to help develop the necessary skills and reskilling. **<u>Details of each of the four activities:</u>** **Activity 1) Development of industrial technology roadmaps on low carbon technologies for energy-intensive industries and on circular industrial technologies** The 'New ERA' aims to speed up the transfer of research results into the real economy through the development of common industrial technology roadmaps with Member States, industry and other stakeholders to include R&I investment agendas from fundamental research to deployment. The European Commission links these roadmaps closely to the Strategic Innovation Agendas agreed with Member States and industry under the Horizon Europe R&I Partnerships. The aim is to facilitate bringing high-potential industrial technologies from basic research to deployment, including providing the necessary framework conditions. Work on two roadmaps started in 2021 in cooperation with a sub-group of the ERA Forum for Transition and has progressed, with finalisation planned for the: • Industrial roadmap on low carbon technologies for energy-intensive industries (March 2022) • Circular industrial technology roadmap (Q4 2022). Specifically, the industrial technology roadmaps on low carbon technologies for energy-intensive industries (EII) and on circular industrial technologies pull together evidence on the state of play in development and uptake of sustainable technologies to drive the green transition in Europe. Based on evidence about developments from basic research to deployment, including the contribution from the EIC, they illustrate the options and needs for the fastest possible rollout of these technologies across different sectors and the EU and identify additional

	R&I needs. **The roadmaps provide the first steps on Transition Pathways for relevant EU industrial ecosystems [COM(2021)350].** ➢ These activities are related to the two processes in Action 12: the development of a consultation mechanism on the R&I-related needs of industry and a policy approach to link industrial and R&I policies, notably on how to accelerate the industrial take-up of R&I results. ***Finalisation of the preparation of the two technology roadmaps and developing lessons learned and follow-up activities*** We propose to finalise the two roadmaps by continuing the ongoing cooperation with Member States. The evidence and state of play relies inter alia on information from Member States and stakeholders on relevant investments, public and private, including notably different support schemes. In parallel, we propose to start the follow up on the conclusions in a deeper exchange of information and experience, aiming at ensuring that European and national support mechanisms and investment agendas help in synergy 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. The experience from these discussions would feed into the development of the policy approach envisaged under this action. The ERA industrial technology roadmaps reveal that measuring the real progress of industrial R&I development remains a challenge. ***Monitoring and analysis of relevant evidence*** at EU-level (such as current TRLs, levels of private and public investment into RD&I, patents/standards, technology transfer, prospective gains in efficiency and/or cost-reduction for industry, regional/national engagement in relevant RD&I) is not enough to provide feedback to policy instruments. However, without a solid approach and the data to measure the functioning of the research and innovation pipeline for novel techniques/solutions in EU industrial ecosystems, policy action to improve that pipeline at EU and national levels remains patchy. Thus, Member States and the European Commission could further discuss the level of detail when it comes to what kind of technologies need to be monitored. Member States and the European Commission could agree on a high-level set of key monitoring indicators and regular exchange of information about key elements for **functioning RD&I pipelines** to inform policymaking at EU and national level as well as follow-up action in the context of the New ERA. The ERA Forum will play a key role in that context. The aim is to make more targeted use of existing evidence to

	enable a continuous transfer of R&D&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 could also assess new concepts for a new dynamic for industrial clusters and Green Hubs strengthening development and transfer of R&I in the industrial eco-systems and at national and regional levels. **Activity 2) Development of a coordination mechanism to provide industry with the technology infrastructures needed to test, validate and upscale innovations** ***Technology infrastructures in the RD&I ecosystem*** The European Research[1] and Technology Infrastructures[2] (RIs and TIs) play a key role in the ERA action 12, in particular for outcomes one and five, as they are essential for functional and efficient European RD&I ecosystems in Europe. 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 *From Lab' to Fab* process. In the broader context of the European research infrastructures landscape, RIs and TIs have each their own specificities and are both important components in an RD&I ecosystem. As underlined in *the JRC Policy Brief* (JRC127798), there is a continuum between RIs and TIs, and they often are complementary: RIs create new scientific knowledge, which is often used by TIs to address the future needs of European society and industry. At EU level, it is evident that links and synergies between the European Strategy Forum on Research Infrastructures

[1] In the European Commission Staff Working Document [SWD 2019/158] on Technology infrastructures, TIs 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."*

