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PART 2/2

COMMISSION STAFF WORKING DOCUMENT

Annual Single Market Report 2022

Annexes

Table of Contents

Annex 1: Implementation of the SME Strategy

The EU's SME Strategy[1] includes a wide array of actions aimed to improve SMEs' performance. These actions principally concern capacity-building, access to finance and market access. They have not only helped provide immediate crisis support to SMEs, but are also key to supporting SMEs' recovery and fostering their resilience against future shocks, as well as their green and digital transition.

Fostering the resilience of the EU's SMEs

Recent history has been marked by sudden and severe shocks. These shocks affected all businesses regardless of their size. However, evidence clearly shows that the smaller the enterprise the more vulnerable they are to those shocks. The SME Strategy therefore features measures geared towards preparing SMEs to better withstand future shocks.

Improving access to finance for SMEs is a critical factor in their resilience. Although large amounts of public support measures have ensured continued access to finance during the crisis, it remains important to ensure SMEs can get the financing they need. In the EU's 2021-2027 multiannual financial framework, the Union introduced debt and equity support under its flagship programme InvestEU and chiefly its SME window. InvestEU is expected to considerably increase investments in SMEs, both in capital support and equity financing.

In addition, the European Commission has decided to prolong until 30 June 2022 the State Aid Temporary Framework[2] with two objectives: set out the path towards a progressive phase-out of crisis measures in view of the observed economic recovery, and subject to the evolution of the pandemic, and kick-start and crowd-in private investment for a faster, greener and more digital recovery including through solvency support. The new solvency support tool enables Member States to leverage private funds and make them available for investments in SMEs. This tool is particularly relevant in light of the increasing indebtedness levels since the beginning of the crisis, in particular of smaller companies. It provides access to equity financing that is often difficult for these companies to pool alone. For example, Member States can give guarantees to dedicated investment funds that will reduce risks for private investors and make it more attractive to invest in SMEs, start-ups and small midcaps.

Access to finance is also hindered by late payments, which increased markedly during the pandemic. The average time for an SME to get paid increased from 35 days in 2019 to more than 52 days in 2020, and the average delay in payments from public authorities increased from 9 to 15 days[3]. Even though these numbers slightly decreased in 2021 (to 48 days and 11 days, respectively), they remain substantially higher than before the crisis. The latest survey on the

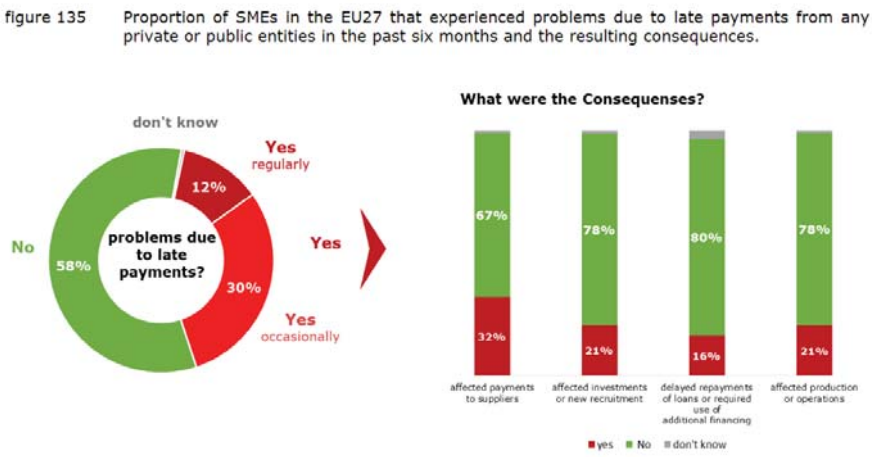
[1] An SME Strategy for a sustainable and digital Europe (COM/2020/103), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0103, see table on Stocktaking of the implementation of the 2020 SME Strategy for a full overview of the implementation of the SME Strategy actions.

[2] Sixth Amendment to the Temporary Framework for State aid measures to support the economy in the current COVID-19 outbreak and amendment to the Annex to the Communication from the Commission to the Member States on the application of Articles 107 and 108 of the Treaty on the Functioning of the European Union to short-term export-credit insurance, 2021/C 473/01.

[3] SME Performance Review 2021, based on the European Payment Report, Intrum.

access to finance of enterprises (SAFE)[4] shows that for those SMEs who experienced late payments, the most common consequence was that it affected their payments to suppliers in turn. Late payments therefore have a cumulative effect that spreads through supply chains, undermining their viability and resilience.

Figure 1a: 42% of SMEs experienced problems due to late payments



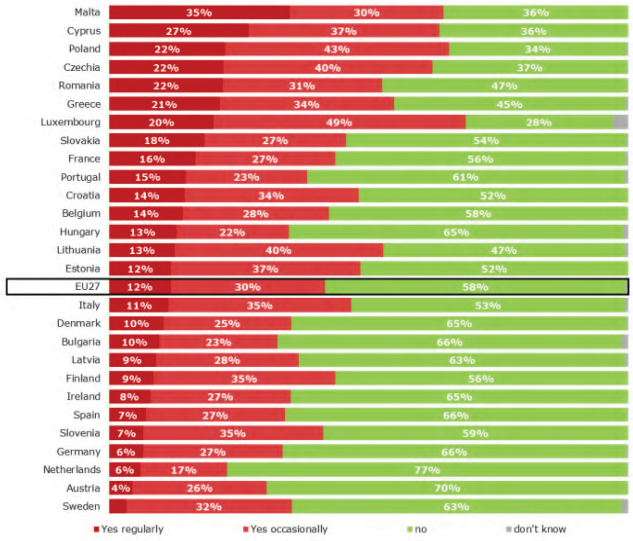
Source: SAFE Survey November 2021

The Commission is working on improving the effectiveness of the Late Payment Directive. A late payment observatory will identify unfair payment performance and practices by public authorities to businesses and in B2B transactions. Pilot work on the observatory is ongoing in the construction sector, consisting mainly of SMEs. Further work in other industrial ecosystems will follow.

Figure 1b

[4] The SAFE provides information on the latest developments in the financial situation of enterprises, and documents trends in the need for and availability of external financing. The survey is available at https://www.ecb.europa.eu/stats/ecb_surveys/safe/html/index.en.html.

figure 136 Proportion of SMEs in the EU27 that experienced problems due to late payments from any private or public entities in the past six months and the resulting consequences, by country.



Source: SAFE Survey November 2021

In addition to financial support, SMEs need the right partners and a level playing field to grow and innovate. Europe's Single Market is the most powerful instrument acting in favour of Europe's innovators. A European Innovation Council (EIC) was established under the EU Horizon Europe programme to identify and scale-up breakthrough innovations that have the potential to create entirely new markets and value networks. The EIC, the European Innovation Ecosystems (EIE), the European Institute of Innovation and Technology (EIT) and the Startup Europe programme help develop new business by creating local connections, and linking them up to learn from each other, catering for their specific needs. Improving the impact of EU funding for "market-creating" innovations is key to making the EU an industrial frontrunner.

Addressing SMEs' challenges of digitalisation, sustainability and capacity-building

Digitalisation has proven to be one of the key factors explaining how well individual SMEs have been able to weather the crisis. The Annual Report on European SMEs[5] unveiled large disparities regarding the digitalisation of SMEs, particularly small SMEs. A much larger proportion of micro SMEs reported focusing only on basic digital technologies and not on advanced digital technologies (36.5% of micro SMEs versus 29.2% of small SMEs and 26.9% of medium-sized SMEs). Although the crisis delivered clear evidence about the importance of digitalisation for the resilience of enterprises, many SMEs still do not consider digitalisation as essential for their business: 59% of SMEs not using ICT believe it is not suitable for their enterprise. EU and national support measures are therefore needed to allow all SMEs to make the transition towards digitalisation.

The SME Strategy has provided important tools to SMEs to master the digital transition. For example, the Digital Innovation Hubs provide access to technical expertise and experimentation as well as the possibility to 'test before invest'**.** They help SMEs improve their business processes, products, or services using digital technologies. They also provide innovation

[5] Full report available at https://ec.europa.eu/docsroom/documents/46062.

services, such as financing advice, training, and skills development that are needed for a successful digital transformation. Member States have already designated their candidate hubs to the European Commission.

The green transition confronts SMEs with similar challenges than the digital one. Only 24% of all EU SMEs have a concrete plan in place to reduce the carbon-footprint of their business and, eventually, achieve climate neutrality. Close to half (46%) of EU SMEs have invested less than 1% of their annual turnover in 2021 in measures to become more resource-efficient and less than a third (32%) have green products in their product range, i.e. goods or services that have the predominant function of reducing environmental risk and minimise pollution and use of resources[6].

The SME strategy includes a number of important support measures to help SMEs succeed the green transition. The SME pillar of the Single Market Programme (2021-2027)[7] and the former COSME programme (2014-2020) include actions to provide support for the transition to sustainability and / or the green transition. As of 2022, Sustainability Advisors will become fully operational within the Enterprise Europe Network (EEN). These advisors will help all types of SMEs in their transition to more sustainable business models by identifying sustainability challenges and opportunities and advising on new sustainable business models, circular economy and resource efficiency. In addition, the European Resource Efficiency Knowledge Centre (EREK), which is an integral part of the European Cluster Collaboration Platform, helps companies by providing tools and services that show new ways to boost resource efficiency and to benefit from circular economy business models. There are other schemes to help address sustainability challenges in specific sectors such as social economy, and tourism which also include some possibilities for third party financing to SMEs. In addition, there is extensive support for patents and Intellectual Property, which helps SMEs invest in new green and sustainable technologies. There are also support schemes for encouraging good practice in sustainability at regional and local level. For example, the Intelligent Cities Challenge mobilises cities for setting up local green deals and support to local businesses is an important component of these.

SMEs also need financial support for green and sustainable investments. Amongst other things, SMEs can access debt and equity financing by contacting the local commercial or public banks that offer financial products for SMEs backed by InvestEU guarantees. This finance is available to SMEs in all sectors, and some of the financial products on offer also have specific environment/climate goals. Pending the full roll- out of InvestEU, similar financial instruments funded under the previous MFF continue to operate. In 2021, the European Innovation Council channelled over EUR 1 billion to start-ups and innovative SMEs.

The Enterprise Europe Network (EEN) and Clusters bring together various actors and offer support to SMEs, including advisory services on access to finance, access to markets, intellectual property rights, technology transfers, innovation and partnering opportunities. Namely, the EEN services are also being upgraded to help SMEs benefit from the sustainable and

[6] 'Flash Eurobarometer 498: SMEs, resource efficiency and green markets', European Commission, 2022, forthcoming.

[7] Single Market Programme - Regulation (EU) 2021/690. More information available at https://ec.europa.eu/info/funding-tenders/find-funding/eu-funding-programmes/single-market-programme/overview_en.

digital transitions and improve their resilience to market shocks, for example by introducing Sustainability Advisors.

Innovative SMEs need to keep protecting and managing their intangible assets, thus strengthening their competitive position and the resilience of national economies. To support this, an Intellectual Property Action Plan was prepared and an Intellectual Property voucher was deployed for post-COVID recovery and green and digital transitions.

On 1 January 2021, the Commission and the European Union Intellectual Property Office (EUIPO) launched the EU SME Fund, which has offered financial support through intellectual property (IP) vouchers for SMEs impacted by the COVID-19 crisis, with the objective to help them manage their IP portfolios. With a budget of EUR 20 million for one year, the Fund offered services to reimburse part of the costs of IP Scan and national trade mark and design registration. More than 12 000 SMEs from all Member States have benefited from the first SME Fund, which provided in total more than 28 000 services. On 10 January 2022, the Commission and the EUIPO launched a second EU SME Fund, with a budget of EUR 47 million, aiming at supporting SMEs in the COVID-19 recovery and green and digital transitions for the next three years (2022-2024). The new Fund counts includes higher reimbursement rates and an extended scope, also covering patents

The Intellectual Property Action for SMEs (IPA4SME), a project funded by COSME, has provided financial and expert support for intellectual property (IP) valorisation and protection services to eligible SMEs, worth up to EUR 15 000. With an overall budget of over EUR 4 million it has benefited more than 750 SMEs so far. It provided a number of support actions for SMEs, such as a) reimbursement of intellectual property pre-diagnostic services and advice on the intellectual property potential of their business, b) financial aid for fees charged by the European Patent Office (EPO) and c) financial aid for costs of external legal advice by intellectual property attorneys.

Innovative SMEs require access to skilled labour as well as an environment conducive to entrepreneurship. The Pact for Skills was launched in November 2020 with a dedicated component for SMEs and a series of stakeholder roundtables. In 2021, 26 Member States and Iceland signed the EU Start-up Nations Standard of Excellence, to ensure that start-ups and scale-ups in Europe benefit from best practices underpinning the world's most successful start-up ecosystems. The Member States commit to take actions including an entrepreneurship-friendly environment and sharing of best practices, and have launched a Start-up Nations Hub to promote exchange among signatory countries.

Important regulatory initiatives benefiting SMEs in particular are under preparation or negotiation. The initiative on short-term accommodation will encourage the responsible development of short-term accommodation rentals and benefit the big number of micro and small companies in the tourism ecosystem. The Digital Services Act and the Digital Markets Act, so as the upcoming Data Act will help SMEs grasp the opportunities of the data /digital economy and also enhance fairness in business-to-business relations.

Stocktaking of the implementation of the 2020 SME Strategy

Colour-coding

Implemented / launched before February 2022

Under preparation

Action	State of implementation
Capacity building and support for the twin transition	
The Commission will enhance and upgrade the **Enterprise Europe Network** including with dedicated **Sustainability Advisors** and other sustainability services to provide SMEs with the necessary support in the twin transition.	Ongoing. The new Enterprise Europe Network has started in January 2022, incorporating the Sustainability Advisors.
The Commission will launch a "**digital volunteers"** programme to allow young skilled people and experienced seniors to share their digital competence with traditional businesses.	Ongoing. A Pilot phase started in May 2021, where digitally skilled staff of large companies support SMEs in their digital transformation. Roll out of the full programme in 2022.
The Commission will develop **Digital Crash Courses** for SME employees to become proficient in areas like AI, cybersecurity or blockchain.	Ongoing. Three online courses are available on the digital skills and jobs platform: https://digital-skills-jobs.europa.eu/en/about/digital-skillup. General action funded under the Digital Europe Programme will start in 2022.
The Commission will update the **Skills Agenda for Europe**, including a Pact for Skills with a dedicated component for SMEs, and will propose a Council Recommendation aimed at modernising vocational	The Commission launched a Pact for Skills in 2020. Dedicated services have been deployed through the Pact, such as a networking and knowledge hub and training centers of excellence providing vocational education and training (VET)

education and training.	to offer support for SMEs. The Council adopted in November 2020 the Commission's Proposal for a Council Recommendation on VET for sustainable competitiveness, social fairness and resilience. Action 6 of the Skills Agenda is supporting skills to accompany the green and digital transitions.
The Commission will expand **Digital Innovation Hubs** in connection with Startup Europe and the EEN to provide a seamless service within local and regional ecosystems.	Ongoing. First grants to be signed in 2022. Many European Digital Innovation Hubs (EDIH) will be based on existing clusters or include organisations that are part of an EEN consortia. Stronger cooperation between EEN, clusters and DIHs will be ensured.
The Commission will allocate at least 300 million Euros to encourage breakthrough innovations delivering Green Deal objectives under the **EIC**.	Ongoing.
For the SMEs which focus their activities on short-term accommodation rental services, the Commission will continue to explore a possible **collaborative economy initiative**.	Inception impact assessment published, public consultation closed. A Commission adoption of this initiative is planned for 2022.
Reducing regulatory burden and improving market access	
The EU SME Envoy and the network of national SME Envoys will contribute to the work of the Commission's Single Market Enforcement Task Force, to be set up as a result of the Enforcement Action Plan, to address among others **gold-plating** in the transposition process with a view to keep the regulatory burden on SMEs to a	The Single Market Enforcement Task Force (SMET) has started its work and the SME Envoy network is involved.

minimum.	
The Commission will encourage Member States to implement the Single Digital Gateway in a business friendly way. Member States link their services in a **one-stop-shop**.	Ongoing.
The EU SME Envoy will **filter** EU initiatives to signal to the Commission those that merit close attention from an SME perspective and have a specific role in the new Fit for Future Platform.	Ongoing.
The Commission will mobilise Member States behind an **EU Start-up Nations Standard** to share and adopt best practices to accelerate growth of high tech SMEs and start-ups.	The European Start-up Nations Standard was launched through a joint declaration in March 2021.
The Commission calls on Member States and their contracting authorities to use the flexibility offered by the **new EU's procurement framework** to enhance opportunities for SMEs including through the use of digital tools and platforms to step up cross border procurement. The Commission will **issue guidance and support to contracting authorities.**	Ongoing.
The Commission will encourage Member States to develop proposals for **regulatory sandboxes** by launching a pilot.	Pilot to be set up in 2022.
The Commission will launch a call for **pioneer partnerships among border regions** to enhance regional cooperation in enforcing the Single Market and removal of administrative barriers.	Ongoing.

The Commission will support the Member States in enforcing the **Late Payment Directive** by setting up monitoring and better enforcement tools and exploring the feasibility of alternative resolution/mediation mechanisms for SMEs. Furthermore, ongoing reflection to identify a roadmap of additional actions, not originally included in the Strategy) to ensure a more targeted response in view of the crisis(e.g. a possible Communication).	Ongoing. The EU Observatory on late payments will monitor payment performance and unfair payment practices by public authorities to businesses and in B2B transactions, across supply chains. Pilot work on the Observatory is ongoing in the construction sector. A Report on late payments indicators for the construction sector was published in September 2021 (https://ec.europa.eu/docsroom/documents/46899). The Alternative Dispute Settlement Resolution Mechanism will make it easier for SMEs to settle unresolved payment claims while preserving the commercial relationship with their clients.
The Commission will facilitate cross border cooperation with and among SMEs under the **European Defence Fund** and map strengths in its research and innovation eco-system.	European Defence Fund-related actions are being deployed over 2021-2027.
The Commission's will launch a **Space Entrepreneurship Initiative 'CASSINI'.**	The initiative was kicked off in 2021 with a series of hackathons in 20 locations across Europe. The preparation for the CASSINI Accelerator, Prizes and Seed & Growth Fund is ongoing.
The Commission will support Member States in transposing the recently adopted Directive on preventive restructuring frameworks and second chance, by **helping them set up early warning mechanisms** for companies in financial difficulties to avoid bankruptcy.	Ongoing. Early warning (EW) mechanisms under the Early Warning Europe network are being expanded. The EW design focuses on providing diagnosis and mentoring to companies in distress.
The Commission will explore with Member States possible measures to create a supportive environment for **transfer of SMEs**.	Commission project on improving the evidence base and data collection methods on business transfers across the EU completed in December 2020.
The Commission will continue to **enhance SME access to**	Free Trade Agreement (FTA) negotiations including SME chapters are ongoing

third country markets including through dedicated SME chapters, use of dialogues to exchange good practices with trade partners and a new information portal. The Commission will facilitate SME access to trade defence instruments.	with several third countries. New 'Access2Markets' (A2M) information portal launched in 2020: https://trade.ec.europa.eu/access-to-markets/en/content
EU Delegations will provide support by addressing queries of SMEs linked to the FTAs.	Ongoing.
The Commission will extend the **Erasmus for Young Entrepreneurs Global scheme.**	Ongoing.
Improving access to financing	
The Commission will **support Initial Public Offerings (IPOs) of SMEs** with investments channelled through a new private-public fund, to be developed under the InvestEU programme under the Capital Markets Union.	Preparatory work ongoing.
The Commission will introduce a first of a kind risk/reward mechanism to boost the size of venture capital funds and crowd in private investments for scaling up through the **ESCALAR initiative.**	Ongoing. Projects are in the process of being signed.
The Commission will launch **a gender-smart finance initiative** to stimulate funding for women-led companies and funds and to empower female entrepreneurship.	Implementation agreement is being finalised.
The Commission will launch a **green tech investment initiative** to pool funding from the EU, Member States and the private sector to increase the access to equity finance	A market assessment is being prepared. Ongoing discussions on InvestEU financing for green technologies.

for innovative SMEs and start-ups that develop and adopt green tech solutions.	
The Commission will launch **a blockchain-based initiative** enabling issuance and trading of SME bonds across Europe, using the European Blockchain Services Infrastructure.	Investigation of existing examples of issuance and trading of SME bonds and scope of the use case is ongoing.
The Commission will co-fund **tech due diligence services** under an EU pilot project to enable more precise valuations high tech start-ups and prepare their investment readiness.	Call for EU pilot project for tech due diligence and venture building linked to the Innovation Radar finalised in 2021 Project(s) to start in 2022.
The Commission will further **simplify the existing state aid rules** on combinations of national funds with InvestEU and Horizon funds. This will make it easier for SMEs to benefit from pooled resources to help them with the twin transitions. Furthermore, as part of its ongoing review of state aid rules, the Commission will **revise state aid rules for risk finance and the IPCEI** communication, to further support SME involvement, ensure crowding-in of private investment while avoiding distortions of the level playing field.	The simplification to achieve synergies with Horizon Europe was introduced in 2021 in the MFF General Block Exemption Regulation. The revised Communication on important projects of common European interest (IPCEI) was adopted in November 2021. The revised Guidelines on State aid to promote risk finance investments were adopted in December 2021. Both apply from 1 January 2022. The revised Guidelines on State aid for climate, environmental protection and energy were adopted and apply as from 27 January 2022. The review of state aid rules for research and development and innovation is expected to be finalised in Q1 2022.
Governance	
The Commission will appoint a high level EU SME Envoy.	The nomination process of the EU SME Envoy is ongoing.
The Commission will reinforce the **SME Envoys Network to strengthen** the link between the EU and national level	Ongoing.

on SME policy.	
The Commission will launch a group of Strategic Entrepreneurship Ambassadors.	Reflections within Commission ongoing.
The EU SME Envoy will raise awareness on SME-related aspects in a **regular dialogue with the Regulatory Scrutiny Board**.	Pending nomination of EU SME Envoy. In the meantime, EU SME Envoy network raises awareness on SME-related aspects.