[2] *'Research infrastructures' means facilities that provide resources and services for the research communities to conduct research and foster innovation in their fields, including the associated human resources, major equipment or sets of instruments; knowledge-related facilities such as collections, archives or scientific data infrastructures; computing systems, communication networks and any other infrastructure of a unique nature and open to external users, essential to achieve excellence in R&I; they may, where relevant, be used beyond research, for example for education or public services and they may be 'single sited', 'virtual' or 'distributed';* [Title I, Article 2, Regulation (EU) 2021/695 establishing Horizon Europe]

	(ESFRI) and the future EU Strategy for TIs should be established. Therefore, a close link will be established to action 8 of the ERA policy agenda. To be able to achieve the ambitious targets of the *Twin Transition*, research actors, industry and SMEs in Europe need access to both, world-class RIs and TIs, which are integrated at EU, national and regional levels. Building cross-border, long-term and trusted ecosystems will need to start by complementing the existing elements in the RD&I landscape. A stronger pan European integration of RD&I capacities with industry and SMEs will require different types of skills of these actors in the management of ecosystems, networks, business models and user experience. Therefore, the **implementation of ERA action 12 should recognise the alignment with the European Skills Agenda in order to avoid gaps or overlap between the two.** **The European Strategy for TIs** should use ESFRI processes and Digital Europe Programme modalities as sources of inspiration for development of the strategy, options for governance models and involvement of stakeholders. **Stakeholders' involvement (TI managers, public and private users) in the strategy development** is important to support sustainability, guarantee accessibility and resilient services, and to facilitate science-based solutions and innovations in support of EU political priorities. **Access conditions for European TIs and future needs** The access conditions for TIs will need to ensure that access is granted to any interested user on a transparent and non-discriminatory basis and on market terms. Future TI needs should be supported by a bottom-up and value-chain approach for roadmapping and gap analysis in close cooperation with Members States. The EU Technology infrastructures' roadmap shall answer to the needs of specific technology and/or industrial areas, the identification of complementary services, synergies, and an improvement of TI accessibility and visibility. Based on key challenges identified in the Staff Working Document on technology infrastructures from April 2019 and on recommendations from a dedicated JRC policy brief 2021, a set of sub-actions is foreseen to produce the expected outcomes: **Responding to the needs of industry and SMEs and coordination of activities** ○ The European Commission will establish a small pilot advisory board (as a start) for pillar II activities for technology infrastructures (having members from Research Performing Organisations, Technical Universities, Regions, Living labs etc.) as a formalised

	round table to support in making recommendations, reviews and promoting technology infrastructures. o The advisory board will make a proposal to the European Commission on a methodology to be used to launch three to five pilot areas for technology infrastructures, in line with the main policy objectives such as for the European Green Deal, to kick off the development of activities in support of an integrated European technology infrastructure landscape o In concertation with Member States and stakeholders, the European Commission will initiate the development of access conditions for technology infrastructures in collaboration with TI managers (including research infrastructures providing services to industrial users) and users. **Reflection on funding models** o Funding for technology infrastructures, currently provided through various EU programmes, will need streamlining through measures such as subjecting (parts of) funding from existing programmes to support overarching priority setting on TIs. o Stock taking of the policy initiatives and current funding instruments to support TIs at regional, national, and European levels to streamline investments, to understand the gaps and to provide opportunities for benchmarking. o Reflection on a plan for a technology infrastructure funding scheme that allows allocation of funding in areas not covered by other programmes. **Promoting stronger synergies with research infrastructures** o The European Commission will promote the integration of research infrastructure services for industry, that are so far fragmented, into the broader strategy for technology infrastructures and the mapping of technology infrastructure services, thus increasing the visibility and accessibility of these services. o The overall aim is to find a **mechanism to link sectorial roadmaps, prioritisation and coordination of investments in TIs at EU level** and to help identifying future needs of TIs. This would also help to avoid duplication of TIs and services when unnecessary and to ensure and support accessibility across Europe. o **Combining and completing the existing repositories and mappings of TIs at EU level** covering both TIs' locations and the services and facilities they offer could be used to: (1) enable a better understanding of the TIs' landscape by policymakers and users; (2) foster accessibility of TIs (if coupled with efficient platforms for sharing information and adequate marketing campaigns to increase visibility) and (3) create connections between complementary TIs. An action plan for a sustainable mapping methodology, model and tool to be hosted by the European Commission is foreseen as an outcome of the implementation of the ERA actions and European Strategy for TIs.