Annex 2: Stocktaking of the implementation of the 2020 Single Market Enforcement Action Plan

Colour-coding

Implemented / launched before February 2022

Under preparation

Action	State of implementation
Establishment of the Single Market Programme.	• Adopted by co-legislators in 2020.
Single Market Barriers Report.	
Single Market Enforcement Action Plan.	
Action 1. Provide more specific guidance tools for national authorities.	The following guidance documents have been adopted so far: • Guidelines on the practical application of the essential functionality criterion of the definition of a 'video-sharing platform service' under the Audiovisual Media Services Directive 2020/C 223/02. • Guidelines pursuant to Article 13(7) of the Audiovisual Media Services Directive on the calculation of the share of European works in on-demand catalogues and on the definition of low audience and low turnover 2020/C 223/03. • Guidance document on Article 4 of the Market Surveillance Regulation. • Guidance on the Regulation on the principle of Mutual Recognition. • Guidance on the application of Articles 34-36 TFEU. • Guidance document on Article 9 of the Market Surveillance Regulation. • The new Guidance on Innovation Procurement was adopted on 18 June 2021 A series of webinars are being organised to illustrate the key parts of the document starting from 30 September 2021. Three webinars have been organised so far under the series on Innovation Procurement:

	– Preliminary Market Consultations – Ecosystems of Innovation – Intellectual Property Rights and Innovation Procurement • The Notice on tools to fight collusion in public procurement and on guidance on how to apply the related exclusion ground was published on 15 March 2021. • The new guide "Buying social – a guide to taking account of social considerations in public procurement" was adopted on 26 May 2021. A series of short lunchtime talks are being organised throughout 2021 and the first half of 2022 to further promote the guide and good practices in the field of socially responsible procurement. • Works on the Recommendation on Review systems ongoing: a questionnaire submitted to Member States representatives at the meeting of the Network of First Instance Review Bodies on 29 June 2021. • Guidance on Article 17 of the Directive on copyright and related rights in the Digital Single Market was issued in June 2021. • The Communication on taking stock of and updating the reform recommendations for regulation in professional services of 2017 adopted in July 2021.
	• Blue Guide on the implementation of EU for harmonised product rules • Practical application of the new media literacy obligations of the AVMSD: media literacy toolbox is planned for Q1 2022.
	• Practical application of the new media literacy obligations of the AVMSD: guidelines to Member States. • Support to the transposition of the European Accessibility Act (ongoing action). • Setting up platforms for exchange with Member States such as the one used for Public Procurement Directives. • Setting up a central information point on practical questions that civil servants in Member States have in their daily work applying single market law.

Action 2. Improving access to information on rules and requirements for users.	• **Your Europe Portal** became the interface of the Single Digital Gateway on 12 December 2020 and now provides not only information on EU rules and requirements, but also on national ones, both in English and the relevant national language. • Your Europe Portal continues to add links to national websites notified by Member States. An annually updated guidance document helps Member States meet their information obligations under the SDG Regulation. • New module of **Information and Communication System on Market Surveillance (ICSMS)** deployed since April 2020. • In the framework of the SMET project on restrictive measures concerning non-harmonised construction products, a number of questions have been clarified that Member States authorities had concerning the application of the mutual recognition principle and notifications in ICSMS. • Member States registered their authorities responsible for construction products in ICSMS and confirmed that they do have access to the mutual recognition module of ICSMS. Most of the authorities have already been trained for mutual recognition. Further training sessions on mutual recognition are planned. • The **EU Product Contact Points** are empowered by the 'Goods Package' to provide better and faster information to businesses about the rules that apply to their products.
Action 3. Online platforms facilitating compliance of products.	• Horizontal asymmetric due diligence obligations have been included in the Commission's proposal for the Digital Services Act. This includes know-your-business-customer obligation for online platform that allow consumers to conclude distance contracts with traders, which will help in idenitfying sellers of illegal products. • The Digital Services Act is under negotiations in the Council and the European Parliament.
	• The revision of the General Product Safety Directive aims to improve product safety, including in online sales. On 30 June 2021, the European Commission

	adopted a proposal for a new general product safety regulation. The legislative proposal is currently subject of the negotiations by the co-legislators.
	• New EU database on medical devices (EUDAMED) currently under development. Ongoing work: collection, processing and analysis of data related to medical devices in the EU, development of the IT platform with interconnected modules. EUDAMED will contain, inter alia, specific modules on devices and certificates registration, market surveillance, vigilance and clinical investigation. Three modules already released in 2020 and 2021: Actors registration, UDI/Devices registration, Notified Bodies and Certificates.
Action 4. Training and exchange of practices for national judges and practitioners.	• European judicial training strategy for 2021-2024 adopted and European Training Platform[8] launched in December 2020. • Training provided to Member State authorities on the application of the Mutual Recognition Principle for non-harmonised products. • Other actions ongoing.
	• Conference of stakeholders on European judicial training took place in May 2021.
Action 5. Capacity building for national public administrations.	• Ongoing numerous actions under implementation by various Commissions services.
	• The EU Product Compliance Network adopted its Work Programme for 2021-2022 decided on the prioritisation of joint actions and first sectors for the establishment of Union testing facilities, eligible for funding under Article 36 of the Market Surveillance Regulation 2019/1020.
Action 6. Building capacity of public procurement professionals and strengthening the cooperation between	• Regular meetings of the Network of First Instance Review Bodies on Public Procurement - ongoing (the last meeting was organised in June 2021).

[8] https://e-justice.europa.eu/content_european_training_platform-37158-en.do

national bodies.	• High-level training programme in 2021 to improve administrative capacity of Central Purchasing Bodies (a new package of training sessions ongoing: September 2021 – beginning 2022).
Action 7. Structured dialogue for better transposition of Single Market Directives.	• Ongoing monitoring of transposition of the European Electronic Communication Code (EECC) through the Communications Committee and through regular meetings with competent authorities in the Member States. • Regular meetings of the Contact Committee on the Audio-Visual Media Services Directive. • Ongoing cooperation of media regulators within the European Regulators Group for Audiovisual Media Services (ERGA) with voluntary cooperation mechanism put in place at the end of 2020. • Regular meetings of the Copyright Contact Committee. • In 2020, the Commission revamped its IT monitoring system on transposition. • Regular workshops with national authorities in the Company Law Expert Group (CLEG) to support the transposition of the Directive on digital tools in company law (2019/1151) and of the Directive on cross-border conversions, mergers and divisions (2019/2121), Capital Requirements Directive (CRD V) (2019/878/EU), Bank Recovery and Resolution Directive (BRRD II) (2019/879/EU), Investment Firms Directive (2019/2034/EU) and Covered Bonds Directive (2019/2162/EU).
Action 8. Implementation partnership for Single Market Regulations.	• Ongoing, numerous actions under implementation by various Commissions services.
Action 9. Improving ex-ante assessment of restrictive regulation under the Proportionality Test Directive.	• Guidance document on the Proportionality Test Directive is being finalised on the basis of the insights gained from the compliance checks of national implementation measures.
Action 10. Streamlining the operation of the Single Market Transparency Directive (SMTD).	• Development of the strategic implementation of the SMTD, including reinforced participation of and cooperation with Member States as well as the development of a new TRIS IT system (ongoing).

Action 11. Preventing new barriers to providing services in the Single Market	• Ongoing actions including the upgrade of the IMI module used for services notifications, guidance and training provided to Member States, a detailed annual report on the implementation of the procedure and awareness raising. • Other ongoing actions: – Workshops organised on the notification procedure under the Services Directive to increase awareness of Member States. – Trainings provided to Member States authorities on the Services Directive notification procedure.
Action 12. Unlocking the full potential of the notification mechanism under the e-commerce Directive.	• Ongoing, numerous actions under implementation by various Commissions services.
Action 13. Rationalising Single Market IT systems and setting-up a platform for online enforcement (e-enforcement lab).	• The proof-of-concept e-enforcement lab for the consumer protection authorities (EU eLab) is being tested with the authorities from 15 Member States. Subject to approval of Commission's Information Technology and Cybersecurity Board, EU eLab would be available for all CPC network as of early 2022.
	• New interface in IMI for submission of posting declarations in Road Transport sector & information exchange to enforce posting rules in 2022.
	• Establish a single European information entry point for authorities for controls on non-food products, where the existing systems such as ICSMS and RAPEX will be reachable.
	• Integration of the Regulated Professions Database in IMI in 2022.
	• Implementation of the new platform 'Annual Report Official Controls' (AROC) in IMSOC to allow Member States to upload their annual reports using the new electronic version of the standard model form. In 2021, for the first time, all Member States used this platform to upload their annual reports for 2020. • Commission Notice on a guidance document on how to fill in the standard model form in the Annex to Commission Implementing Regulation (EU) 2019/723

	published on 1 March 2021 (2021/C 71/01).
Action 14. Strengthening the fight against counterfeit and illegal products.	• Contribution to the EU Toolbox against counterfeiting. • Cases against imports of illicit or non-compliant medical devices and protective equipment. • Pilot cases against food fraud – Ongoing cooperation between SANTE, OLAF and national authorities. • Development of OLAF's operational activities targeting imports of substandard products, particularly those linked to the Covid-19 pandemic, and continuing active support for activities addressing fight against IPR infringement.
	• Project to verify the implementation of arrangements put in place by Member States to fight fraud in the agri-food chain in accordance with the provisions of Regulation (EU) 2017/625. Two pilot missions were carried out in 2020, followed by 6 fact finding studies in 2021-2022.
Action 15. Strengthening enforcement in the agri-food chain.	• Systematic follow-up of audit recommendations to ensure that Member States implement the actions necessary to correct identified shortcomings by the competent services (continuous) General Follow-up Audits (GFAs) on 8 Member States carried out in 2021 and further 11 GFAs are planned for 2021. • Continuation of 'Better Training for Safer Food' training programme. • Ongoing work on monitoring implementation of Multi-Annual National Control Plan (MANCP) and the review of obligations on Member States and new requirements for MS annual reports.
	• Commission Notice on a guidance document on the implementation of the requirements for the multi-annual national control plans as set out in Articles 109 to 111 of Regulation (EU) 2017/625 published on 8 March 2021 (2021/C 78/01). • Regular meetings of the National Audit Systems (NAS) network. • Commission Notice on a guidance document on the implementation of the provisions for the conduct of audits under Article 6 of Regulation (EU) 2017/625 of the European Parliament and of the Council published on 26 February 2021

	(2021/C 66/02). • Inception Impact Assessment on the review of the Geographical Indications (GIs) published on 28 October 2020. GIview database launched on 25 November 2020 • Ensuring that national schemes in favour of local products in some Member States are compatible with the principle of non-discrimination. • Development of OLAF's operational activities targeting imports of substandard products and continuing active support for activities addressing fight against food fraud.
Action 16. Development of labelling and traceability systems.	• Evaluation of the need to update the digital labelling and traceability requirements started in 2020. • New customs equipment capable of reading and checking the encoded information will be developed as part of the Integrated Border Management Fund 2021-2027. • The Commission will seek the digital submission of compliance information for industrial and consumer products. • External study on cybersecurity of connected products in the Single Market launched in August 2020.
	• Dedicated module in the EU database on medical devices (EUDAMED) for the identification and traceability of medical devices via Unique Device Identification system (UDI) released for voluntary use in 2021.The use of the module will become compulsory according to the transitional provisions set out in Regulations (EU) 2017/745 and 2017/746.
Action 17. EU Product Compliance Network.	• The EU Product Compliance Network has adopted its Work Programme for 2021-2022.
Action 18. Making SOLVIT the default tool for Single Market dispute resolution.	• SOLVIT training to **European Labour Authority** (ELA) staff (including National Liaison Officers). • The Mutual Recognition problem solving procedure became operational on

	19 April 2020. • First Commission Opinion adopted on the application of the Mutual Recognition Principle on 30 September 2021. • ELA Mediation Working Group (Member States, Social Partners and Commission (including EC SOLVIT) drew up **European Labour Authority - SOLVIT Cooperation Agreement** (covering cooperation generally and cooperation on mediation) in the course of 2021. . It was finalised and agreed on both sides in January 2022. The agreement will allow SOLVIT to refer unresolved cases concerning the EU labour mobility rules to ELA for mediation. The ELA mediation procedure is expected to be up and running as from mid-2022.
	• SOLVIT is considered as part of a problem solving initiative in the area of VAT double taxation.
Action 19. Better prioritisation of enforcement action.	• Action 19 is addressed by the Annual Single Market Report. • Continued quarterly reports about structural and recurrent issues detected through the SOLVIT application. • Ongoing work to improve the use of SOLVIT evidence by European Commisison services for policy and enforcement actions. • Ensuring consistent and comprehensive approach in different ecosystems/cross-cutting areas (e.g. public procurement, health products, late payments, construction, authorisation of economic activities, automotives etc).
	• Actions ongoing aiming towards a better articulation between SOLVIT and other types of follow-up of complaints.
Action 20. Clarity and consistency in case handling.	• The Commission's complaint handling system was adjusted to reflect the new requirements on preliminary assessment of complaints, and internal guidance was issued in January 2021.

Action 21. Better use of the EU Pilot system.	• In order to better target and structure the EU Pilot system as a rapid and effective tool, the Commission issued new EU Pilot guidelines on 30 July 2020 resulting in an increase of the use of EU Pilot .
Action 22. Systematic periodic package meetings.	• Package meetings have been organised with all Member States in the areas of responsibility of DG GROW/CNECT/DEFIS (2020-2021).
Setting up a Single Market Enforcement Task-Force (SMET), composed of Member States and the Commission(GROW/SMP).	• Ongoing: Inaugural meeting took place on 7 April 2020. • Based on a strong partnership with the Member States, SMET made real progress quickly and efficiently in addressing some of our major Single Market concerns. • The first SMET Report was published and presented to EU Ministers during the Competitiveness Council on 29 September 2021.
Cooperation network between national enforcement coordinators.	• First meeting took place on 24 November 2020. • Online trainings provided in the Single Market area for national judges and national administration in Denmark, Lithuania and Croatia.
Single Market Scoreboard.	• Being updated to better reflect the needs of end users in the Single Market and to support the European Semester. Single Market Scoreboard 2021 edition published on 20 December 2021.

Annex 3: Stocktaking of the implementation of the March 2020 Industrial Strategy and its May 2021 Update

Colour-coding

Implemented / launched before February 2022

Under preparation

A New Industrial Strategy for Europe (10 March 2020)

Key action	State of implementation
1. Creating certainty for industry: A deeper and more digital single market	
Single Market Enforcement Action Plan and Single Market Barriers Report.	• Adopted in March 2020.
Setting up a Single Market Enforcement Task-Force, composed of Member States and the Commission.	• First report on the work of the Single Market Enforcement Taskforce published in September 2021. • The Taskfoce has met so far in April, June and September 2020 and January, February, May, July, October and December 2021.
SME Strategy for a sustainable and digital Europe.	• Adopted in March 2020.
Ongoing review of competition rules, including the evaluation of merger control and the fitness check of State aid guidelines.	• State aid fitness check completed. • Evaluation of jurisdictional and procedural aspects of EU merger control published. • Review of competition rules ongoing. The Commission adopted in November 2021 the Communication "A competition policy fit for new challenges". • The Regional aid Guidelines were adopted in April 2021. • The revised Communication on important projects of common European interest

	(IPCEI) was adopted in November 2021. • The revised Guidelines on State aid to promote risk finance investments were adopted in December 2021. • The revised Climate, Environmental protection and Energy Aid Guidelines (CEEAG) were adopted in January 2022. • The review of state aid rules for research and development and innovation is expected to be finalised in Q1 2022.
Intellectual Property Action Plan to assess the need to upgrade the legal framework, ensure a smart use of IP, better fight IP theft.	• Adopted in November 2020.
Follow-up to the European Data Strategy to develop an EU data economy, including the launch of common European data spaces in specific sectors and value chains.	• Proposal for a Regulation on European data governance (Data Governance Act) presented in November 2020. The Regulation will empower users to stay in control of their data, and encourage the creation of common European data spaces in crucial sectors. These sectors include health, the environment, energy, agriculture, mobility, finance, manufacturing, public administration, and skills.
	• Common European data spaces in specific sectors under preparation. Specific data spaces have different timelines. • Conceptual work is ongoing in several sectors such as health and finance. In addition the Commission launched in November 2021 a call for proposals under the Digital Europe programme for coordination and support actions aiming at defining the technical architecture and the governance model of several data spaces, among which the green deal, industrial manufacturing, agriculture, mobility, smart communities, tourism and skills data spaces. • The coordination and support actions are expected to start in 2022 and deliver their first results by 2023. At the same time, the Commission is investing in the development of the basic building blocks for the creation of sectoral data spaces

	through its actions supporting the creation of a European Cloud & Edge data infrastructure. Overall, the Commission is going to invest about 400 millions EUR for the creation of data spaces.
Digital Services Act to update and strengthen the legal framework for a single market in digital services.	• The European Commission proposed in December 2020 two legislative initiatives to upgrade rules governing digital services in the EU: the Digital Services Act (DSA) and the Digital Markets Act (DMA). They form a single set of new rules applicable across the whole EU to create a safer and more open, fair and contestable digital space.
Initiative on improving the working conditions for platform workers.	• The Commission adopted in December 2021 proposals to improve the working conditions of people working through digital labour platforms, including: a Communication on Better Working Conditions for a Stronger Social Europe, a proposal for a Directive on improving the working conditions in platform work. Draft guidelines on the application of EU competition law to collective agreements of solo self-employed people have also been published for stakeholders' feedback.
2. Upholding a global level playing field	
White paper on an instrument on foreign subsidies by mid-2020, also looking at foreign access to public procurement and EU funding.	• Following the adoption of the White Paper in June 2020 and an extensive consultation process with stakeholders, the Commission proposed in May 2021 a Regulation on foreign subsidies distorting the internal market. The legislative process is ongoing.
Action plan on the Customs Union in 2020 to reinforce customs controls, including a legislative proposal for an EU Single Window Environment for Customs to allow for fully digital clearance processes at the border.	• Customs Union Action Plan published in September 2020. • Proposal for a Regulation establishing the EU Single Window Environment for Customs Presented in October 2020. Pending adoption by EP and Council.
Swift adoption of the International Procurement	• Proposal adopted and revised.

Instrument.	Pending adoption by EP and Council.
Strengthening the global rules on industrial subsidies in the World Trade Organization.	• Annex to the Trade Policy Review Communication on reforming the WTO presented in February 2021. • The EU will continue discussions and outreach with other WTO Members on industrial subsidies/level playing field.
3. Supporting industry towards climate neutrality	
Strategy for smart sector integration.	• Adopted in July 2020.
A Common European Energy data space will exploit the potential of data to enhance the innovative capacity of the energy sector.	• Ongoing. • The Commission presented A European strategy for data in February 2020 and proposed a Regulation on European data governance as part of its data strategy in November 2020. The Regulation will encourage the creation of common European data spaces in crucial sectors to ensure that more data become available for use in the economy and society, while keeping the companies and individuals who generate the data in control. These sectors include health, the environment, energy, agriculture, mobility, finance, manufacturing, public administration, and skills.
Launch the Just Transition Platform to offer technical and advisory support for carbon-intensive regions and industries.	• Launched in June 2020.
Chemicals Strategy for Sustainability.	• Adopted in October 2020.
Review of the Trans-European Network Energy regulation.	• The Commission adopted a proposal to revise the EU rules on the TEN-E Regulation in December 2020.
EU Strategy on Offshore Renewable Energy.	• Adopted in November 2020.

EU Strategy on Clean Steel.	• Funding proposal for Clean Steel Partnership presented in the context of Horizon Europe in September 2020. • Commission Staff Working Document 'Towards competitive and clean European steel' published in May 2021 in the context of the Update of the industrial strategy. • End of June 2021 Commissioners Gabriel and Breton signed a Memorandum of understanding for 6 partnerships, including the Clean Steel Partnership.
Comprehensive Strategy for Sustainable and Smart Mobility.'	• Adopted in December 2020.
'Renovation Wave' Initiative and Strategy on the built environment.'	• 'Renovation Wave' adopted in October 2020. • Revision of the energy performance of buildings Directive presented in December 2021.
Carbon Border Adjustment Mechanism to reduce carbon leakage, in full compatibility with WTO rules.	• Commission proposal adopted in July 2021 as part of the 'Fit-for-55' package.
4. Building a more circular economy	
Circular Economy Action Plan adopted in parallel with this strategy, including a new sustainable product policy framework.	• Circular Economy Action Plan adopted in March 2020.
	• Sustainable product policy framework to be adopted in 2022 including: – Empowering consumers for the green transition – Substantiation of green claims – Sustainable Products Initiative – Circular electronics initiative (non-legislative) – New design requirements and consumer right.
	• The Commission will also propose an Initiative on the right to repair in 2022.

New Regulatory Framework for Sustainable Batteries.	• Proposal for a Regulation on batteries and waste batteries adopted in December 2020.
EU Strategy for Textiles	• The Commission will present a new EU strategy for sustainable textiles in 2022.
5. Embedding a spirit of industrial innovation	
Communication on the Future of Research and Innovation and the European Research Area to map out a new approach to innovation and ensure the EU budget is used with maximum impact.	• Adopted in September 2020.
Launch Public Private Partnerships in the Horizon Europe programme.	• Single Basic Act for proposed institutionalised partnerships (Joint undertakings) and art 185 (public-public partnerships) adopted by the Commission in February 2021.
	• The Commission adopted a Decision on the approval and signature of the Memoranda of Understanding for 11 co-programmed partnerships in June 2021.
6. Skilling and reskilling	
The Commission will update the Skills Agenda for Europe, including a Pact for Skills, and will propose a Council Recommendation aimed at modernising vocational education and training.	• Skills agenda adopted in July 2020. • The Council Recommendation on vocational education and training for sustainable competitiveness, social fairness and resilience was adopted in November 2020.
Launch of a European Pact for Skills.	• Launched in November 2020.
Communication on achieving a European Education Area by 2025.	• Adopted in September 2020.

New Digital Education Action Plan (2021-2027).	• Adopted in September 2020.
Implementation of the EU Gender Equality Strategy 2020-2025, adopted in March 2020.	• Ongoing.
7. Investing and financing the transition	
Work with Parliament and Council to ensure rapid adoption and implementation of the next long-term budget.	• Agreement in November 2020.
Consider scope for coordinated investment by Member States and industry in the form of new IPCEIs and on the possible follow-up to the first IPCEIs on batteries and microelectronics.	• Second IPCEI for batteries launched in January 2021. • Some Member States and companies have jointly expressed interest to engage in additional IPCEIs, such as next-generation Cloud and Edge Infrastructure and Services, hydrogen, health and a second IPCEI on microelectronics. The Commission monitors several of these projects plans and will assess if and when notified to the Commission under applicable state aid rules.
Review State aid rules for IPCEIs.	• The revised Communication on important projects of common European interest (IPCEI) was adopted in November 2021.
Action Plan on the Capital Markets Union in 2020, including measures in support of integrated capital markets and more funding opportunities for citizens and businesses.	• Action Plan on the Capital Markets Union adopted in September 2020. Implementation ongoing. • Capital Markets Union package adopted in November 2021, including: – A proposal for a European Single Access Point (ESAP) Regulation – Review of the European Long-Term Investment Funds (ELTIFs) Regulation – Review of the Alternative Investment Fund Managers Directive (AIFMD) – Review of the Markets in Financial Instruments Regulation (MiFIR). • Building on the actions announced in the 2020 Capital Markets Union (CMU)

	Action Plan, the Commission will follow up in 2022 with more CMU actions, including a proposal on listing, an open finance framework, an initiative on corporate insolvency and a financial literacy framework.
A renewed sustainable finance strategy.	• Adopted in July 2021.
A new Digital Finance Strategy.	• Adopted in September 2020.
8. Reinforcing Europe's industrial and strategic autonomy	
A new EU pharmaceutical strategy in 2020, including actions to secure supplies and ensure innovation for patients.	• Adopted in November 2020.
An Action Plan on Critical Raw Materials, including efforts to broaden international partnerships on access to raw materials.	• Adopted in September 2020.
Follow-up to the 5G Communication and the Recommendation on cybersecurity of 5G networks.	• Ongoing. • Cybersecurity Strategy for the Digital Decade published in December 2020, including an appendix with a list of actions and objectives for the next steps in the EU coordinated approach on 5G cybersecurity. • Cybersecurity Strategy implementation report published in June 2021 including an update on the coordinated work on 5G cybersecurity. • ENISA has started to work on a candidate EU cybersecurity certification scheme for 5G networks. • The NIS Cooperation Group has decided to launch an in-depth analysis of the security implications of Open RAN, following the approach and methodology of the EU Toolbox.