	Activity 3) Develop a robust policy framework to better support fundamental research at national and European levels to generate breakthrough knowledge and innovation Since its inception in 2018, the EIC (European Innovation Council) has played a critical role in supporting emerging technologies and breakthrough innovations, taking decisive steps towards funding promising projects and innovative companies that contribute to the priorities of the European Green Deal and the transition towards a low-carbon economy. As the most important initiative for breakthrough innovation in the EU, the EIC can provide valuable insights on emerging technology trends in areas such as the electrification of heavy industries, novel routes to hydrogen use, carbon capture and storage (CCS) & carbon capture and utilisation (CCU), circular industrial systems and industrial symbiosis, to name a few. In addition, the EIC can act as a catalyst for the consolidation of sectorial ecosystems in the industrial arena, by bringing together innovative research teams and companies, investors, public authorities (including public procurers) and corporates. In this regard and for the past years, the EIC has launched various activities with the aim of opening new opportunities for collaborations between industry and innovators, as well as fostering public procurement of innovation. Collaboration could also be extended to Members States' authorities, including public agencies or bodies focused on advanced research, breakthrough innovation and support to innovative SMEs, particularly through the sharing of information and good practices. **Activity 4) Address the social adaptation of the green (and digital) transitions** The details of this activity will be co-created with the Member States, ERA forum and other stakeholders.
2. Actors	Actions to improve the monitoring of specific industrial innovation at EU and national level and other follow-up to the industrial technology roadmaps will involve participants from Member States, Associated countries, industry, Research Performing Organisations, EU Technology Infrastructures, universities. It is important that adequate links are established with representatives from the Industrial Forum and Horizon Europe partnerships. In general, the ERA Forum for Transition and the EIC Forum will be used as platforms for exchange of best practices and consultation. If needed a dedicated subgroup bringing together national experts for industrial policy could be seen as added value.

	Leadership of the different elements of the action will be assumed depending on their specificities and the mandate of different actors. For example, the European Commission will lead the preparation of the EU Strategy for TIs, gap analysis and stock taking of the current funding instruments of TIs and related identified gaps. Member States shall offer examples of their current innovative funding mechanisms and models for TIs and their best practices to accelerate the mapping and analysis of the on/going activities in Member States on national and regional levels.
3. Timing and milestones	**<u>Industrial Technology Roadmaps</u>** • **Finalisation of industrial technology roadmaps (work ongoing):** o ERA industrial technology roadmap for low-carbon technologies for energy-intensive industries (mid-March 2022) o Circular industrial technologies (Q4 2022) • **Follow up to technology roadmaps (2022-2023)** o Exchange of best practices and lessons learned o Development of R&I&D indicators for monitoring o Design of additional R&I pipelines by Member States o Development of concepts for new cross-sectoral industrial clusters and Green hubs in cooperation with Member States and with the help of DG R&I Framework Contract (Q4 2022) o Agreement with Member States at ERA Forum (Q1 2024). **<u>Technology Infrastructures</u>** • **Establishment of a small pilot advisory board** (as a start) for pillar 2 activities for technology infrastructures to support recommendations, reviews and to promote technology infrastructures. **(Q2 2022)** • **Selection of three to five pilot areas for technology infrastructures**, in line with the European Commission's main policy objectives, to kick off the development of an integrated European technology infrastructure landscape. **(Q3 2022)** • **Kicking-off the development of technology infrastructure access conditions** (including synergies with research infrastructures, providing services to industrial users and a framework of enhanced and harmonised access conditions of TIs incl. IPR and data management aspects). **(Q1 2023)** • **Stock taking, mutual learning and modelling of the current funding models for technology infrastructures** provided through various EU programmes to create a best practises and funding models' inventory as deliverables. **(Q2 2022)** • **Creation of an EU technology infrastructures' funding plan** that allows allocation of funding in areas not covered by other programmes to fill in the gaps, up-scaling of the existing TIs and research to develop the forefront TIs. **(Q1 2024)**