Action Plan on synergies between civil, defence and space industries, including at the level of programmes, technologies, innovation and start-ups.	• Adopted in February 2021.
9. A partnership approach to governance	
Building on the successful template of industrial alliances, a new European Clean Hydrogen Alliance will be launched.	• European Clean Hydrogen Alliance launched in July 2020.
Alliance on low-carbon industries.	• Under consideration.
Alliance on raw materials.	• European Raw Materials Alliance launched in September 2020.
Industrial European Alliance on Industrial Data, Edge and Cloud.	• European Alliance on Industrial Data, Edge and Cloud launched in July 2021.
The Commission will undertake a thorough screening and analysis of industrial needs and identify ecosystems needing a tailor-made approach.	• Ongoing.
An inclusive and open Industrial Forum will be setup by September 2020 to support this work.	• The Industrial Forum was established in December 2020. The Forum met in February, June and December 2021.
The Commission's annual Industry Days will continue to be an important event to bring all players together.	• The 5th edition of the EU Industry Days took place on 8-11 February 2021.

Updating the 2020 New Industrial Strategy: Building a stronger Single Market for Europe's recovery (5 May 2021)

1. Strengthening Single Market resilience	
Single Market Emergency Instrument.	• Under preparation. To be presented in 2022.
Annual Single Market Report.	• First Annual Single Market Report published in May 2021. Second Report presented in February 2022.
Possible common form/template for the declaration of the posting of workers.	• Under preparation. • Consultations with Member States and social partners are ongoing. To be presented 2022.
Strengthen Single Market surveillance of EU and imported products.	• Ongoing.
Under InvestEU, work on capital support and equity financing to support SMEs.	• Ongoing.
	• New guarantee and equity products for SMEs to be launched in Q1 2022.
2. Dealing with dependencies: open strategic autonomy in practice	
Adopt proposal to address the potentially distortive effects of foreign subsidies in the Single Market.	• Adopted in May 2021.
Periodic review of strategic dependencies and monitoring of risks associated with strategic dependencies.	• Ongoing. • Report on EU strategic dependencies and capacities: second stage of in-depth reviews published in February 2022.
Explore international partnerships and cooperation to address strategic dependencies.	• Ongoing. • EU-US TTC Working Group on Secure Supply Chains launched in September 2021 with focus on critical raw materials, pharmaceuticals and solar energy value chains as well as a dedicated track on semiconductors.

	• EU-Ukraine Strategic Partnership on Raw Materials and EU-Canada Strategic Partnership on Raw Materials established in July 2021.
Launch of the Industrial Alliance for Processors and Semiconductor technologies.	• European Alliance on Processors and Semiconductor technologies launched in July 2021.
Launch of the European Alliance for Industrial Data, Edge and Cloud.	• European Alliance for Industrial Data, Edge and Cloud launched in July 2021.
Consideration of further European industrial Alliances.	• European Alliances are being considered in the following areas: Space Launchers, Zero Emission Aviation, Renewable and Low-Carbon Fuels.
Reinforced action on SME supply chain disruptions and vulnerabilities.	• Ongoing.
Adopt a standardisation strategy.	• New Standardisation Strategy adopted in February 2022. The Strategy is accompanied by a proposal for an amendment to the Regulation on standardisation, a report on its implementation, and the 2022 annual Union work programme for European standardisation.
3. Accelerating the twin transitions	
Co-creation of green and digital transition pathways for relevant ecosystems, starting with tourism, energy intensive industries, construction and mobility.	• Ongoing. • The Commission prepared in 2021-2022 staff working documents outlining possible scenarios for transition pathways for the tourism, energy intensive industries, construction, proximity and social economy and mobility ecosystems and invited stakeholders to reflect and contribute to the scenarios and list key enablers for the transition. • Transition pathway for tourism presented in February 2022. Transition pathways

	for other industrial ecosystems will follow.
Actions to promote renewable Power Purchase Agreements in the proposal for a revised Renewable Energy Directive.	• Proposal to revise the Renewable Energy Directive presented in July 2021 as part of the 'Fit-for-55' package. The proposal includes measures to facilitate Power Purchase Agreements (PPAs).
Consider European approach for carbon contracts for difference in the proposal for a revised ETS Directive.	• The 'Fit-for-55' package presented in July 2021 includes a legislative proposal to revise the EU ETS Directive and a new Carbon Border Adjustment Mechanism.
Energy and Industry Geography Lab (EIGL).	• Launched in December 2021.

Annex 4: Monitoring the implementation of Industrial Policy – Key Performance Indicators

The Council Conclusions "A recovery advancing the transition towards a more dynamic, resilient and competitive European industry", adopted on 16 November 2020, "CALLS on the Commission to define key performance indicators for monitoring the industrial strategy and competitiveness […], including taking into account investment trends, and comparing those to other world regions". The conclusions also calls "for the objectives of the EU's industrial policy to be reflected in sound indicators, in particular concerning industrial competitiveness, industry's contribution to the green and digital transition and the Union's resilience and strategic autonomy while preserving an open economy."[9] The set of KPIs presented below presents the analytical approach to address this request.

All the indicators are based on publicly available data. They complement other existing monitoring tools used by the Commission. Regular reporting on areas identified as priorities for European industrial policy, based on reliable data sources, can support the Commission and the Member States in providing timely policy response in case of identified challenges.

Compared to the 2021 edition of the Annual Single Market Report[10], this set of KPIs include a new thematic area (social dimension) and few additional indicators for SMEs and for the international dimension. As new data becomes available and policy priorities evolve, the KPIs will continue evolving.

Structure of the document

The KPIs are clustered along four broad topics:

1. **Headline indicators**, providing a synthetic overview of the main trends of the EU economy and benchmarking against other countries;
2. **Short-term indicators**, to describe the evolution of the COVID-19 crisis and provide a forward-looking analysis;
3. **Thematic indicators,** which proxy the following dimensions:
    a. Economic Resilience
    b. Social dimension
    c. Digital transition
    d. Climate neutrality and circular economy
    e. Single Market integration
    f. SMEs
    g. International dimension
4. **Indicators by ecosystem**, which describe the main features of the ecosystems and their performance.

[9] https://data.consilium.europa.eu/doc/document/ST-13004-2020-INIT/en/pdf
[10] SWD(2021) 351 final

The tables below summarises the selection of indicators by thematic area.

List of horizontal and thematic KPIs			
Thematic area	**Indicator**	**Measure**	**Source**
Headline indicators	Gross value added	annual % change	World Bank, National Accounts, Eurostat
Headline indicators	GDP per person employed	constant prices, annual % change	AMECO
Headline indicators	Number of employees	annual % change	AMECO
Headline indicators	EU global market share	%	Eurostat
Short-term indicators	Turnover	% of the same month in previous year	Eurostat, STS
Short-term indicators	Industrial production	% of the same month in previous year	OECD, Eurostat
Short-term indicators	Declaration of bankruptcies	Index	Eurostat, STS
Short-term indicators	Registration of businesses	Index	Eurostat, STS
Short-term indicators	Permanent, temporary and self-employment	Change with respect to same period in previous year	Eurostat, Labour Force Survey
Short-term indicators	Gross Fixed capital formation	% of same period in previous year	Eurostat, National Accounts
Short-term indicators	Economic confidence Indicator	Level	ECFIN
Economic Resilience	Net public investments	% of GDP	AMECO
Economic Resilience	Net private investments	% of GDP	AMECO
Economic Resilience	R&D expenditures	% of GDP	World Bank, Eurostat
Economic Resilience	STEM graduates	per 100 population aged 20-29	Eurostat and OECD
Social dimension	Net earnings	Index and intra EU differences	Eurostat
Social dimension	Health and safety at work	Number of accidents at work	OSHA and Eurostat
Social dimension	Employment by gender	Shares	Eurostat
Digital transition	Integration of digital technologies	Index	DESI, Eurostat
Digital transition	Use of internet	Index	DESI, Eurostat
Digital transition	Connectivity	Index	DESI, Eurostat
Digital transition	Digital public services	Index	DESI, Eurostat
Digital transition	Human capital	Index	DESI, Eurostat
Digital transition	Population with basic or above basic digital skills	% of total population	Eurostat
Green transition	GHG emission intensity	tCO2e/GDP	UNFCCC and World Bank
Green transition	Electricity prices for non-household consumers	EUR/MWh	Eurostat, IEA and CEIC
Green transition	Wholesale electricity prices	EUR/MWh	Platts, ENTSOE-E and European power exchanges
Green transition	Recycling rate of Municipal waste	% of total	Eurostat
Green transition	Circular material use rate	% of total material use	Eurostat
Single Market integration	Intra-EU trade	Import + Exports, bn EUR	Eurostat
Single Market integration	Intra-EU trade	Nominal growth rate y/y	Eurostat
Single Market integration	Price convergence	Coefficient of variation of PPP for GDP	Eurostat
SMEs	Persons employed in SMEs	Index 2008=100	Eurostat and DIW Econ
SMEs	Value added in SMEs	Index 2008=100	Eurostat and DIW Econ
SMEs	Share of EU SMEs trading across EU borders through e-commerce	%	Eurostat
SMEs	Share of SMEs using Big Data analytics	Share	Eurostat
International dimension	Extra-EU export	Bn EUR and nominal growth rate	Eurostat
International dimension	Extra-EU import	Bn EUR and nominal growth rate	Eurostat

International dimension	Global market share in medium/high technology manufacturing (gross value added	%	UNIDO
International dimension	Global market share of high technology exports	%	World Bank and Eurostat

The majority of the indicators presented are calculated for the whole EU economy. In some cases, the most relevant macro components of the economy (e.g. industry, manufacturing and/or services) are also presented and, where possible and meaningful, international comparisons are included.

A selection of KPIs is also presented for the 14 industrial ecosystems, allowing for a more granular view of the main trends characterizing specific parts of the economy. The table below summarises these indicators.

List of KPIs calculated by ecosystem

Thematic area	Indicator	Measure	Source
Headline indicators	Gross value added	Million EUR and % change 2015-2018	Eurostat
Headline indicators	Employment	Million EUR and % change 2015-2018	Eurostat
Headline indicators	Number of firms	Number	Eurostat
Strenght of the ecosystems	Value added to production value	%	Eurostat
Strenght of the ecosystems	Gross Operating Rate	%	Eurostat
Green transition	Greenhouse gas intensity	Level and % Change 2015-2018	Eurostat
Short-term indicators	Confidence indicator	Level	ECFIN
International dimension	Export intensity	Extra EU Export/VA	Eurostat
Single Market integration	Intra-EU trade	% of total ecosystem trade	Eurostat
Economic Resilience	Churn rate of business	% change 2015-2018	Eurostat
Economic Resilience	Investments in tangibles	Level and % change 2015-2018	Eurostat

This set of KPIs takes into account, and in some cases partially overlaps, other thematic scoreboards that monitor specific policy areas. These initiatives complement the present, by analysing in greater detail and precision the impact and the performance of specific policie areas. Among them we can list the Single Market Scoreboard, the European Innovation Scoreboard, the EU Industrial R&D Investment Scoreboards[11], DESI, the Circular Economy Monitoring framework[12], the Eco-innovation Scoreboard[13], the Resilience Dashboards[14], the European Interoperability Framework[15].

[11] https://iri.jrc.ec.europa.eu/rd_monitoring
[12] https://ec.europa.eu/eurostat/web/circular-economy/indicators/monitoring-framework
[13] https://ec.europa.eu/environment/ecoap/indicators/index_en
[14] Proposed in the Commission's 2020 Strategic Foresight Report COM(2020) 493 final
[15] https://joinup.ec.europa.eu/collection/nifo-national-interoperability-framework-observatory/eif-monitoring

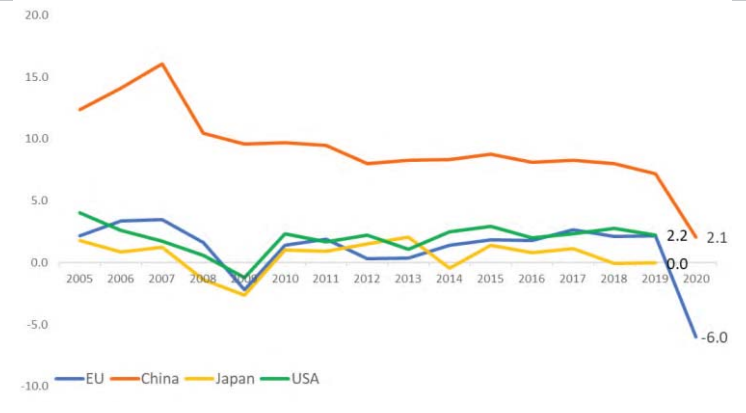
1. Headline indicators

Value added in industry and services

Value added in Industry (including construction): annual % growth.
Source: World Bank national accounts data.

The overall composition of our economy has changed over time, with industry shrinking relative to services.[16] This is a global trend among developped economies and some developping economies, influenced by many factors, including servitisation and productivity gains of industry. Changes in relative prices of industrial goods compared to services, driven by the broad decrease of prices of many manufacturing products, also contribute to this trend.

In 2018, 2019 and 2020, EU growth in industry has been lower than international competitors (except for Japan in 2019).



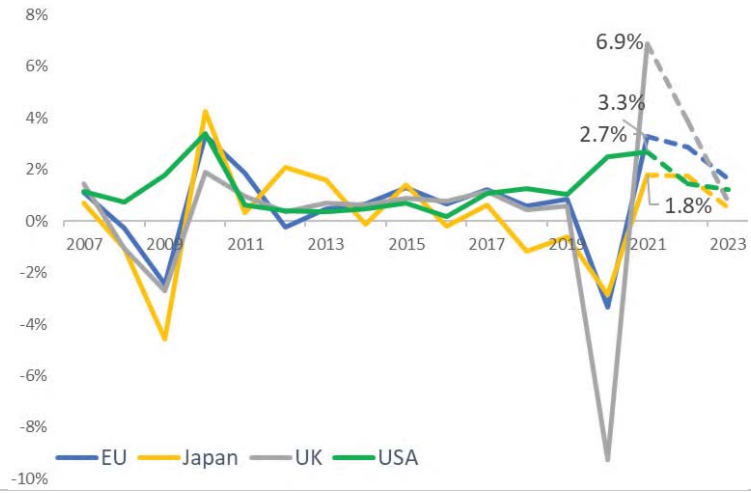
Value added in Services: annual % growth.
Source: World Bank national accounts data.

Services grew faster, but not as fast as China and the United States. In particular, the performance of China signals its increasing importance also in service provision.

The impact of the COVID-19 crisis was very strong for both industry and services, and lead to a significant decrease of value added. In comparison to China, for which more recent data is available, the drop of the EU27 growth rate compared to 2019 was more important. These indicators are only available until 2020 for international comparisons, hence they cannot describy yet the recovery phase. The indicators in the next sections provides an overview of the most recent developments.

[16] Industry corresponds to ISIC divisions 10-45 and includes in mining, manufacturing, construction, electricity, water, and gas. Services correspond to ISIC divisions 50-99 and include wholesale and retail trade (including hotels and restaurants), transport, and government, financial, professional, and personal services such as education, health care, and real estate services.

GDP per person employed

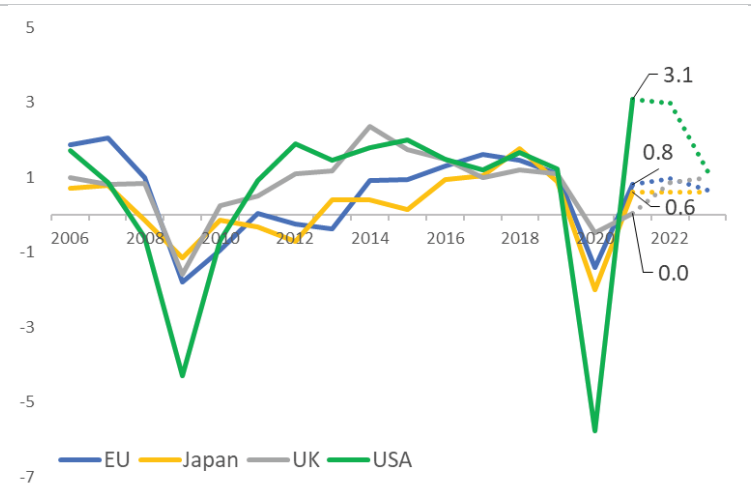


GDP per person employed: constant prices, total economy, % annual growth, data for 2021 and 2022 based on estimates.
Source: AMECO (RVGDE).

Another trend common to most advanced economies is the long-term slowdown in productivity growth, something the EU is not immune from.

In the last days, the EU has experienced a slowdown in labour productivity, matched by a similar trend in total factor productivity growth. Nonetheless, in 2021 productivity increased significantly.

Employment

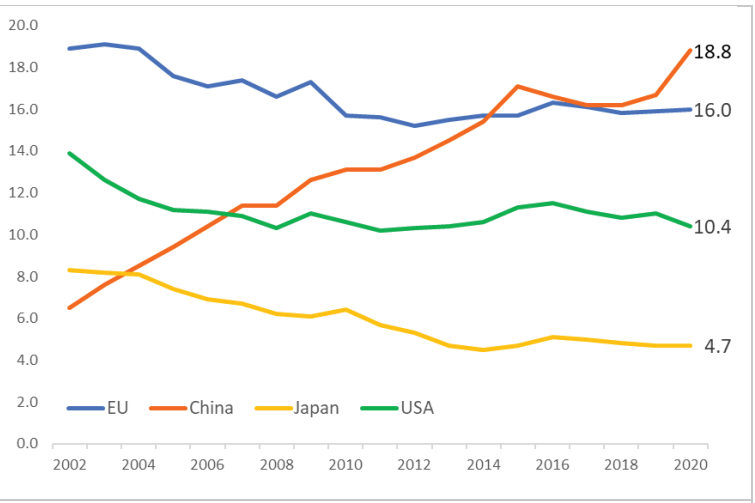


Number of Employees: Total employment, domestic, annual % growth. Data for 2021 and 2022 based on estimates.
Source: AMECO (NETD).

The pandemic triggered the deepest shock in the history of the EU,and caused large employment losses. However, the international comparison shows how social safety nets in the EU played a major role in mitigating them, limiting the drop in the EU as compared to USA and Japan in 2020.

The rebound in 2021 was important, but not enough to compensate previous losses.

Global market shares



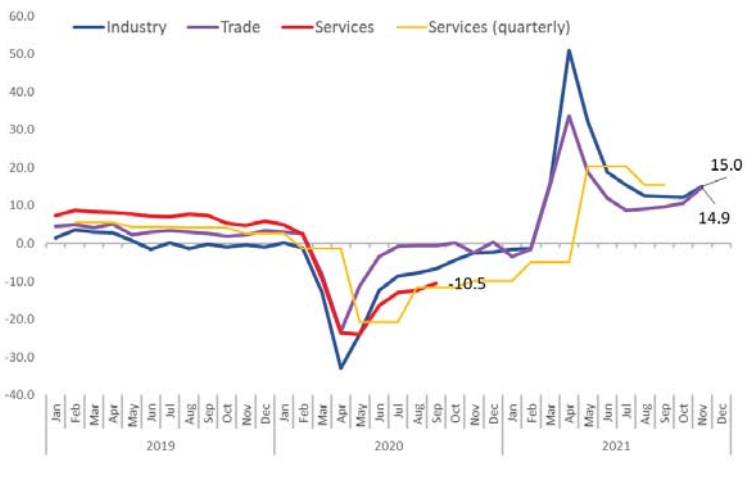
Share of world export: percentage.
Source: Eurostat [ext_lt_introeu27_2020].

The EU share of world exports remained stable at about 16% in the last ten years, amid a very challenging environment in which the rise of China has been remarkable. The COVID-19 crisis caused a drop of more than 9% of EU exports in 2020. Nonetheless, the EU maintained a stable market share of global trade.

As illustrated in Section 1.9, 2021 data on trade show a ssignificant recovery

2. Short-term indicators

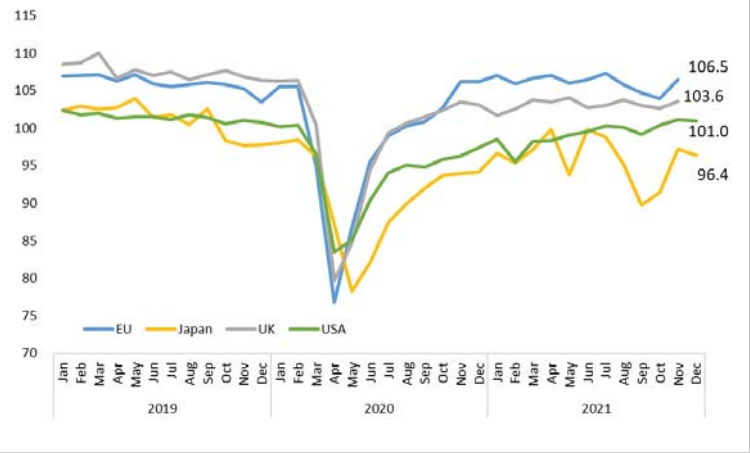
Turnover



Turnover: Percentage change with respect to the same month in the previous year.
Source: Eurostat Short-term Statistics.

The lockdown measures induced by the COVID-19 generated dramatic turnover losses in April and May 2020 (compared to the previous year, -33% for industry, -23% for wholesale and retail trade, -24% for services). The shock hit all sectors. As of January 2021, turnover in industry and trade had recovered to pre-COVID-19 levels and boomed in April, as firms and consumers compensated for the delayed consumption and investments. In December 2021, turnover for both industry and trade was still above the pre-COVID-19 levels. As recent monthly data is not available for services, the graph also reports quarterly data for services, which show a comparable pattern of recovery.

Industrial production

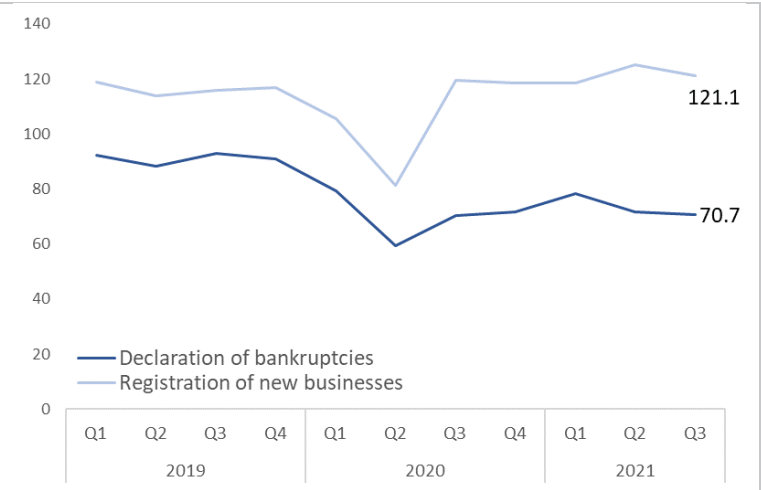


Industrial production: relative to January 2015.
Source: OECD.

The fall in industrial production in April and May 2020 was remarkable, and slightly deeper than other large economies. Nonetheless, its recovery was quick, also compared to international competitors.

Industrial production reached levels comparable to pre-lockdown levels since the end of 2020.

Declarations of bankruptcies and Registration of businesses

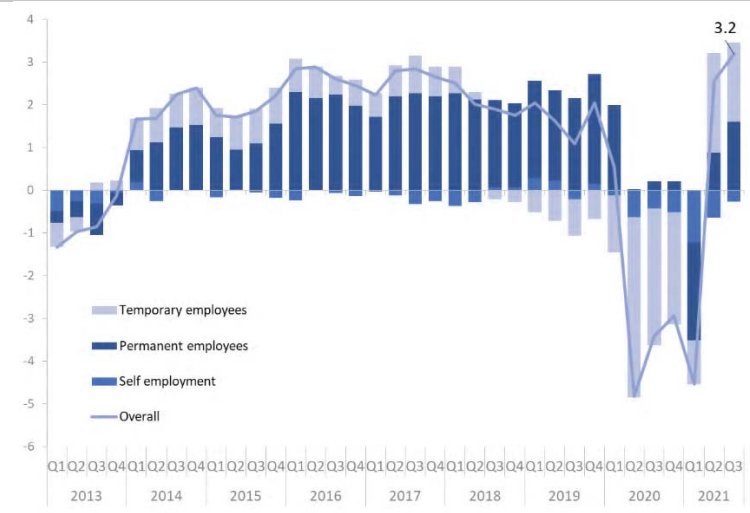


Declaration of bankruptcies and registrations of businesses: index 2015=100. Seasonally adjusted data. Incomplete coverage of EU.
Source: Eurostat [sts_rb_q].

The number of declarations of bankruptcies dropped with the inception of the COVID-19 crisis (2nd quarter 2020). This is due to the support policies put in place by Member States to shelter business in response to the lockdown measures. An increase is visible as of the third quarter of 2020. Since then, the level has been stable.

The number of new registrations of businesses followed a similar pattern, but the rebound has been more significant.

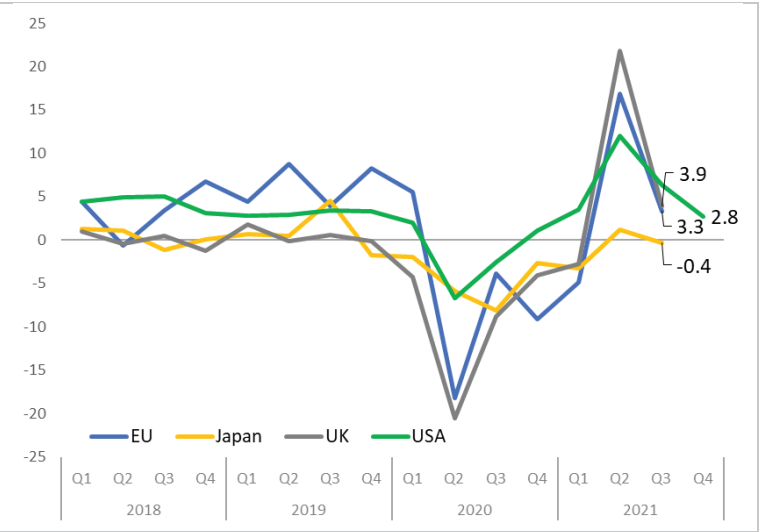
Permanent, temporary and self-employment



Permanent, temporary and self-employment: change with respect to same quarter in the previous year. Age 15-64. Data not seasonally adjusted.
Source: Eurostat - LFS [lfsq_egaps, lfsq_etgaed].

Data by employment type provides a clearer picture of the recovery in terms of social and economic aspects. During the last three quarters of 2020, the most significant drop in employment was visible amongst temporary employees, followed by self-employed, who were generally less protected by the public measures. In the first quarter of 2021, also permanent jobs were affected. More recent data suggest an inversion of the trend for all but self-employed.[17]

Gross fixed capital formation

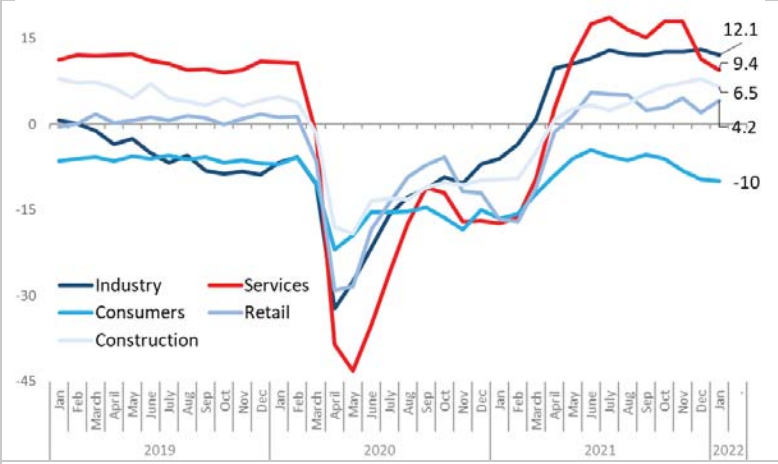


Quarterly Gross Fixed Capital Formation: Growth rates compared to the same quarter of previous year. Seasonally adjusted.
Source: OECD.

Gross fixed capital formation touched its lowest level in the second quarter of 2020, falling by 18.1% compared to the previous year. The start of 2021 was marked by a strong rebound and in Q3 2021, growth with respect to the same period in 2020 was 3.3%. Comparing internationally, the fall during the 2nd quarter of 2020 was much bigger in the EU than in the USA or Japan, but so was the rebound. The USA and Japan showed a much more stable trend.

Economic confidence indicator

[17] Note that in Q1-2021 there was a break in the series, so the result should be interpreted with caution.



Economic confidence indicators
Source: Joint Harmonised EU Programme of Business and Consumer Surveys, European Commission.

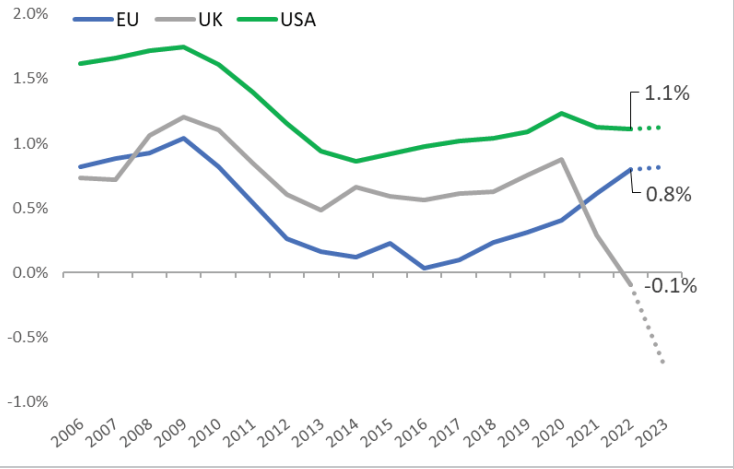
The economic sentiment dropped dramatically to historical lows during the lockdown in spring. Since then, it recovered ground and improved significantly starting from March 2021. However, the analysis of the series signals heterogeneous sectoral developments, with industry and services seeming more optimistic than retail and construction. The consumers' index is still negative, and decreased further in January 2022.

3. Thematic indicators

3.1. Economic Resilience

Resilience is a concept encompassing several dimensions. It is difficult to fully describe it with a limited set of economic indicators. Investments, R&D expenditure and skills are proxies to monitor how European industry renews and upgrades its products, its processes and its workforce.

Net public investments

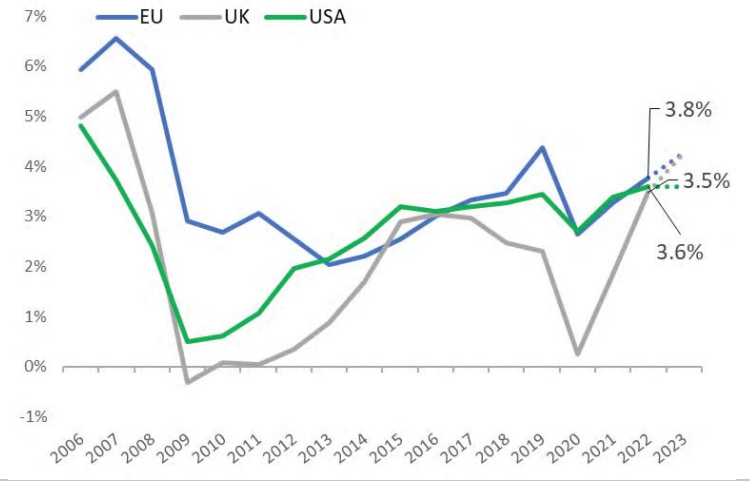


Public Investments: Net Fixed Capital Formation as a share of GDP. Data for 2022 and 2023 based on estimates.
Source: own calculations based on AMECO data.

Investments signals how industry prepares for the economic and societal challenges of the future.

Public investment between 2013 and 2018, has been lower in the EU than in the USA and the UK, and was not even sufficient to compensate for the depreciation of the existing capital stock. However, since 2019, the trend has been increasing and is likely to keep increasing in 2022, also thanks to the interventions at European and Member State level to support the economy during the recovery.

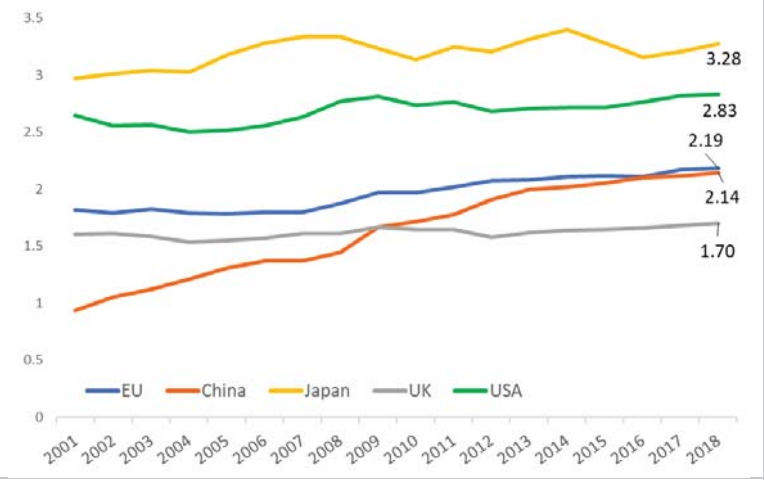
Net private investments



Private investments: Net Fixed Capital Formation as a share of GDP. Data for 2022 and 2023 based on estimates.
Source: own calculations based on AMECO data.

Private investment was on an increasing trend before the COVID-19 crisis, also in line with international levels. After the COVID-19 shock in 2020, which caused a dramatic drop of net private investment, 2021 marked a significant increase, in line with the USA and UK levels.

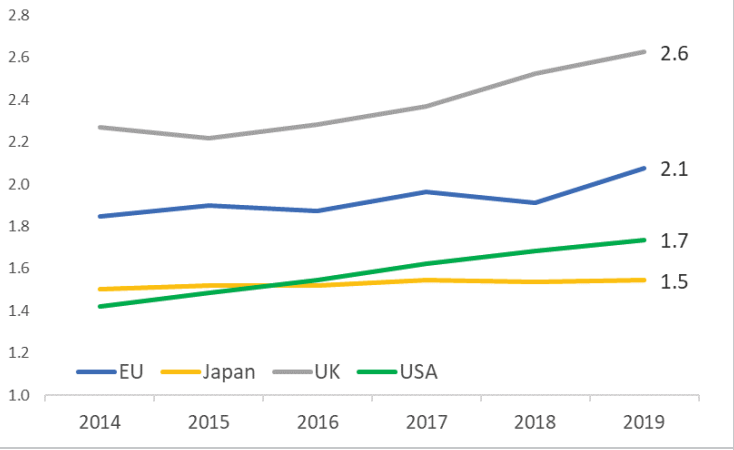
R&D expenditures



R&D expenditure: % of GDP.
Source: UNESCO institute for Statistics through World Bank API.

In terms of R&D expenditures, the EU is lagging behind other major economies, such as the US and Japan. China has also rapidly increased its level of investment in R&D, and has now levels comparable to the EU.

STEM graduates



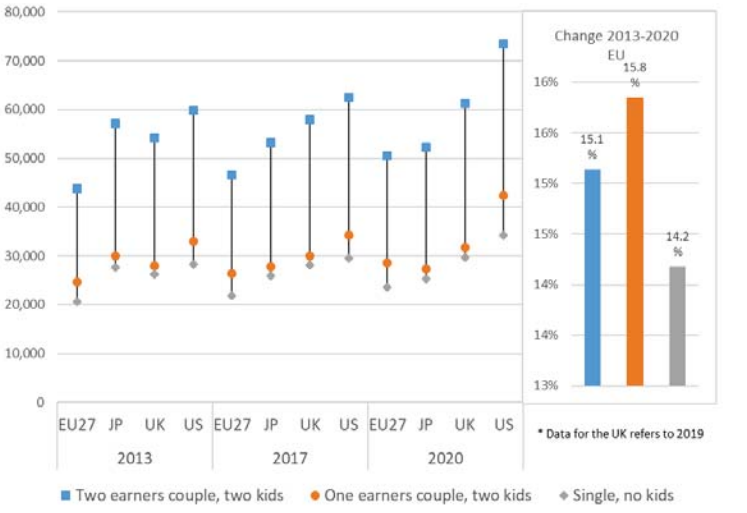
Graduates in STEM and related fields: per 100 population aged 20-29. Tertiary graduates (levels 5-8), in natural sciences, mathematics, statistics, ICT, engineering, manufacturing and construction. Eurostat and OECD data not fully comparable.
Source: Eurostat [EDUC_UOE_GRAD02] and OECD [Distribution of graduates and entrants by Field].

Skills in Science, Technology, Engineering and Mathematics (STEM) are essential to accompany the digital and green transition.

The share in the EU has increased very slightly in the last six years, while the USA and the UK both experienced a more pronounced increasing trend.

3.2. Social dimension

Net Earnings

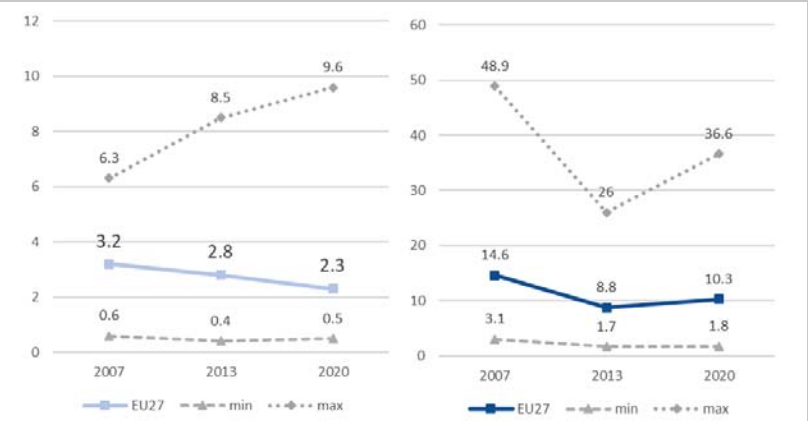


Net earnings: annual net earnings in PPS, for persons earning 100% of the average earning of the specific cathegory.
Source: Eurostat [earn_nt_net].

Net earnings in the EU are slightly smaller than in Japan, UK and USA for all categories considered, but have increased since 2013.

The gap between the lowest (single with no kids) and highest earnings (two earners couple with two kids is also the smallest in the EU, and grew at the same pace as the US.

Health and safety at work

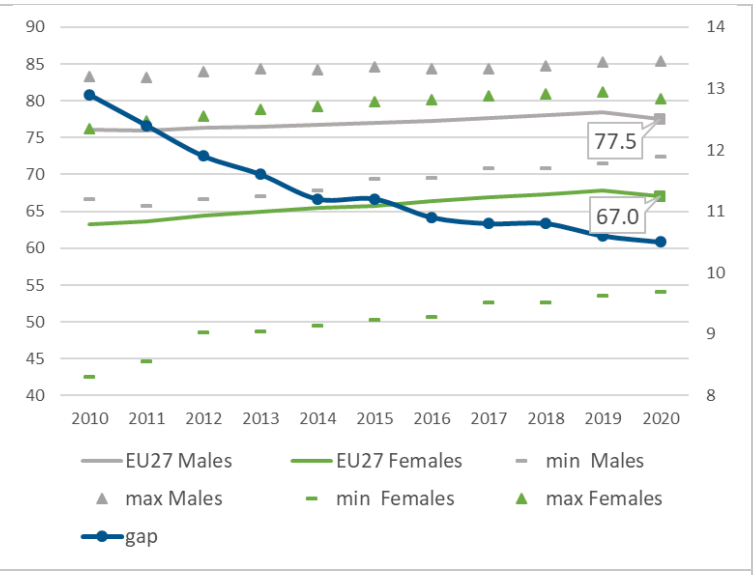


Accidents at work (left) **and work related health problems** (right) **:** percentage of persons employed and previously employed.
Source: Eurostat [hsw_ac1] and [hsw_pb1].

The number of reported accident at work has slightly decreased since 2007 on average, but the variation across Member States is large, and has increased.

The trend for work related health problems is less clear and the difference between the lowest and the highest reporting Member State is very large.

Employment by gender

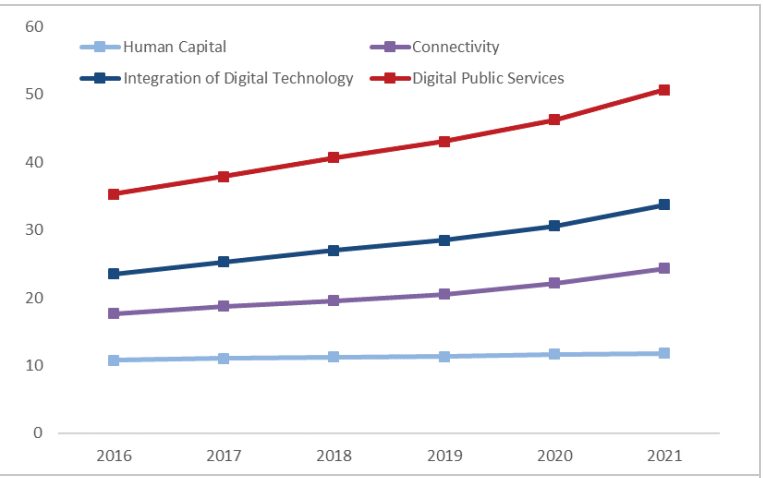


Employment by sex: percentage of total population and gap between male and female.
Source: Eurostat [lfsi_emp_a].

The difference between female and male employment is still significant in the EU. While 77.5% of men between 15 and 64 years old are part of the labour force, only 67% of women are, a gap of more than 10 percentage points, that is decreasing at a relatively slow pace.

3.3. Digital Transition

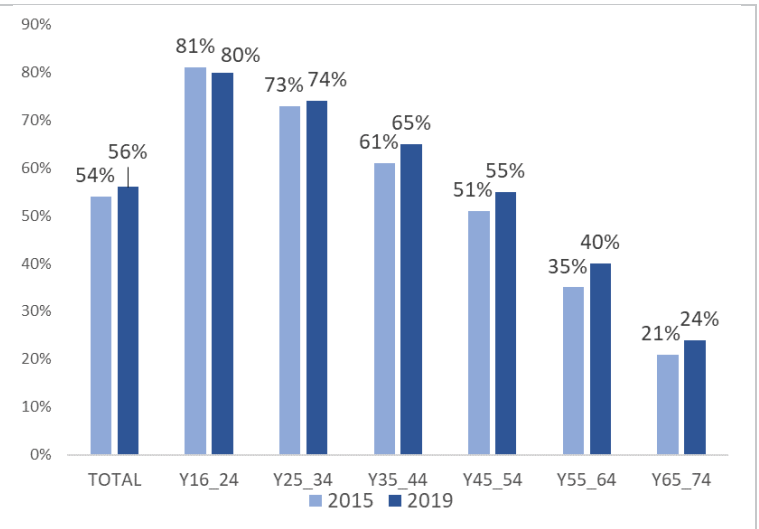
Digital Economic and Society Index bycomponents



DESI: index, weighted score (0 to 100).
Source: Digital Economy and Society Index, European Commission.

In the last six years, the Digital Economic and Society Index (DESI) has grown at a stable rate. All components kept improving, although with some disparity among them. Human capital shows the smallest growth. The digital public services and the integration of digital technology have grown much faster, with the latter starting from low levels, especially in some European Member States. The growth in connectivity has has also increased significantly, and with a strong increase in the last two years.

Digital skills

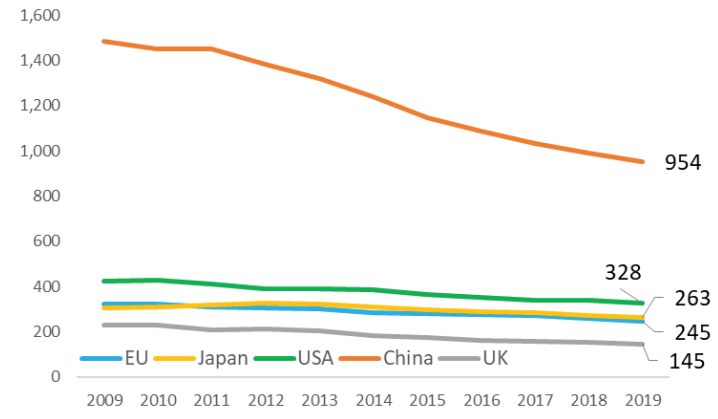


Share of population with basic or above basic digital skills: % of total population, by age group.
Source**:** Eurostat [isoc_sk_dskl_i].

Skills encompass many dimensions, but one area where they are particularly important today is the digital world. In 2019, the majority of the EU population had basic or above basic digital skills, but the dispersion across age groups is wide. The share of total population with basic or above basic digital skills had increased in the last five years, by 2 percentage points.

3.4. Climate neutrality and Circular Economy

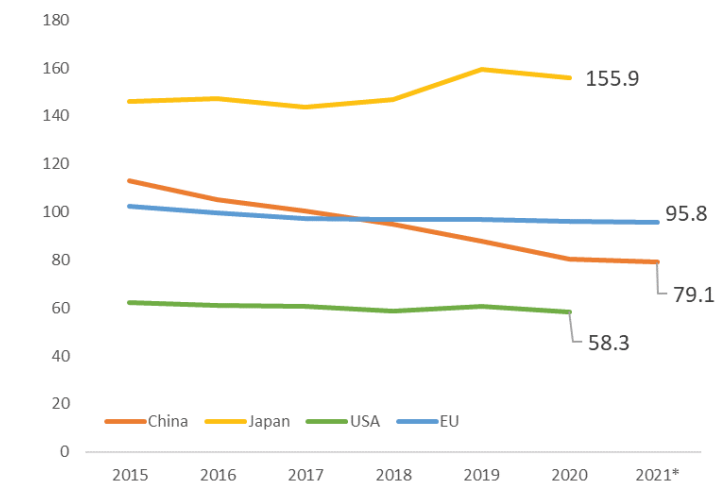
GHG emission intensity



GHG emission intensity: Total GHG/GDP (tCO2eq/GDP constant).
Source: UNFCCC, World Bank.