	The timeline for the other activities and processes will be co-developed with the ERA Forum and stakeholders.
4. Funding	<u>Monitoring of R&I pipeline for development and uptake:</u> • 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 <u>National roadmaps/implementation:</u> • 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) • Co-programmed, co-funded and Institutionalised European Partnerships under Horizon Europe • Other EU programmes – ESIF, Horizon Europe, InvestEU, etc. <u>Technology infrastructures:</u> • Funding for TIs is fragmented at EU, national and regional levels. Unlike the dedicated programme for RIs, there is no dedicated programme for TIs in Horizon Europe or previous Framework Programmes. • To start with, existing funding sources, or at least part of them, need alignment according to EU priorities to be jointly set up by the EU, Member States and stakeholders based on key Industrial sectors. • At a later stage, a dedicated funding strategy plan may be necessary in order to close gaps in the TIs' landscape or in TI's funding that are not addressed by existing programmes. Here, additional funds under Horizon Europe Pillar 2 and at national level will be needed to mobilise the roll out of new TI access models, close the funding gaps not covered by the existing programmes, and bridge the European innovation divide. • Such a strategic funding plan should also consider a specific roadmap for grant based public support to Capital Expenditure Investments (CAPEX) for TIs that can speed up technology development. Furthermore, public investment plans focusing on upgrading of existing TIs are needed. • Synergies between Cohesion Policy and Recovery and Resiliency Facility as well as links to EIC instruments could be further explored. Other funding options will be explored together with the Member States.
5. Expected impact	<u>Key expected impacts of action 12 include:</u>

	• Better understanding of specific R&D&I investment needs to develop and take up key industrial technologies in different EU industrial ecosystems • Increased private RD&I investment into key industrial solutions for the twin green and digital transitions • 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 • Increased quality, quantity and societal impact of R&D&I and the uptake of key industrial technologies enabling the twin green and digital transition • Increased commitments of Member States in their resources • Strengthened industrial-academia cooperation on the development of technologies and necessary skills • Improved support structures to increase uptake of such technologies by companies across the EU and in particular in widening countries • Increased participation in the development of relevant breakthrough technologies and wider uptake by SMEs, fostering their growth opportunities. • Increased sustainability of European Technology infrastructures and the European research infrastructure system as a whole. • Strengthened RI and TI services for academia and industry (large and small), sustainability of such services for different types of users in the context of contemporary scientific challenges and EU policy priorities. • 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. • Thematic networks of TIs with a value-chain approach to integrate and structure the European landscape for TIs in the short and long term. • Capacity building across regions and spreading excellence and expertise to overcome and tackle the European innovation divide. • Dedicated support and funding for network orchestration activities to explore and launch the full potential of TI networks. These individual impacts will together lead to increased excellence, competitiveness and inclusiveness of the ERA and an acceleration of the transfer of research results "from lab' to fab'" and key industrial solutions for the twin green and digital transitions.

6. Monitoring	<u>As regards the part following up industrial technology roadmaps:</u> • 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 exchanges of best practice of industrial solutions for the twin transition • 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. <u>As regards the part following up on technology Infrastructures, the preliminary thoughts for observations and monitoring are:</u> • Reports of Advisory board (incl. implementation plans, methods and tools to roll out five 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 to e.g., a self-registration tool to get these inputs (e.g., a specific box regarding TIs to be included in the ESFRI self-registration tool) • Funding schemes as indicators (interest of MSs across Europe), number of funding ad access schemes in place? • Deliverables and outputs of monitoring for implementation of ERA 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 3 and 4 will be co-designed together with the Member States. At the same time, a number of qualitative and quantitative elements will contribute to this monitoring.
7. Communication	**Communication actions already scheduled for 2022 - 2023:** • **Technology Infrastructures in European Innovation Ecosystem event** organised by TNO and Neth-ER **(Q1 16 February 2022)** • **Event on technology infrastructures under the French Presidency** event organised together by the European Commission, EARTO and the CEA **(Q2, 23 June 2022).** Outcomes of this event will be presented at the INDTECH 2022 conference in Grenoble the week after.

	• **Industry Days 2022** (energy-intensive industries ecosystem, R&D investment and EU green technologies leadership, 8-11 February 2022). **R&I Days** in **June 2022** • **Industry Days (Q1 2023)** • **INTECH** presidency **conference 2022** • Reach out to regions (work with JRC/DG GROW/DG REGIO • **CONCORDi conference in 2023** Other communication activities (not scheduled yet): • 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. • Launch of inventory of the existing funding instruments on EU, national and regional level in close cooperation with Members States and Associated countries. • 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. • Targeted communication towards (potential) TI users in specific technology domains.
8. Additional information	**Key publications and sources:** - Low Carbon technologies industrial roadmap for energy-intensive industries (febr.1, 2022), draft in consultation, https://ec.europa.eu/info/sites/default/files/research_and_innovation/strategy_on_research_and_innovation/documents/ec_rtd_era-low-carbon-industrial-tech-roadmap-final-draft.pdf - 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,

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