Greenhouse gas emission intensity is one of the most important factors in pursuing the European Green Deal and also one of the clearest indicators to measure its success. The GHG emission intensity of the EU is close to Japan, lower than the United States and significantly lower than in China. In the last decade, the GHG emission intensity of the EU economy decreased by 24.5%, compared to 22.8% for United States. China's emission intensity has decreased by 35.7%, but remains much higher.

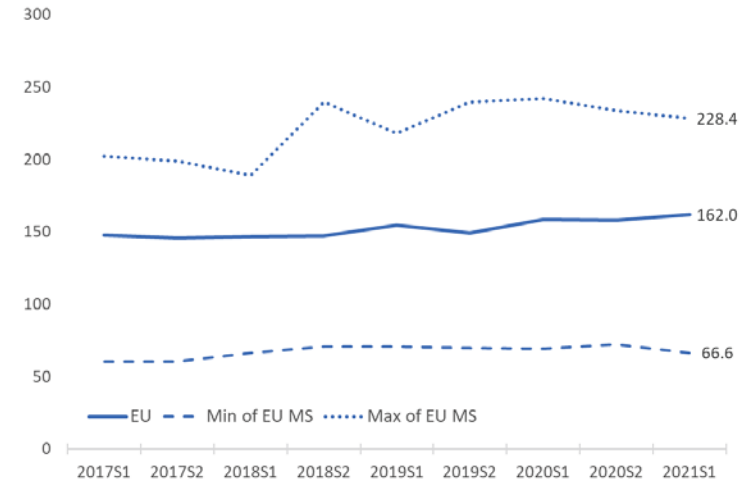
Electricity prices



Industry Electricity Prices: International Comparison, EUR/MWh. EU data based on medium size industrial consumers (annual consumption of 2000-20000 MWh). Prices exclude taxes and levies. The last data point for the EU refers to the first semester of 2021.
Source: CEIC, IEA and Eurostat [nrg_pc_205].

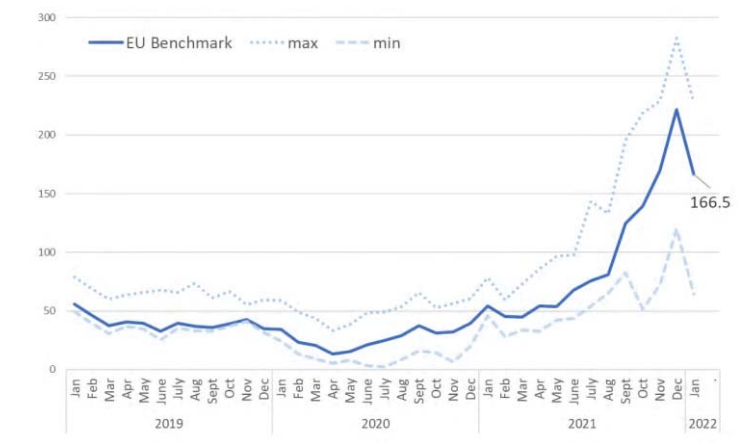
The green transition will require access to abundant, decarbonised and competitively priced electricity. While increases in electricity prices can trigger improvements in energy efficiency, electricity prices are also a key component for the competitiveness of some industries.

Despite the reduction in emissions, EU industry electricity prices have been relatively stable for the last decade, up until the first semester of 2021. They were significantly higher than the US prices. Despite comparable emission intensity, prices in the EU are below the prices in Japan. Industrial electricity prices in China declined and are now below EU prices. EU industrial (non-household) electricity prices fluctuated around 96 EUR/MWh in the last decade.



Electricity prices for non-household consumers: prices in PPS per Megawatt-hour, all taxes and levies included, for the consumption band between 500 MWh and 2 000 MWh.
Source: Eurostat [nrg_pc_205].

When taxes and levies are included, EU electricity prices double. Data also show a significant variation across Member States. In the first semester of 2021, the average EU price increased by 2.02% compared to 2020.

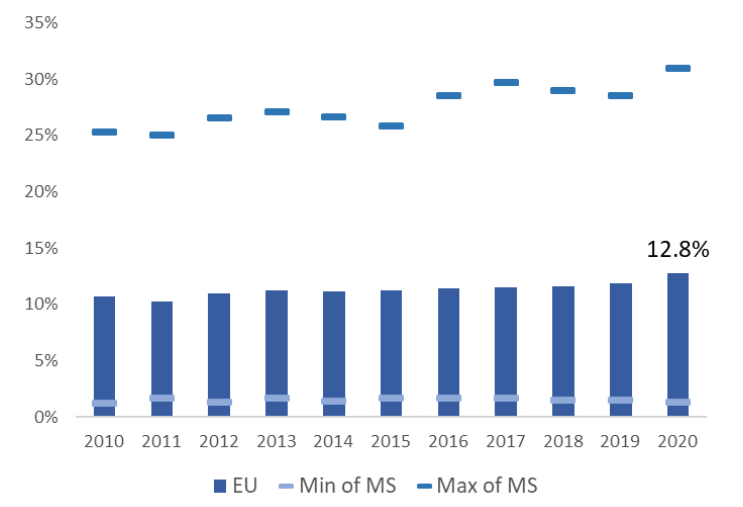


Wholesale electricity prices: EUR/MWh, European Power Benchmark based on weighted average consumption of the 5 most important markets in the EU (DE, FR, NL, ES and NordPool), and range of variation across Member States.
Source: Platts, ENTSOE-E and European power exchanges.

The data above do not capture the most recent developments in energy markets. In January 2022, electricity prices had increased by 208% compared to January 2021. This is likely to impact significantly energy-intensive sectors in manufacturing.

Due to the exclusion of VAT and other factors related to tariff calculation, industrial electricity prices are more influenced by the energy component compared to households and, hence, more driven by developments in wholesale markets. Thus, the current increase in wholesale electricity prices can be seen as a proxy of the increase on retail prices for non-household consumers.

Circular material use rate



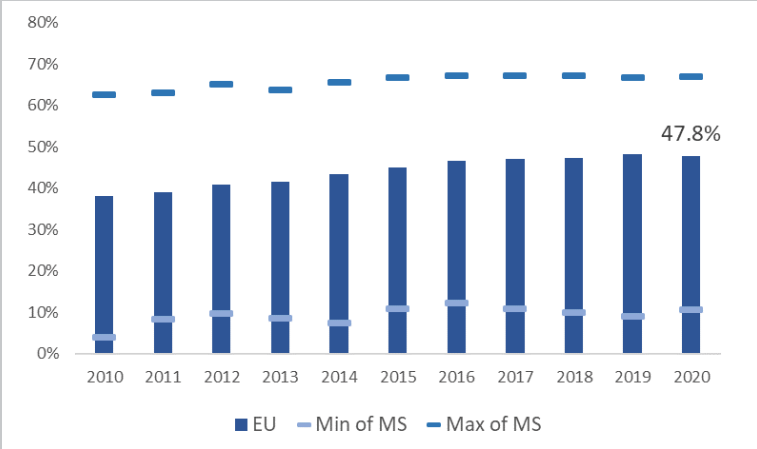
Circular material use rate: percentage share of overall material use.
Source**:** Eurostat [cei_srm030]

Scaling up the circular economy will play a key contribution to achieve climate neutrality by 2050. Increasing recycling rates offer a partial picture of the circular economy, as they do not capture the extend to which recycled materials find their way back into the economy. The circular economy aims at increasing the amount of material recovered and fed back into the economy.

The circular material use rate measures the contribution of recycled materials to overall materials demand. A high circularity rate value indicates that more secondary materials substitute for primary raw materials, thus reducing the environmental impacts of extracting primary material. In the last 10 years, the rate of re-use of materials in the EU has increased to 12.8% in 2020. There is significant variation across Member States.[18]

Recycling rate of municipal waste

[18] The new Circular Economy Action Plan for a cleaner and more competitive Europe announced that the Commission will revise the Monitoring Framework. New indicators will take account of the focus areas and of the interlinkages between circularity, climate neutrality and the zero pollution ambition. Indicators on resource use will also be further developed.



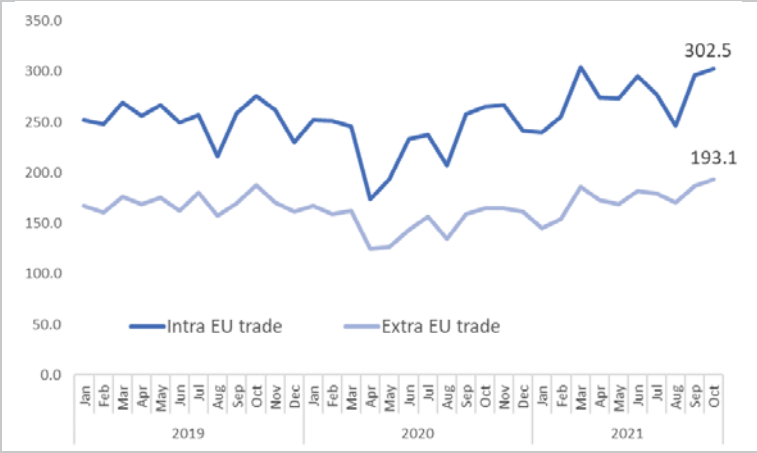
Recycling rate of municipal waste: % and variation across Member States.
Source: Eurostat [CEI_WM011].

Increasing recycling is fundamental for the circular economy, as the demand and the supply of recycled material should naturally evolve together.[19] The Waste Framework Directive sets a target of 50% recycling of municipal waste in 2020.[20]

In the last decade, the recycling rates for municipal waste have increased by around 10 percentage points for the whole EU, getting very close to the target of 50%. However, heterogeneity across Member States remains high.

3.5. Single Market Integration

Intra-EU trade

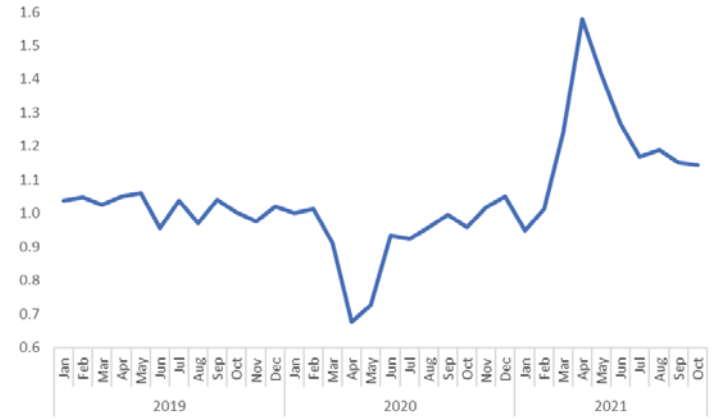


[19] The indicators presented here describe only partially the complexity of the industrial transition towards a circular economy. The Commission in 2018 adopted a comprehensive framework of indicators to measure the transition towards a circular economy. The indicators of the framework follow the lifecycle of products and offer a snapshot on how well we save our resources. As such, the framework will continue being a fundamental element of industrial policy strategy https://ec.europa.eu/eurostat/web/circular-economy/indicators/monitoring-framework

[20] Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain directives; Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste (OJ L 150, 14.06.2018, p. 109-140).

Intra and Extra EU trade: EUR bn nominal values; trade is defined as the average between imports and exports.
Source **:** EU trade by CPA 2.1 [DS-1062396].

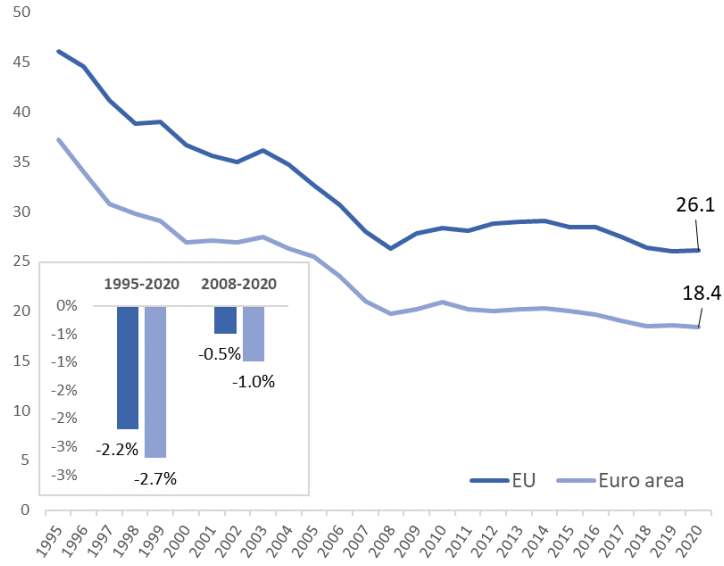
The single market is one of the most important assets of the EU and its further deepening is one of the goals of the EU. Intra-EU trade is a good proxy for single market integration. In October 2021, intra-EU trade was 56% higher than extra EU trade. The initial effect of the COVID-19 crisis was larger on intra-EU trade, but the recovery was also faster. Both intra and extra-EU trade grew in 2020 and in the first three quarters of 2021.



Intra-EU exports: share over the same period of previous year.
Source **:** EU trade by CPA 2.1 [DS-1062396].

The COVID-19 crisis initially resulted in a significant downturn in intra-EU exports with a drop of over 30% in April 2020 as compared to April 2019. However, the situation has improved significantly and in October 2021, intra-EU exports were 14% higher than in October 2020, but still lower than the same month in 2019.

Price convergence

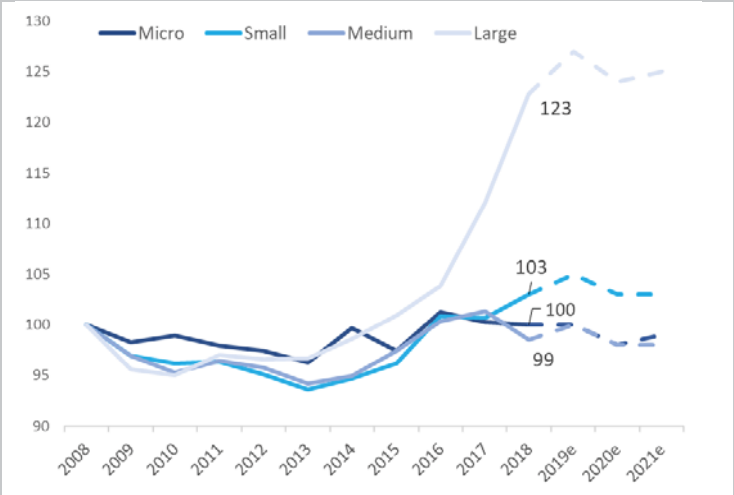


Price dispersion across Member States: coefficient of variation of price level indices (PPP for GDP) and their average growth rates (small box).
Source: Eurostat [prc_ppp_conv].

To assess the integration of the European economy, it is useful to consider the differences in price level among different Member State economies. In the years running up to 2008 the dispersion in price levels in the EU drastically decreased, but increased again with the financial crisis. Between 2014 and 2019 , we could observe again a slow decrease. In 2020, dispersion remained stable.

3.6. SMEs

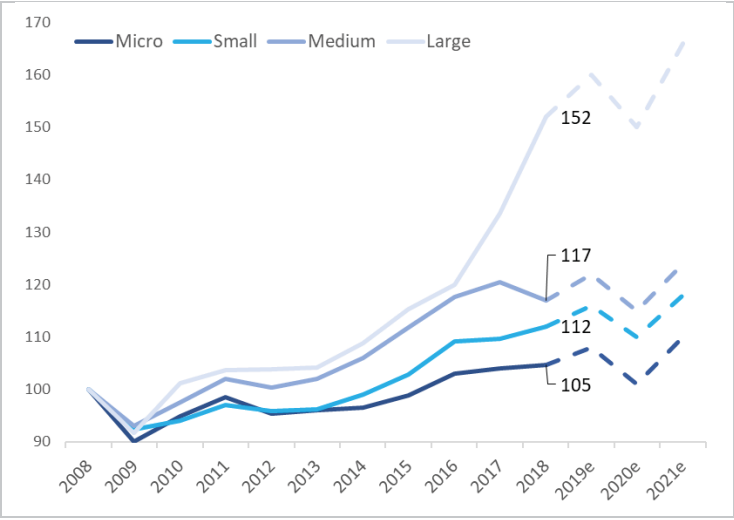
Employment in SMEs



Number of persons employed: by size class, index: 2008=100. Source: Eurostat [sbs_sc_sca_r2]. Estimates for the period 2019-2021 produced by JRC, based on Eurostat Structural Business Statistics, Short-Term Business Statistics and National Accounts Database.

In the last years, the increase in employment has concentrated more in large enterprises. This could signal a polarisation trend in the EU industrial fabric.

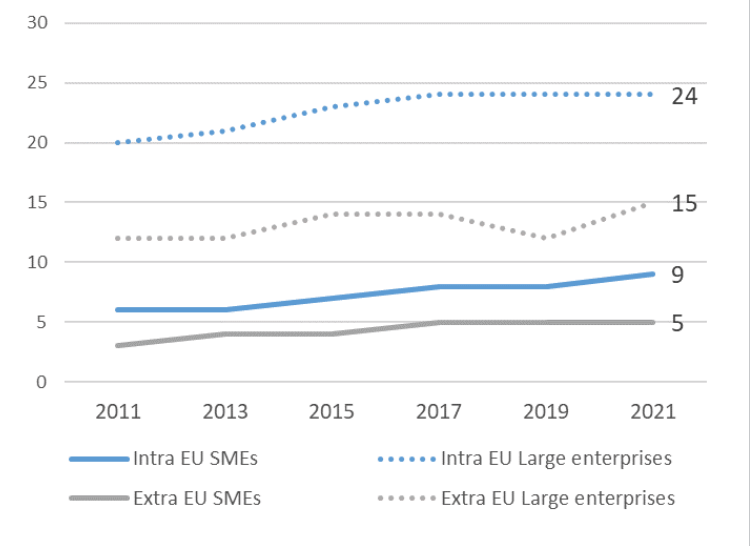
Value added in SMEs



Value-added: by size class, index: 2008=100.
Source : Eurostat [sbs_sc_sca_r2]. Estimates for the period 2019-2021 produced by JRC, based on Eurostat Structural Business Statistics, Short-Term Business Statistics and National Accounts Database.

In terms of value-added, all companies have increased their contribution. However, the difference across size class is striking, with large companies increasing their value added significantly more than micro, small and medium companies, in particular since 2016.

Share of SMEs e-trading across EU borders through e-commerce



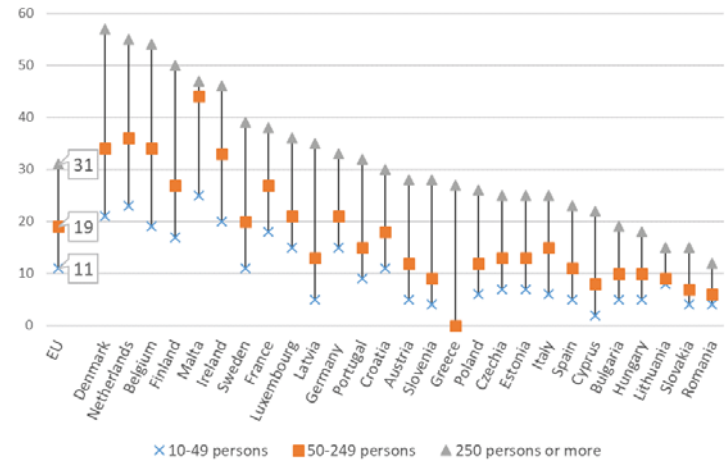
Enterprises with e-commerce export: percentage of enterprises
Source : Eurostat [isoc_ec_eseln2].

A significant share of European firms export thanks to e-commerce. The share is much larger among large enterprises.

Both SMEs and large enterprises are more likely to export thanks to e-commerce within the Single Market.

This indicator only captures a share of the total number of SMEs trading cross border, as other SMEs may be trading goods or services across EU borders without using e-commerce.

Share of SMEs using Big Data analytics



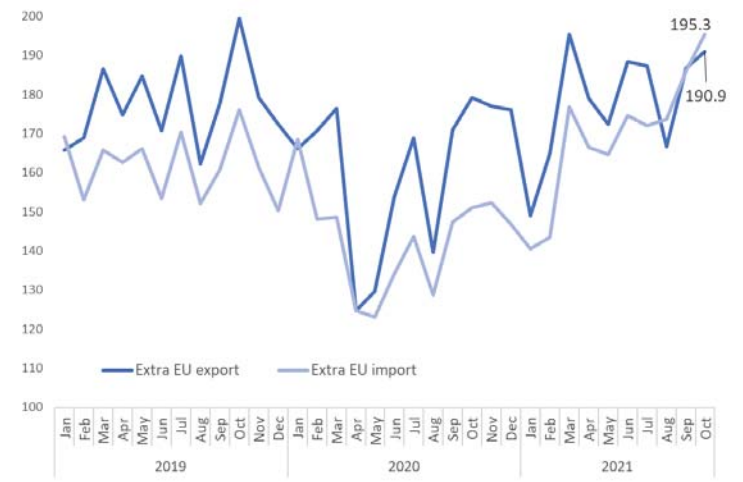
Enterprises using Big Data analytics: percentage of enterprises that analyse big data internally from any data source.
Source : Eurostat [isoc_eb_bd].

Large firms are significantly more likely to use big data analytics (31%) than small (11%) and medium (19%) enterprises.

The variation across Member States is very significant.

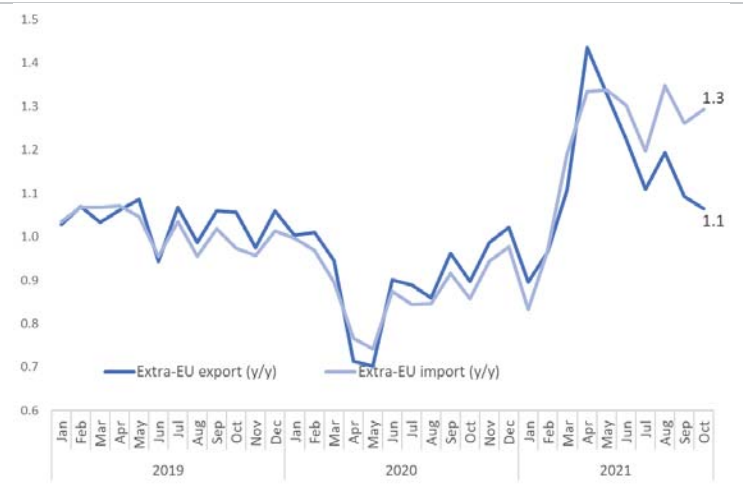
3.7. International dimension

Extra-EU trade



Extra-EU trade : EUR bn nominal values.
Source **:** EU trade by CPA 2.1 [DS-1062396].

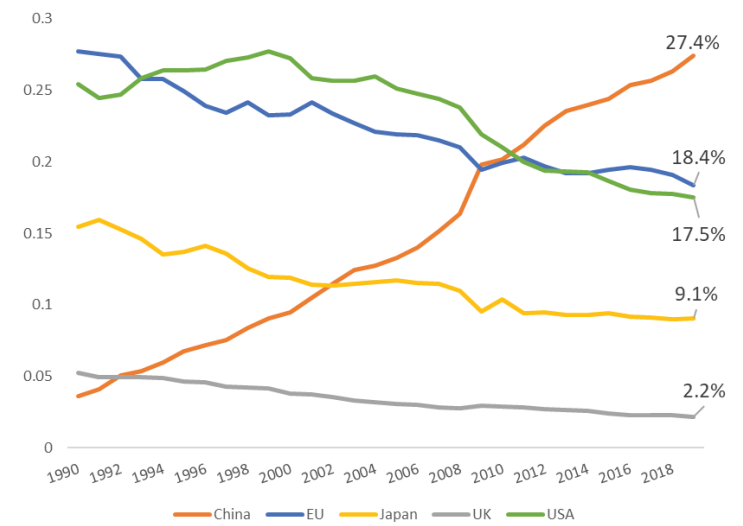
Extra-EU exports and imports have followed similar patterns in the last three years and a half, with the net trade balance being almost always positive. However, in October 2021 a small deficit emerged. The COVID-19 crisis resulted in a significant drop, particularly in exports, with a rapid recovery to pre COVID-19 levels.



Extra-EU trade: share over the same period of previous year.
Source **:** EU trade by CPA 2.1 [DS-1062396].

The year on year growth rates of extra-EU exports and imports have also followed a similar pattern in the last three years. Extra-EU exports were more severely affected by the COVID-19 crisis but also recovered faster. The strength of the recovery is visible in comparison to the situation in April and May 2020, when both exports and imports were almost 30% down on their values of the previous year.

Global market share in medium/high technology manufacturing (gross value added)

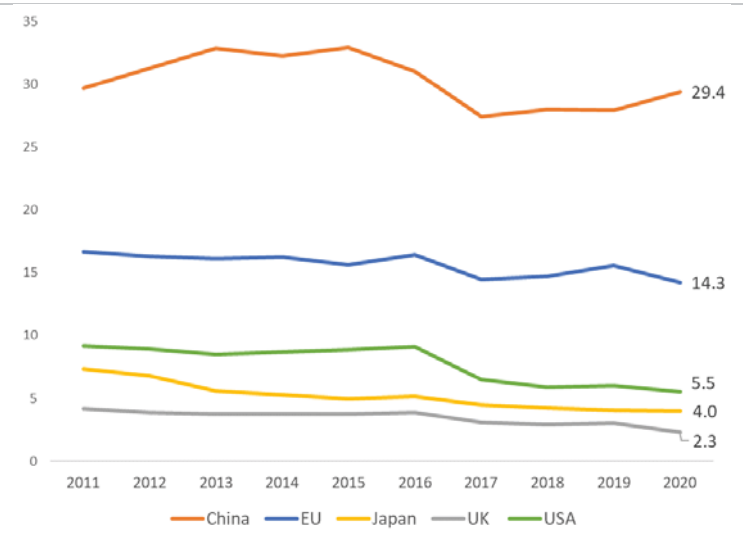


Global market share of high technology export: High-technology exports of products with high R&D intensity, such as aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery.
Source **:** UNIDO CIP dataset.

The evolution of global market share of medium and high technology manufacturing is clearly carachterised by the fast ascent of China, in parallel to a slow descent of other major industrial economies.

EU's share has declined from 27% in 1990 to 18.4%, but has been relatively stable since 2008, and was slightly larger than the USA.

Global market share of high technology exports



Global market share of high technology export: High-technology exports of products with high R&D intensity, such as aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery.
Source **:** World Bank [TX.VAL.TECH.CD] and Eurostat [COMEXT], [ert_bil_eur_a].

The European share of high technology exports have declined slightly during the last decade, but it is still significantly higher than the USA. China is by far the global leader, but part of its exports are due to EU and USA externalisation of manufacturing processes.

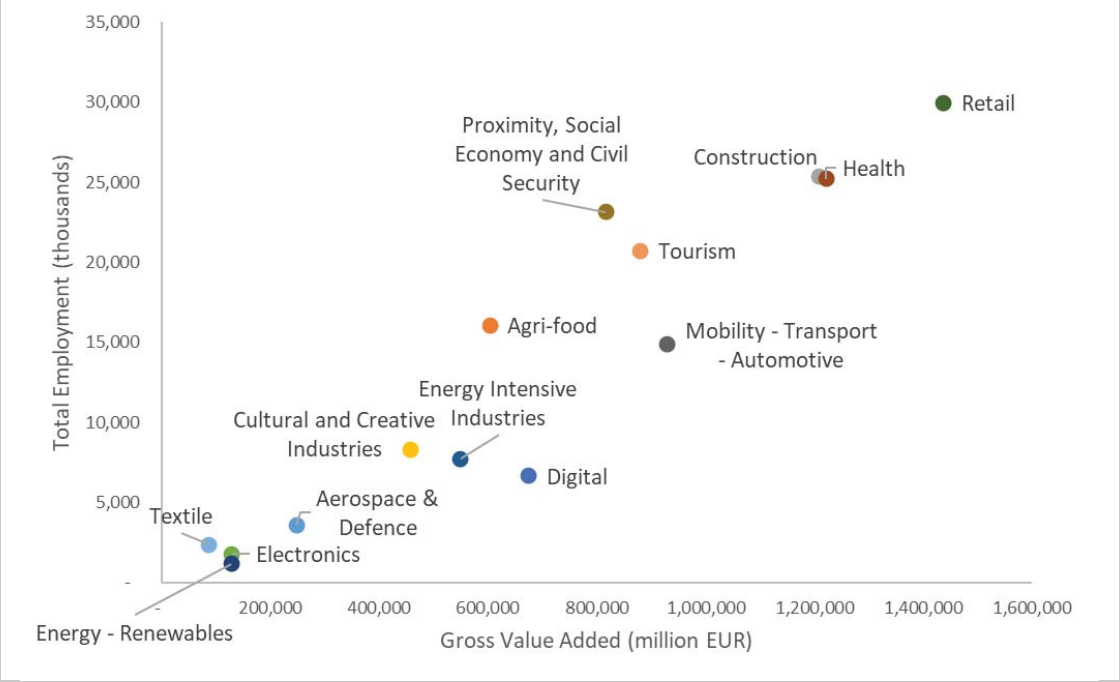
4. Key Performance Indicators for EU Industrial Ecosystems

The KPIs presented in this section describe the ecosystems in more details. The granularity of the sectoral classification for the data sources available is not ideal to describe the ecosystems precisely. Hence, the indicators below should be interpreted with caution.

The methodology followed for the calculation of these indicators is explained at the end of this annex. Due to data availability, most of the indicators presented below do not capture the COVID-19 crisis period.

Headline indicators: the size and performance of ecosystems

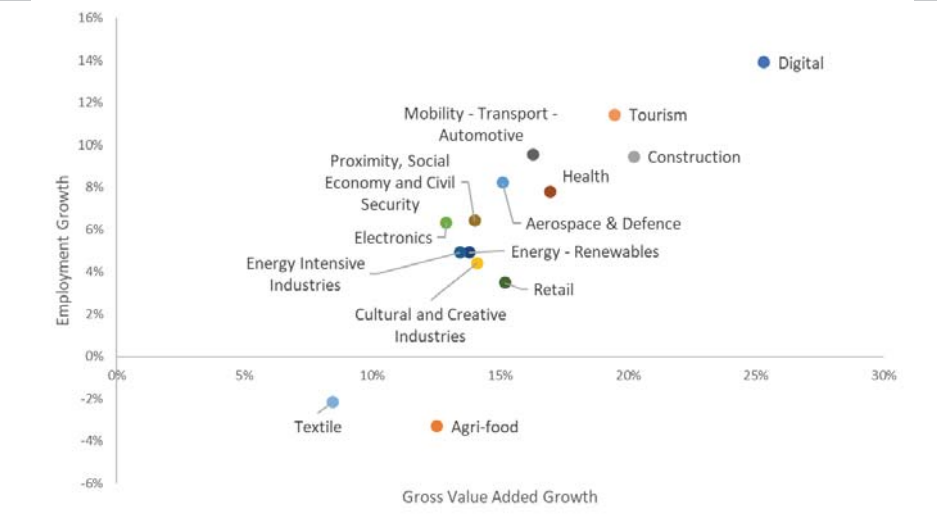
The 14 industrial ecosystems, as defined in this document, represent roughly 80% of the European business economy in terms of value added and employment.[21] They differ significantly in terms of size. Their size is influenced by several factors. For instance, Retail, by far the largest ecosystem, serves virtually all ecosystems, ensuring the contacts to final consumers. Energy Intensive Industries or Aerospace and Defence, are instead very "upstream" ecosystems. For this reason, although based on indicators as value added and employment they may look less relevant, their strategic value is fundamental, as their output is relevant for all other ecosystems.



[21] In this document, business economy is defined as total economy excluding financial services and public administration. While both financial services and public administration are clearly of great importance for the functioning of all industrial ecosystems, given their special nature, their inclusion in the calculation of the indicators would make some results more difficult to interpret.

Value Added and Employment, 2018.
Source: European Commission analysis based on Eurostat [nama_10_a64] and [nama_10_a64_e]. Data refer to 2019, most recent year available.

All ecosystems have grown in gross value added between 2015 and 2019, with Digital, Construction and Tourism showing the largest growth rates. Looking at employment dynamics, the Digital, Tourism and Mobility-Transport-Automotive ecosystems show the largest increase while Textiles and Agri-food have marginally reduced total employment between 2015 and 2019.



Change in Value Added and Employment, 2015-2019
Source**:** European Commission analysis based on Eurostat [nama_10_a64] and [nama_10_a64_e].

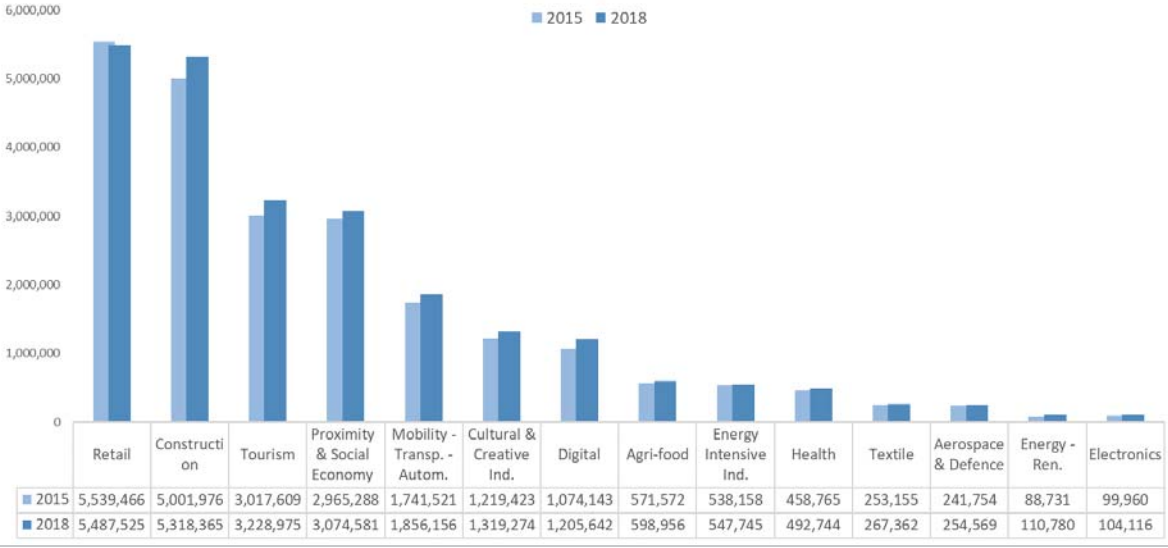
Gross Value added and Employment by ecosystem, 2019

	Gross Value Added (million EUR)	Total Employment (thousands)
Aerospace & Defence	246,999	3,605
Agri-food	602,983	16,083
Construction	1,208,032	25,380
Cultural and Creative Industries	457,117	8,299
Digital	674,286	6,663
Electronics	128,765	1,780
Energy - Renewables	127,452	1,183
Energy Intensive Industries	549,115	7,734
Health	1,221,472	25,232
Mobility - Transport - Automotive	929,684	14,875
Proximity, Social Economy and Civil Security	816,070	23,137
Retail	1,436,417	29,987
Textile	86,298	2,356
Tourism	880,561	20,739

The share of SME's value added and employment varies significantly by ecosystem. Construction and Textile have the largest share of employment and value added related to SMEs among the ecosystems for which data is available.

	Share of Persons Employed in % by size class, EU-27, 2019					Share of Value Added in % by size class, EU-27, 2019				
Ecosystem	0-9	10-49	50-249	250 or more	SME	0-9	10-49	50-249	250 or more	SME
Aerospace & Defence	10.7%	14.3%	19.9%	55.1%	44.9%	7.3%	11.6%	16.5%	64.7%	35.3%
Agri-food										
Construction	36.5%	23.7%	15.3%	24.5%	75.5%	29.2%	24.7%	17.3%	28.8%	71.2%
Cultural and creative industry	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Digital	23.6%	15.6%	16.5%	44.3%	55.7%	12.0%	11.8%	16.0%	60.2%	39.8%
Electronics	9.7%	13.9%	21.1%	55.3%	44.7%	5.7%	11.1%	18.8%	64.4%	35.6%
Energy-Renewables	12.0%	10.8%	16.5%	60.6%	39.4%	11.4%	8.7%	13.8%	66.1%	33.9%
Energy Intensive Industries	11.9%	15.8%	23.1%	49.1%	50.9%	5.7%	10.8%	20.8%	62.7%	37.3%
Health	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Mobility-Transport-Automotive	23.7%	17.3%	15.7%	43.3%	56.7%	12.7%	14.4%	15.5%	57.3%	42.7%
Proximity, social economy	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
Retails	32.0%	19.1%	13.0%	35.8%	64.2%	21.9%	20.2%	16.8%	41.0%	59.0%
Textile	20.4%	26.3%	27.7%	25.6%	74.4%	13.6%	23.6%	26.9%	35.9%	64.1%
Tourism	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
European Commission calculation based on Eurostat data (National Accounts and Structural Business Statistics) and methodology developed by DG GROW.										

The number of firms varies significantly across ecosystems, signalling differences not only of size, but also of market structure. For instance, Retail and Proximity, Social Economy and Civil Security count also a very large number of small and labour intensive firms, while in other ecosystems more capital-intensive activities can lead to relatively more concentration (e.g. Energy-Renewables).

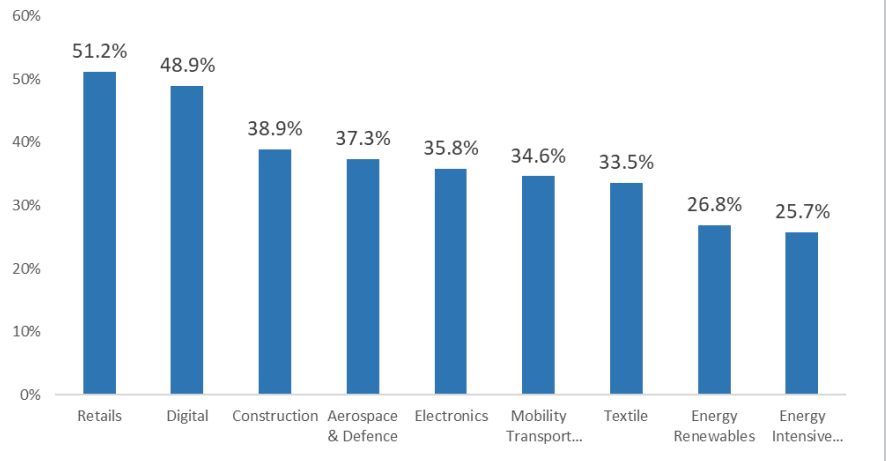


	Retail	Construction	Tourism	Proximity & Social Economy	Mobility - Transp. - Autom.	Cultural & Creative Ind.	Digital	Agri-food	Energy Intensive Ind.	Health	Textile	Aerospace & Defence	Energy - Ren.	Electronics
2015	5,539,466	5,001,976	3,017,609	2,965,288	1,741,521	1,219,423	1,074,143	571,572	538,158	458,765	253,155	241,754	88,731	99,960
2018	5,487,525	5,318,365	3,228,975	3,074,581	1,856,156	1,319,274	1,205,642	598,956	547,745	492,744	267,362	254,569	110,780	104,116

Number of Firms, 2015-2018.
Source**:** European Commission analysis based on Eurostat, Structural Business Statistics.

Strenght of the ecosystems: Value added to production value

The share of value added to the value of production measures. what is left of the production value after taking into account intermediate consumption. It is a measure of the strength of the ecosystems, as it measures their capacity to generate value added using the intermediate inputavailable. Retail and digital are the best performong among the ecosystems for which data is available.

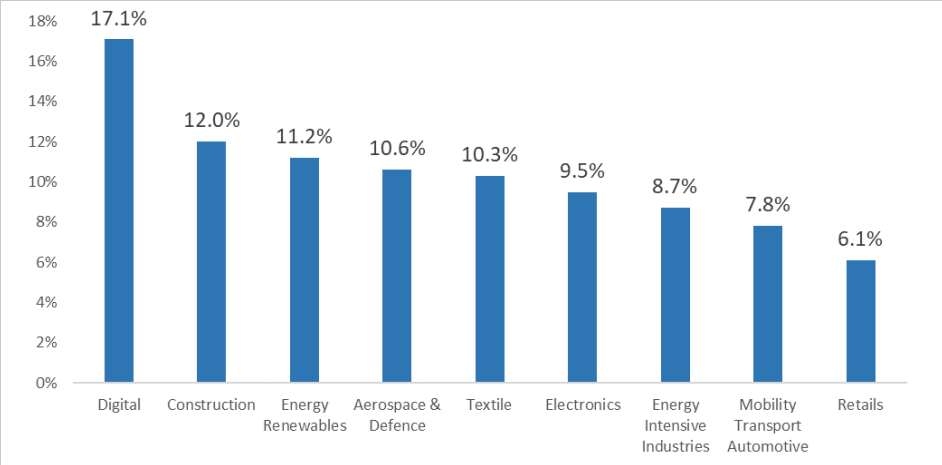


Ratio of value added to production value, 2019
Source**:** European Commission calculation based on Eurostat data (National Accounts and Structural Business Statistics) and methodology developed by DG GROW.'

Strenght of the ecosystems: Gross Operating Rate

The gross operating rate represents the share of value added minus personnel costs to turnover. It measures the ecosystem's capacity to generate a surplus through its standard activities, after the

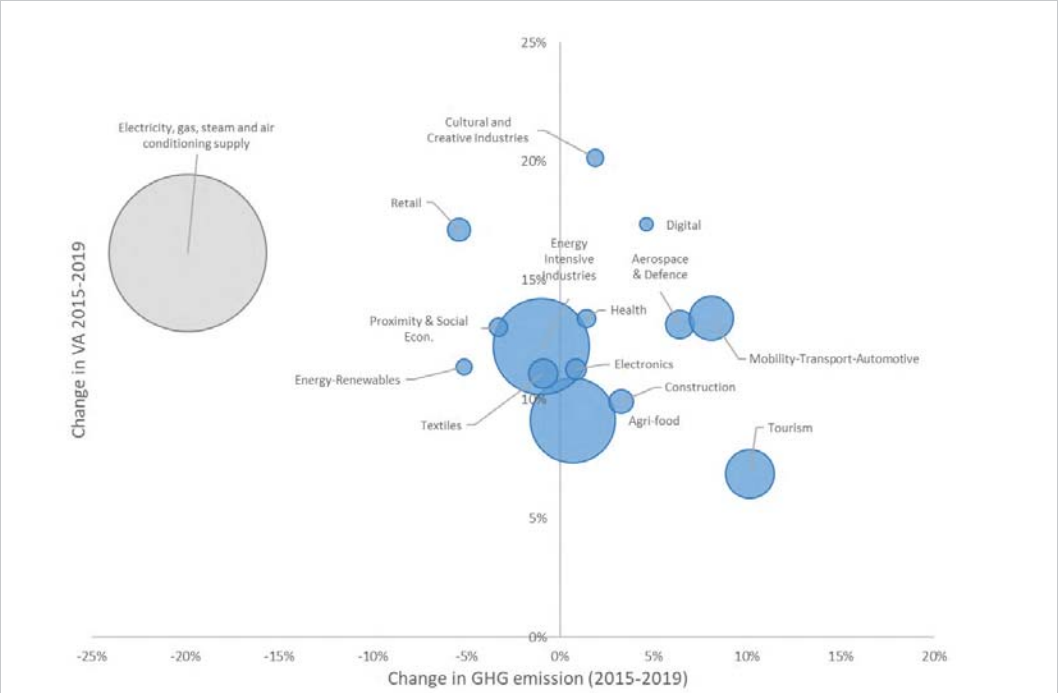
compensation of labour. The Digital ecosystem is the best performing among the ecosystems for which data is available.



Gross Operating Rate, 2019
Source**:** European Commission calculation based on Eurostat data (National Accounts and Structural Business Statistics) and methodology developed by DG GROW.

Green transition: GHG emissions

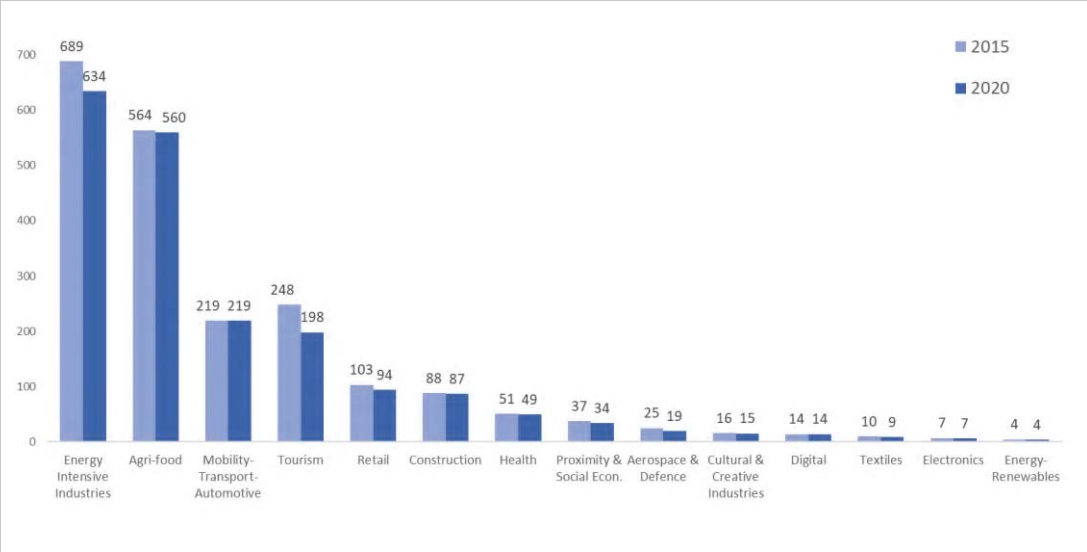
Reducing Greenhouse gas emission is a top priority of the Commission. The increased ambition of the decarbonisation target (-55% by 2030) will require an effort from all ecosystems.



GHG emission intensity (2019)**, change in GHG emissions and changes Value Added** (2015-2019).
Source**:** European Commission analysis based on Eurostat [nama_10_a64] and [env_ac_ainah_r2]. The size of the bubble represents GHG emission intensity in 2018. The ecosystem Energy-renewables does not

include emissions from energy generation, as they are assumed to be zero. The grey bubble represents the full energy sector (NACE D35), included for the sake of comparison.

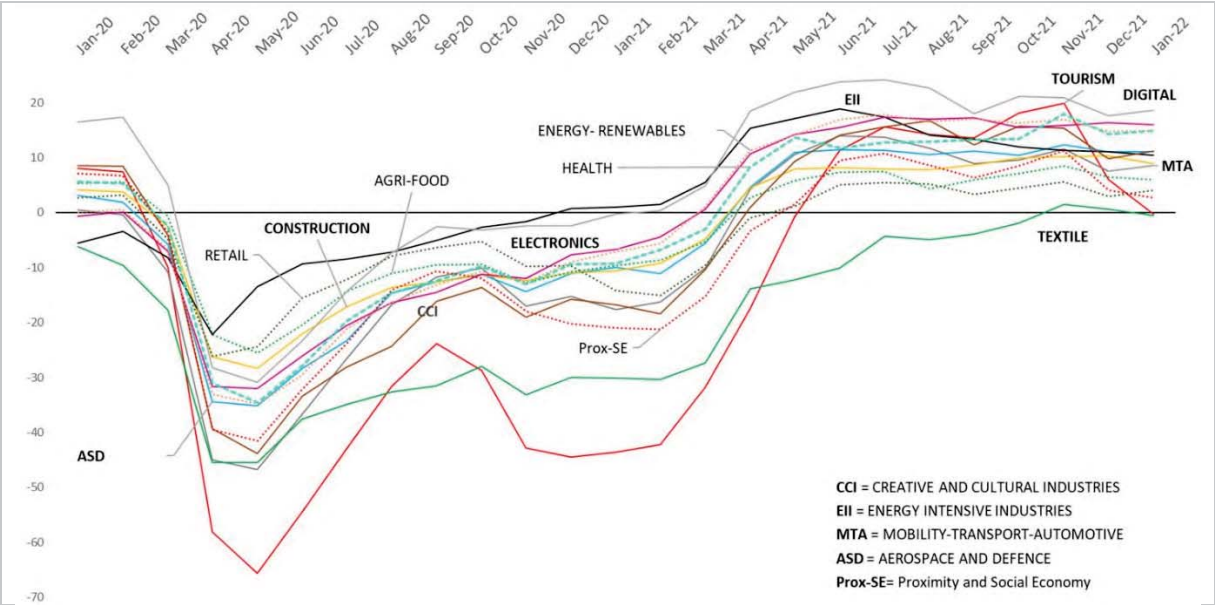
In the graph above, GHG emissions are assumed to be nil for the generation of renewable energy, which is included in the Energy-Renewables ecosystem.[22] Nonetheless, the corresponding share of value added attributable to renewables is still included in the Energy-Renewables ecosystem. For the sake of comparison, the NACE sector "Electricity, gas, steam and air conditioning supply" (D35) is presented in the figure under a different colour to distinguish it from the industrial ecosystems. The sector D35 includes emissions and value added for both renewable and non-renewable energy supply. As shown by the size of the bubbles, "Energy Intensive Industries" and "Agri-food" had the highest level of GHG emissions intensity in 2019. Most ecosystems have reduced their GHG emission intensity between 2015 and 2019, as the positive change in Value Added is larger than the change in GHG emissions. For completeness, the next figure shows the latest available figures on emissions per ecosystem.



GHG emissions, 2015-2019, million tonnes.
Source**:** European Commission analysis based on Eurostat [env_ac_ainah_r2].

Short-term indicators: Economic confidence

[22] This is of course an imprecise assumption, as even the generation of renewable energy requires a minimum of emissions.

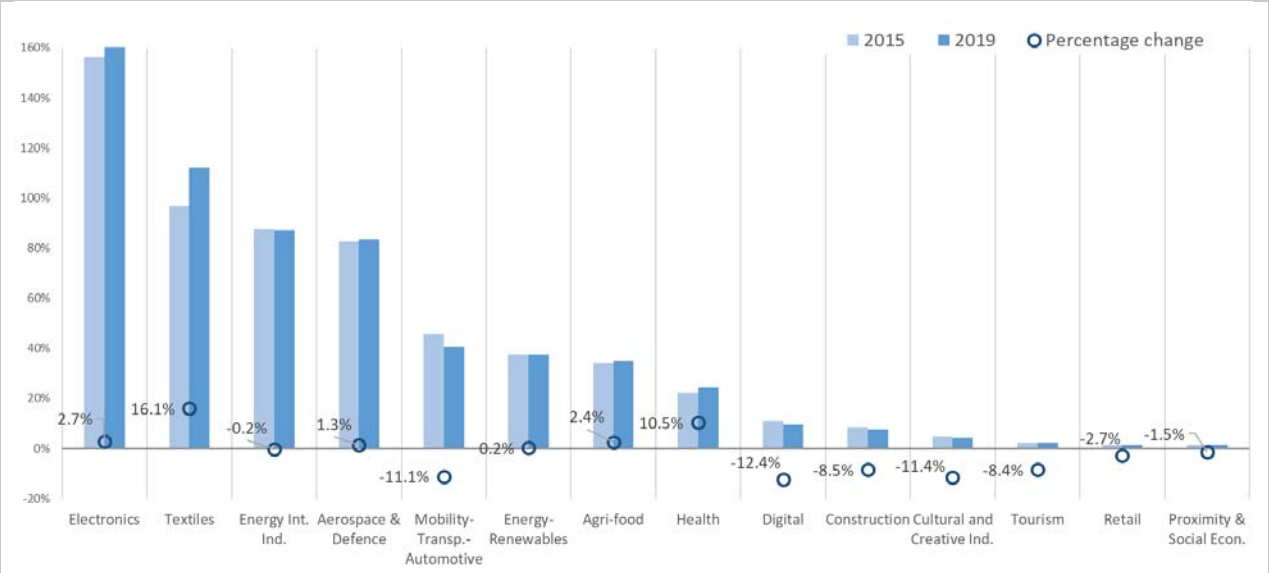


Confidence Indicator by Ecosystem – 2020-2022, monthly.
Source: European Commission analysis based on data by the Joint Harmonised EU Programme of Business and Consumer Surveys. Note: For "Retail", "Agri-food", "Proximity, Social Economy and Civil Security", "Energy-Renewables", and "Health", data coverage is partial, so they are depicted using dotted lines and the related values have to be interpreted with caution. Data for Cultural and Creative Industries may underestimate the impact of the crisis, as data for some relevant sectors are not available.

Survey data helps complement the analysis by providing very timely information before the publication of official statistics. Data from the Joint Harmonised EU Programme of Business and Consumer Surveys can provide useful insights when used to build an economic sentiment indicator for each ecosystem.[23] In the most recent months, the confidence indicator remained rather stable or slightly improved in most industrial ecosystems. The important exception is Tourism, for which confidence levels dropped dramatically and turned negative, something that had not happened since April 2021. the decline of confidence in Tourism during the December and January is remarkable, moving from being the second best performing ecosystem to the worst performing one, together with Textiles.

International dimension: Trade

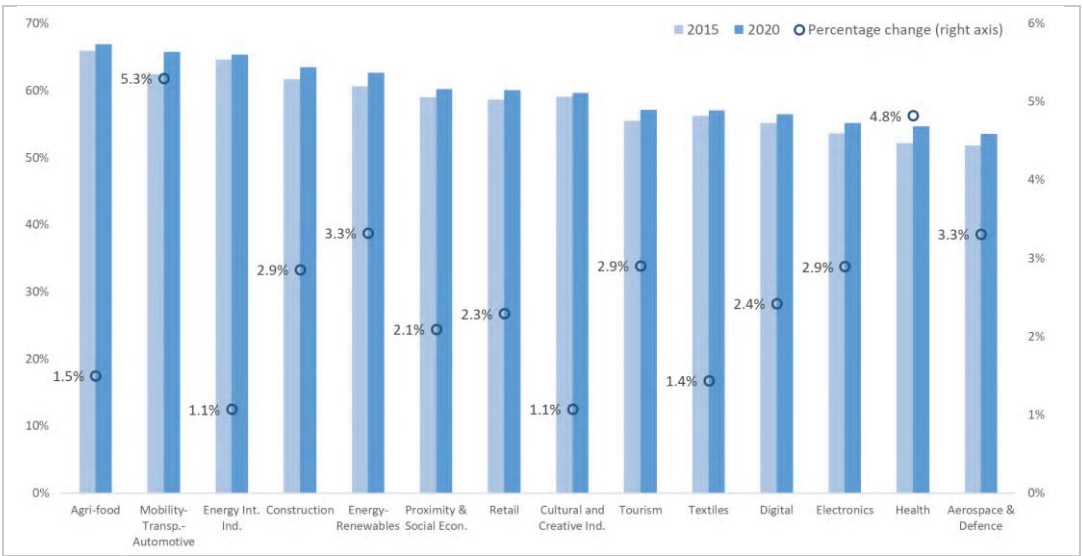
[23] We build a profile of the economic sentiment for each ecosystem, by aggregating the data for the different sectors. We calculate a weighted average of the values of those sectors included in the definition of each ecosystem; the weights are based on the share of value added that each sector has in the total value added of the ecosystem, as a measure of the relevance of that sector to that ecosystem. This surveys-based indicator is highly correlated (80%) with the data on actual changes in turnover, for each ecosystem in each month.



Export Intensity: extra EU exports as percentage of value added.
Source**:** European Commission analysis based on Eurostat, EU trade since 1988 by CPA 2.1 [DS-1062396].

The fourteen industrial ecosystems differ significantly in their export intensity, with "Electronics", "Textiles" and "Energy Intensive Industries" showing the highest values. Given the profoundly different nature of the ecosystems analysed here, this divergence should not be interpreted as a signal of dismal performance by some of them. Indeed, export of goods is clearly not a core activity for ecosystems as Proximity, Social Economy and Civil Security, or for a service ecosystem as Retail. The change in export intensity across ecosystems between 2015 and 2019 has been relatively small. "Textile" is a notable exception, with an increase of export intensity of 9 percentage points.

All ecosystems rely more on intra EU trade than on extra EU trade. The changes since 2015 across ecosystems are relatively small.

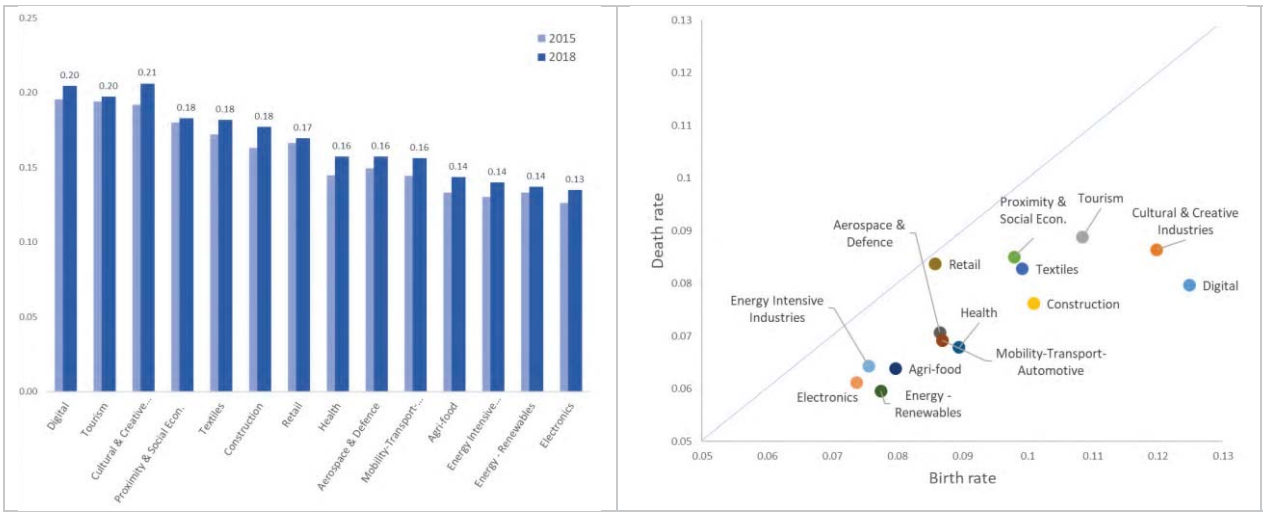


Intra EU Trade: share of total ecosystem trade.
Source: European Commission analysis based on Eurostat EU trade since 1988 by CPA 2.1 [DS-1062396],

last update 18 March 2021.

Resilience: the dynamism of ecosystems

The ecosystems differ less significantly in their level of dynamism, as measured by entry and exit of firms and by the churn rate, defined as the sum of birth and death rate of firms. These indicators proxy the degree of "creative destruction" of the ecosystems, which contribute to aggregate productivity growth of business.[24] The separate analysis of birth and death rates shows that for all ecosystems the birth rate is higher than the death rate. However, for Retail the births and deaths are very similar.



Churn rate of businesses of EU ecosystems, 2015-2018
Source: European Commission analysis based on Eurostat [bd_9bd_sz_cl_r2]. Data refer to 2018. Data are not fully available for for Agri-food, Creative & Cultural Industries, and Proximity and Social economy.

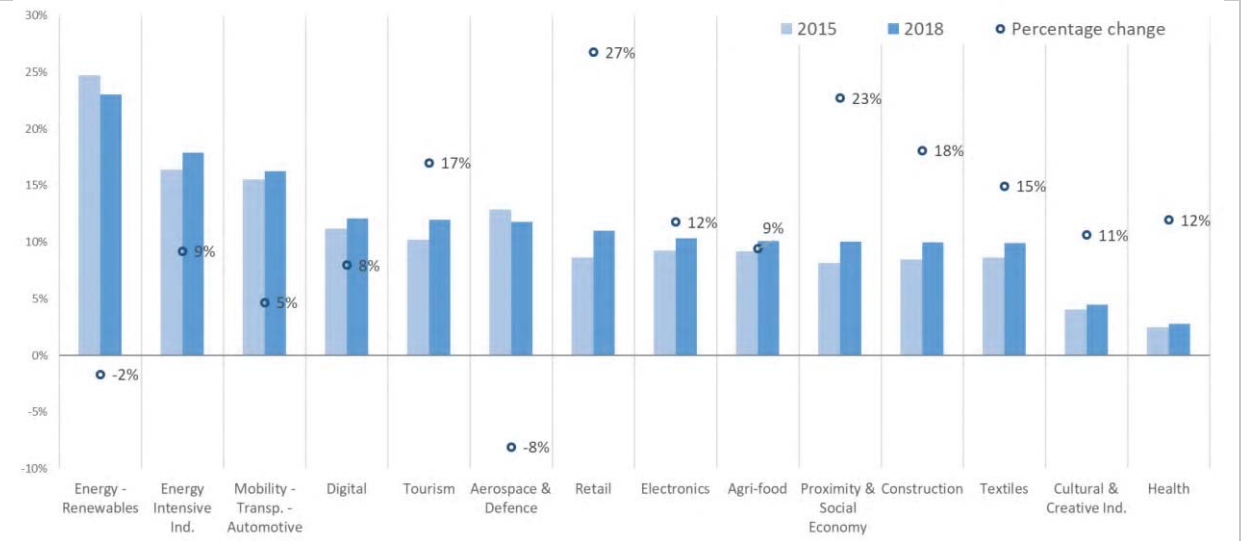
The data used to calculate this indicator do not cover the whole economy. The ecosystems Agri-food, Health, Cultural and creative industries as well as Proximity, Social economy and Civil security are only partially covered, hence result should be interpreted with caution.

Resilience: Investments in tangibles

The table below shows a measure of investment intensity, given by the ratio of investment in tangibles to Value Added. The Energy-Renewable ecosystem shows the highest investment intensity, which is not surprising given the capital-intensive nature of energy generation.

[24] See, for instance, Calvino, F., C. Criscuolo and R. Verlhac (2020), "Declining business dynamism: Structural and policy determinants", OECD Science, Technology and Industry Policy Papers, No. 94, OECD Publishing, Paris, https://doi.org/10.1787/77b92072-en.

Most ecosystems increased their investment intensity from 2015, with the only exceptions for Aerospace & Defence and Energy – Renewables, for which the ratio has slightly decreased, mostly due to a strong increase of value added creation. However, this measure does not take into account investments in non-tangible goods, whose importance is rapidly increasing.



Investment in tangibles as a share of Value Added: 2015 and 2018 (%).
Source: European Commission analysis based on Eurostat, Structural Business Statistics [partial data coverage of some ecosystems notably Agri-food; Cultural and Creative Industries; Health; Proximity, Social Economy and Civil Security and Tourism].

The data used to calculate this indicator do not cover the whole economy. The ecosystems Agri-food, Health, Cultural and creative industries as well as Proximity, Social economy and Civil security are only partially covered, hence results should be interpreted with caution.

Methodology for constructing the data used for the analysis of industrial ecosystems

The industrial ecosystems in this report are composed of a number of related industries and competences that show strong inter-industry interdependencies. The industries are identified according to their main activities. The data used to compile indicators on the ecosystems are derived from official statistics, including national accounts, Structural Business Statistics, and Short-term business statistics. These statistical sources use the NACE rev.2 classification to identify enterprises according to their main activity.

The NACE rev.2 classification has also been used to define the 14 industrial ecosystems, as reported in the table below. The mapping provided in this list is based on 2-digits classification. This level of granularity is not optimal to identify all the elements of the ecosystems, but most of the data sources we used to calculate indicators are only available at the 2-digits level. This affects the precision of the indicators. The most relevant issues were alleviated by defining weighs for those 2-digits sectors that include activities relevant for different ecosystems. Weights have been calculated based on more granular datasets when available, or based on existing studies. They are reported in the column "Share". As ecosystems naturally overlap, some sectors are attributed to more than one ecosystem.

Ecosystem	NACE_R2	Description	Share*
Aerospace & Defence	C25	Manufacture of fabricated metal products, except machinery and equipment	0.01^
Aerospace & Defence	C26	Manufacture of computer, electronic and optical products	0.44
Aerospace & Defence	C27	Manufacture of electrical equipment	0.24
Aerospace & Defence	C30	Manufacture of other transport equipment	0.68
Aerospace & Defence	C33	Repair and installation of machinery and equipment	0.08^
Aerospace & Defence	H51	Air transport	0.09
Aerospace & Defence	H52	Warehousing and support activities for transportation	0.18
Aerospace & Defence	J61	Telecommunications	0.07
Aerospace & Defence	N80	Security and investigation activities	1
Agri-food	A	Agriculture, forestry and fishing	1
Agri-food	C10	Manufacture of food products	1
Agri-food	C11	Manufacture of beverages	1
Agri-food	C12	Manufacture of tobacco products	1
Construction	C31	Manufacture of furniture	1
Construction	F	Construction	1
Construction	M71	Architectural and engineering activities; technical testing and analysis	1
Construction	N81	Services to buildings and landscape activities	1
Cultural and Creative Industries	C18	Printing and reproduction of recorded media	1
Cultural and Creative Industries	C32	Other manufacturing	0.08
Cultural and Creative Industries	G47	Retail trade, except of motor vehicles and motorcycles	0.01
Cultural and Creative Industries	J58	Publishing activities	1
Cultural and Creative Industries	J59	Motion picture, video and television programme production, sound recording and music publishing activities	1
Cultural and Creative Industries	J60	Programming and broadcasting activities	1
Cultural and Creative Industries	J62_63	Computer programming, consultancy and related activities;	0.004
Cultural and Creative Industries	M71	Architectural and engineering activities; technical testing and analysis	0.15^

Cultural and Creative Industries	M73	Advertising and market research	1
Cultural and Creative Industries	M74	Other professional, scientific and technical activities and veterinary activities	0.44
Cultural and Creative Industries	N77	Rental and leasing activities	0.0001^
Cultural and Creative Industries	P85	Education	0.1
Cultural and Creative Industries	R90-R92	Creative, arts and entertainment activities; libraries, archives, museums and other cultural activities; gambling and betting activities	0.8
Cultural and Creative Industries	S94	Activities of membership organisations	0.02
Cultural and Creative Industries	S95	Repair of computers and personal and household goods	0.26
Digital	C26	Manufacture of computer, electronic and optical products	0.29
Digital	J58	Publishing activities	1
Digital	J61	Telecommunications	0.97
Digital	J62	Computer programming, consultancy and related activities	1
Digital	J63	Information service activities	1
Digital	S95	Repair of computers and personal and household goods	0.48
Electronics	C26	Manufacture of computer, electronic and optical products	1
Electronics	C28	Manufacture of machinery and equipment n.e.c.	0.10^
Energy - Renewables	C27	Manufacture of electrical equipment	0.38
Energy - Renewables	D35	Electricity, gas, steam and air conditioning supply	0.29
Energy Intensive Industries	C16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	1
Energy Intensive Industries	C17	Manufacture of paper and paper products	1
Energy Intensive Industries	C19	Manufacture of coke and refined petroleum products	1
Energy Intensive Industries	C20	Manufacture of chemicals and chemical products	1
Energy Intensive Industries	C22	Manufacture of rubber and plastic products	1
Energy Intensive Industries	C23	Manufacture of other non-metallic mineral products	1
Energy Intensive Industries	C24	Manufacture of basic metals	1
Health	C21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	1
Health	C32	Other manufacturing	1
Health	Q86	Human health activities	1
Health	Q87_Q88	Residential care activities and social work activities without accommodation	1
Mobility - Transport - Automotive	C27	Manufacture of electrical equipment	0.03
Mobility - Transport - Automotive	C29	Manufacture of motor vehicles, trailers and semi-trailers	1
Mobility - Transport - Automotive	C30	Manufacture of other transport equipment	0.32
Mobility - Transport - Automotive	G45	Wholesale and retail trade and repair of motor vehicles and motorcycles	1
Mobility - Transport - Automotive	H49	Land transport and transport via pipelines	0.52
Mobility - Transport - Automotive	H50	Water transport	0.69
Mobility - Transport - Automotive	H52	Warehousing and support activities for transportation	0.39
Proximity & Social Economy	G47	Retail trade, except of motor vehicles and motorcycles	0.16
Proximity & Social Economy	I	Accommodation and food service activities	0.14
Proximity & Social Economy	L	Real estate activities	0.08
Proximity & Social Economy	N81	Services to buildings and landscape activities	0.28
Proximity & Social Economy	N82	Office administrative, office support and other business support activities	0.11
Proximity & Social Economy	Q87_Q88	Residential care activities and social work activities without accommodation	1
Proximity & Social Economy	S95	Repair of computers and personal and household goods	1
Proximity & Social Economy	S96	Other personal service activities	1
Proximity & Social Economy	T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	1

Retail	G46	Wholesale trade, except of motor vehicles and motorcycles	1
Retail	G47	Retail trade, except of motor vehicles and motorcycles	1
Retail	H53	Postal and courier activities	1
Textile	C13	Manufacture of textiles	1
Textile	C14	Manufacture of wearing apparel	1
Textile	C15	Manufacture of leather and related products	1
Tourism	H49	Land transport and transport via pipelines	0.45
Tourism	H50	Water transport	0.21
Tourism	H51	Air transport	0.91
Tourism	I	Accommodation and food service activities	1
Tourism	N79	Travel agency, tour operator and other reservation service and related activities	1
Tourism	N82	Office administrative, office support and other business support activities	1
Tourism	R90-R92	Creative, arts and entertainment activities; libraries, archives, museums and other cultural activities; gambling and betting activities	0.67
Tourism	R93	Sports activities and amusement and recreation activities	1

*Shares shown in the table are computed based on value-added. Shares computed based on employment data are also used for the analysis but not shown.
^ Additional share on top of horizontal component (cfr. below).

Some sectors are horizontal in nature and, as such, they contribute to the well-functioning of all the ecosystems. These are marked as "Horizontal" in the table above. To take into account their contribution, these sectors have been distributed across ecosystems using Input-Output tables,. which allows to calculate how much each horizontal sector is used by the rest of the ecosystems. In particular, it is possible to calculate the share of value added of the horizontal sector which is embodied in the output of other sectors in the ecosystem. In general terms, these weights ($\boldsymbol{Weight}_{is}^{kz}$) are defined as follows:

$$\boldsymbol{Weight}_{is}^{kz} = \frac{v^{kz}\boldsymbol{\Lambda}_{is}^{kz}\sum_{j=1}^{N} f_j^{is}}{va^{kz}}$$

where $\boldsymbol{\Lambda}$ measures the total euro worth of country-sector *kz* goods required to meet 1 euro worth of country-sector *is'* final demand, defined as ($\sum_{j=1}^{N} f_j^{is}$). Note that the final demand of country-sector *is* is consumed by different countries *j*. The value created by country-sector *kz* is captured by v^{kz}. The total value-added generated by country-sector *kz* is denoted as va^{kz}. In this setting, *kz* is the EU's horizontal sector and *is* captures the different non-horizontal sectors of the EU. Once these weights are defined at a NACE rev. 2 level, the second step uses the definition of different ecosystems in order to capture to what extend horizontal sectors are important for the different ecosystems. The weights are summarised in the table below:

	C25	C28	C33	E36	E37-E39	M69_M70	M71	M72	N77_N78
Aerospace & Defence	6.74%	6.79%	7.76%	1.74%	2.74%	2.50%	3.37%	5.65%	2.71%
Agri-food	6.62%	7.82%	11.85%	12.18%	9.48%	7.72%	6.02%	7.21%	8.21%
Construction	30.52%	19.84%	15.54%	10.25%	13.67%	11.51%	25.68 %	10.41%	12.92%
Cultural and Creative Industries	0.90%	1.26%	1.32%	2.47%	1.89%	2.77%	2.03%	2.72%	2.85%
Digital	2.09%	3.05%	3.29%	2.22%	2.78%	5.13%	4.42%	6.90%	5.17%

Electronics	1.96%	2.26%	1.53%	0.69%	1.02%	1.17%	1.46%	5.07%	1.30%
Energy - Renewables	1.56%	1.60%	1.64%	1.13%	1.43%	0.97%	1.17%	0.83%	0.85%
Energy Intensive Industries	3.63%	4.01%	4.74%	4.01%	8.62%	4.91%	3.68%	3.06%	3.13%
Health	5.16%	5.62%	6.86%	11.10%	8.53%	8.76%	7.61%	14.22%	10.00%
Mobility - Transport - Automotive	23.55%	27.76%	16.53%	5.82%	9.82%	8.62%	9.29%	13.00%	8.55%
Proximity, Social Economy and Civil Security	2.35%	3.00%	3.57%	7.65%	5.37%	5.72%	4.42%	4.65%	6.12%
Retail	4.42%	5.73%	6.47%	7.41%	7.76%	13.45%	8.00%	8.14%	12.69%
Textile	0.85%	1.00%	0.97%	1.29%	1.44%	1.15%	1.12%	1.15%	0.99%
Tourism	3.68%	5.01%	7.17%	10.46%	7.12%	6.76%	5.49%	4.85%	8.28%

All weights refer to 2014, i.e. the latest year for which Input-Output tables are available. It should be noted that the list of "Horizontal" sectors does not include financial services. Financial services are obviously of primary importance for industrial ecosystems, as without those most of the daily operations and investments would be impossible. Insurance services are also of the essence. However, the relevance of these services is also reflected in the impact their inclusion would have on several indicators. Since in the analysis of KPIs we want to focus on the industrial component of ecosystems, we opted for excluding financial activities.

Annex 5: Investment volumes in a number of areas of relevance for the EU's green, digital and resilient transformation

This Annex presents an illustration of investment volumes which can currently be observed **in nine industrial areas, in support of a green, digital and resilient EU**, that is: raw materials, batteries, solar PV, hydrogen, steel, cement, chemicals, clouds services, and cybersecurity. However, this assessment is not more than an illustration and does not represent an exhaustive analysis of the selected sectors With the exception of hydrogen[25], such volumes relate to budgets of pipeline projects and commitments of, or goals set by, the industry to contribute to policy objectives: whilst in some cases such contribution has been validated by public authorities (e.g. approved IPCEIs), in other cases it only reflects an ambition of industrial actors to play a role in the achievement of EU policy objectives. Such private sector endeavours are often the response to public sectors calls: therefore, this Annex also outlines ongoing EU initiatives and support instruments and tools which have been used to channel private sector commitments. For cloud and cybersecurity, numbers draw on the analysis made in the preparation of the NGEU, and extrapolates those numbers to get an aggregate investment figure up to 2030.[26]

These nine areas have been selected in view of their relevance for most ecosystems and the important role they play for the competitiveness of tomorrow's industry. The nine areas share one or more of the following characteristics, which have been used as selection criteria. *First*, the importance of the product or technology as enabler of the EU's green and digital industrial transformation: this is the case for example for batteries, solar panels, hydrogen, clouds services and cybersecurity.[27] *Second*, the large magnitude of the transformation effort ahead, including for the decarbonisation of energy intensive industries, decontamination circularity of production activities, as well as innovation and digitalisation: this is the case for example for cement, steel and chemicals. *Third*, the fact that in the Commission's assessment of strategic dependencies the EU has been found to be highly dependent on third countries for access to the products and technologies at stake and therefore that their resilience has to be strengthened:[28] this is the case for raw materials, solar PV and cloud services[29].

[25] For hydrogen, the investment relate to policy targets in the European Hydrogen Strategy.
[26] SWD (2020) 98 final, table 2.
[27] For instance, the EU experienced significant supply challenges and price spikes in construction materials in 2021, such as steel and cement.
[28] The Industry Strategy update highlighted the importance of better understanding the EU's strategic dependencies and presented a comprehensive assessment, which identified them across a number of sensitive ecosystems (COM(2021)350 final). The Commission carried out a *first round of in-depth reviews* on strategic dependencies, which covered raw materials, batteries, semiconductors, cloud, hydrogen and active pharmaceutical ingredients. An upcoming *second round* addresses rare earth permanent magnets, chemicals, solar panels, cybersecurity, and IT software.
[29] In addition, the EU's dependence on a number of critical raw materials has spill-over effects to a wide range of key areas where these raw materials act as inputs to EU value chains (including e.g. batteries, clean hydrogen, green steel and chemicals).

The investment volume per each of these areas is presented in Table 1. The total cumulative investment volume for the nine selected areas at around **EUR 405 billion for the period up to 2030**, **which corresponds to ca. EUR 45 billion annually**.

Table 1: Overview of cumulative investment volume over the period 2022-2030 for nine industrial areas of relevance

	Industrial Ecosystem	**Investment, EUR** ***overall estimate not available – number reflect pipeline**	**Link to relevant policy priorities**
Raw Materials	Mobility-Transport-Automotive, Aerospace & Defence, Energy Intensive Industries, Digital, Renewable Energy, Electronics	12bn*	Relevant for the green and digital transition and for EU resilience
Batteries	Mobility-Transport-Automotive, Renewable Energy, Electronics Aerospace & Defence	172bn	Relevant for the green and digital transition and for the EU resilience.
Solar PV	Renewable Energy, Aerospace & Defence.	8.1bn[#]	Relevant for the green transition and for the EU resilience
Hydrogen	Mobility-Transport-Automotive, Energy Intensive Industries, Renewable Energy, Aerospace & Defence.	24-42bn	Relevant for the green transition.
Cement	Energy Intensive Industries, Construction	7.7bn*	Relevant for the green transition.
Steel	Energy Intensive Industries, Aerospace & Defence	25bn*	Relevant for the green transition.
Chemicals	Energy Intensive Industries, Agrifood	20bn	Relevant for the green transition and for the EU resilience.
Cloud services	Digital, Electronics, Aerospace & Defence	100bn	Relevant for the digital and green transition.
Cybersecurity	Digital, Electronics, Aerospace & Defence.	27bn	Relevant for the resilience and digital transition.
Total		**405bn**	

Note: Figures related to the digital transformation (i.e. cloud services and cybersecurity) are currently being updated in view of the 2030 digital decade targets. For these areas, figures have been extrapolated from estimates in table 2 of SWD (2020) 98 final. For hydrogen, the midpoint of the range (33bn) is used in the sum. Note that only expected electrolyser costs and technology mix is considered in the hydrogen estimate.

[#]: Figure for the Solar PV goal includes investment up to 2025

Source: EC elaboration based on data collected and/or estimated through consultations with relevant public stakeholders, industrial associations and alliances.

The following sections dive deeper into the nine areas of relevance, providing details on: the investment volumes related to policy or industry goals; project pipelines that have been committed, announced or planned by industry; and the policy support instruments at EU level.

Raw materials

The area of raw materials is critical to underpin the creation and development of a number of clean technologies (e.g. e-mobility, batteries, wind turbines). The European Raw Material Alliance has already identified 28 industrial projects in the EU that would require an investment of EUR 12 billion.[30] Out of those 28 projects, 14 focus on the entire rare earth magnets value chain: mining, processing separation, metallurgy and magnets recycling and aim to satisfy 15-20% of the EU demand (depending on the material) by 2030. The private investments should be the main source of finance.

The main support tools in this area include the Alliance, led by EIT Raw Materials, to identify investment needs and develop a project pipeline[31]; Horizon Europe and InvestEU investments in R&I and capacities (e.g. sourcing, processing, recycling); the Clean Technology Materials Task Force, joint between the Commission industrial alliances and investors, to foster investment funding; in the Innovation Fund, CRM value chain investments can be eligible; and a new public-private Sustainable Battery Materials Fund announced by European Battery Alliance set to invest some EUR 400 million on exploration and sustainable processing of battery raw materials.

Batteries

In the area of batteries, according to EIT InnoEnergy, a battery production capacity of 1000 GWh per year by 2030 is associated with investments of around EUR 172 billion. In this context, InnoEnergy[32] has reported that around EUR 32 billion has been already committed in investment by businesses in the ecosystem by 2030. Projects cover the whole value chain focusing on raw materials extraction and processing, manufacturing of active materials, cells and modules, and recycling. Most of this investment (around 95%), both committed and planned, is coming from the private sector.

A good example of support tools in this area are the two Important Projects of Common European Interest (IPCEI) which allow Member States to devote public resources (in this case

[30] Source: European Raw Material Alliance (ERMA) and "Rare Earth Magnets and Motors. A European Call for Action".
[31] The EU's needs for non-fossil raw materials in the low-carbon economy will be multi-fold and cannot be met by recycling alone See Raw Materials Scoreboard: https://op.europa.eu/en/publication-detail/-/publication/eb052a18-c1f3-11eb-a925-01aa75ed71a1.
[32] InnoEnergy's estimates.

state aid) to supporting the development of a number of breakthrough technology projects across the value chain. The two battery IPCEIs have been established involving 12 Member States and nearly 60 companies for which up to EUR 6.1 billion in State aid has been approved, leveraging an expected further EUR 14 billion in private investments. Other support tools include a dedicated partnership for battery-related research (Batt4Eu) under Horizon Europe with planned EUR 925 million and InvestEU funding in support of R&I activities and capacities (e.g. projects on battery manufacturing, including circularity aspects).

Solar Power

The European Solar Initiative (ESI) estimates that an EU manufacturing capacity of solar PVs of 20GW by 2025 is associated with investments of EUR 8.1 billion (EUR 2.4 billion for the manufacturing of polysilicon; EUR 1 billion for ingots; EUR 1.2 billion for wafers; and EUR 3.5 billion for cells and modules). Across all of those components a substantial project pipeline is being developed. In particular, around 14 projects have been developed, covering wafer, ingot, cell and module manufacturing[33]. A significant share of projects is however for the moment in a draft stage with financing yet to be secured.

Main support tools include the industry-led European Solar Initiative platform to accelerate the deployment of EU solar PV manufacturing projects; InvestEU will be able to support the scaling up of production of viable technologies and investments in R&I and capacities; Innovation Fund also partially providing scaling-up project;[34] and the Clean Energy Transition co-funded European partnership (EUR 210 million) under Horizon Europe to support R&I; various innovation support schemes deployed under RRF and the European Structural and Investment Funds for the development and commercialisation of innovative solar technologies.

[33] That project pipeline includes notably: a) an expansion of current cell and module manufacturing from 1.4 GW to 4.3 GW by Mever Burger (DE); from 100 MW to multi-GW by Oxford PV (DE); from 80 MW to 3 GW by 3SunFactory (IT) If realised, that project pipeline would bring the industry close to achieving the 20GW manufacturing capacity objective; b) new cell and module manufacturing by Giga PV with a 1 GW capacity in PL; 5 GW capacity by Green Fab in DE and 5 GW by Greenland factory in ES; c) New ingots and wafer production located in Norway and Spain.

[34] For instance, Innovation Fund awarded financial support for the development of an industrial-scale pilot line for innovating PV panels in Italy, see Innovation Fund – Focus on - Results of the first call for large-scale project

Hydrogen

The EU set itself ambitious targets for the production of clean hydrogen to decarbonise industry and transport sectors, planning to install 40 GW of renewable hydrogen electrolysers by 2030, up from 0.1 GW today. The EU Hydrogen Strategy[35] expects the installation of 40 GW electrolysers to be associated with investments of around EUR 24 - 42 billion.[36]

Following decades of research, European industry is now getting ready for deploying hydrogen technologies and applications at market-scale. The European Clean Hydrogen Alliance (ECHA) in November 2021 presented a pipeline of over 750 hydrogen projects that its members are preparing to undertake by 2030 and that include, among others, the installation of 21 GW of electrolyser capacity requiring an estimated investment of EUR12.5 billion[37]. Extrapolating this figure to reach the 40 GW target of the Hydrogen Strategy imply project-related investment needs of the order of EUR 24 billion.

Main support tools in this area include a number of EU funding instruments[38] (around EUR 800 million/year) in support of hydrogen production and offtake projects;[39] the preparation of a series of hydrogen IPCEIs that will allow state aid to be provided to breakthrough innovations in the hydrogen value chain as well as for large-scale open hydrogen generation and transmission projects; substantial investment (around EUR 10 billion) under the RRPs; the co-funded European Partnership on Clean Hydrogen under Horizon Europe (EUR 2 billion) to boost R&I[40]; the European Clean Hydrogen Alliance, set up by the Commission, to build an investment pipeline [41]; in the Innovation Fund supports a number of hydrogen technologies and projects, notably in energy intensive industries

Steel

In the area of the green steel, EU steel industry is responsible for 5% of total EU GHG emissions. 54 low-CO2 projects have been identified to start before 2030. The projects focus on circular economy, carbon direct avoidance, smart carbon usage, and carbon capture and storage. This project pipeline would potentially result in the abatement of one third of current emissions by 2030 (76Mt/year). The estimated investments would be EUR 25 billion in CAPEX (additional EUR 45 billion in OPEX).[42] This area has strong links with hydrogen investments, in particular those under the hydrogen IPCEI. The public funding may play a role by de-risking investments

[35] A hydrogen strategy for a climate-neutral Europe, European Commission (COM(2020) 301 final.
[36] European Commission services calculations include only expected electrolyser costs and technology mix.
[37] For the project pipeline of the European Clean Hydrogen Alliance see: Project pipeline (europa.eu).
[38] See hydrogen public funding compass: Funding guide (europa.eu).
[39] GROW calculations based on available EU funding instruments.
[40] Delivering the European Green Deal | European Commission (europa.eu) ; Hydrogen and Decarbonised Gas Package (europa.eu).
[41] European Clean Hydrogen Alliance
[42] EUROFER (European Economic and Social Committee –September 2021).

into the first of the kind facilities using the innovative technologies like hydrogen-based steel making. While markets for sustainable, green and circular products develop and green steel has still to compete in the market with cheaper conventional fossil fuels based alternatives, the public support will be needed through instruments like Carbon Contracts for Difference.

Main support tools in this area include the Research Fund for Coal and Steel (RFCS) to finance R&I projects in coal and steel; the co-programmed Clean Steel Partnership, under Horizon Europe, to pilot breakthrough technologies able to reduce CO2 emissions from EU steel industry; and InvestEU support to R&I projects in the field of clean steel. The Innovation Fund will support, among other technologies, projects in carbon capture use and storage for green steel and all the EIIs' sectors reported in next paragraphs. Furthermore, the recently adopted Climate, Environmental protection and Energy State aid Guidelines (CEEAG), which support the deployment of innovative technologies for decarbonising CO2 emitting industrial processes, provides an updated reference framework for public support that can be appropriately used in the field of steel.

Cement

In the area of cement, the industry aims to achieve savings of 2.5 Mt CO2/year until 2030, going up thereafter by 4Mt CO2/year from 2030 to 2050. Relevant projects would mostly focus on innovation and new technologies, CCS (Carbon Capture and Storage) and CCU (Carbon Capture and Utilisation), resource efficiency, low carbon products, energy efficiency. The associated investments would be EUR 7.7 billion.[43]

Main support tools in this area include the Innovation Fund to support some projects for decarbonising the cement sector; Horizon Europe will also invest in R&I (EUR 100 million for demo projects, feasibility studies on CO2 carbon capture, utilisation and storage, CO2 removal and CO2 carbon capture and utilization for production of materials, chemicals and fuels); and InvestEU will support the decarbonisation and sustainability of the cement industry.

Chemicals

In the area of chemicals, a total of EUR 20 billion of "low-carbon investments" (CAPEX) for the period 2021-2030 is estimated.[44] These investments will aim to achieve between 17% and 20% GHGs reduction by 2030 (wrt 2019). Around 78 projects have been proposed on Low Carbon Industry for abatement of 28Mt CO2/year. A substantial project pipeline is still in development stage. [45]

[43] Cement industry estimates.
[44] Estimations from the European Chemical Industry Council (CEFIC)'s 'iC2050' model (transition modelling tool).
[45] CEFIC iC2050 Project Report.

The investment projects will comprise carbon circularity, electrification, innovative products, process efficiency, carbon capture and storage among others (it is only an initial list of examples of possible major investments in innovation toward 2050 objectives, not the complete picture of investments for GHG emission reduction by 2030). [46]

Main support tools in this area include Horizon Europe to support R&I in sustainable chemicals (EUR 15-20 million), new electrochemical conversion routes (EUR 8-12 million), energy efficiency improvement in process industries or electrification of+ processes (not only for chemical), the production of safer and more sustainable chemicals (EUR 100 million); InvestEU for decarbonisation and sustainability; and LIFE for the support the transition towards a decarbonised and toxic-free economy through its sub-programme on circular economy and quality of life, with an overall budget of around EUR 100 million annually. The recently adopted Climate, Environmental protection and Energy State aid Guidelines (CEEAG) provides an updated framework for public support that can be used in this field.

Cloud Services

In the area of cloud services, the investment gap is estimated to about EUR 11bn/y,[47] or EUR 100 billion by 2030. Twelve Member States are preparing a proposal for an IPCEI on the next generation of Cloud Infrastructure & Services (IPCEI-CIS)[48]. The Connecting Europe Facility[49] and Digital Europe programmes[50] are funding European projects aimed at deploying both infrastructures and cloud-to-edge services supported by a smart middleware for an amount of EUR 110 (2021-2023) & 140 (2021-2022) million respectively.

Main support instruments include the Digital Decade with the twofold objective of deploying 10,000 climate neutral highly secure edge nodes in the EU by 2030 at an estimated cost of around EUR 3 billion altogether, and having 75% of European enterprises take up cloud services; the recently created European Alliance for Industrial Data, Edge and Cloud[51], which will update an existing technology roadmap[52]; and substantial investments in RRPs of many Member States to modernise cloud infrastructure and support business cloudification.

Cybersecurity

In the area of Cybersecurity, associated investment amounts to around EUR 27 billion over the period 2022-2030[53]. EU funding in the 2021-2027 Multiannual Financial Framework envisaged

[46] CEFIC.
[47] Extrapolated from table 2 of SWD (2020) 98 final.
[48] Ministère de l'Économie des Finances et de la relance
[49] CEF Digital | Shaping Europe's digital future (europa.eu).
[50] Work Programmes - DIGITAL | Shaping Europe's digital future (europa.eu).
[51] Cloud Alliance | Shaping Europe's digital future (europa.eu).
[52] European industrial technology roadmap for the next generation cloud-edge offering.
[53] Extrapolated from table 2 of SWD (2020) 98 final.

for cybersecurity under the Digital Europe Programme and under Horizon Europe for research and innovation, with special focus on support for SMEs, is in the order of EUR 2 billion overall.

Main support tools include the Digital Europe Programme to invest in cybersecurity capacity and infrastructures and best practice (EUR1.5 billion from EU funding following the proposed Chips Act) and Horizon Europe to invest in cybersecurity research and innovation (approx. EUR 470m). These will be managed by the European Cybersecurity Industrial, Technology and Research Competence Centre. The Competence Centre is also the mechanism to coordinate investments between the EU, Member States and industry.[54] Funding priorities will include areas such as Security Operations Centres and Cyber Threat Intelligence, Cybersecurity upgrades in SMEs and in the health sector, Cyber secured hardware and operating systems, or training and skills.

Summary

This Annex illustrates the investment volumes in **nine industrial areas of relevance:** raw materials, solar PV, batteries, clean hydrogen, green steel, cement, chemicals, clouds services and cybersecurity. With the exception of hydrogen[55], such volumes relate to budgets of pipeline projects and commitments of, or goals set by, the industry to contribute to policy objectives: whilst in some cases such contribution has been validated by public authorities (e.g. approved IPCEIs), in other cases it only reflects an ambition of industrial actors to play a role in the achievement of EU policy objectives. Such private sector endeavours are often the response to public sectors calls.

The investment volumes are estimated to be **at around EUR 407 billion for the period up to 2030, which corresponds to ca. EUR 45 billion annually.**

These areas are relevant enablers for most ecosystems and play an important role for the competitiveness of tomorrow's industry.

[54] It will work with industry, the academic community and other stakeholders to build a common agenda for investments into cybersecurity, and decide on funding priorities for research, development and roll-out of cybersecurity solutions. For instance, The European Investment Bank is currently undertaking a market study to assess whether cybersecurity SMEs have sufficient access to market finance in order to grow in Europe.

[55] For hydrogen, the investment relate to policy targets in the European Hydrogen Strategy.