European Commission

2020 Strategic Foresight Report

CHARTING THE COURSE TOWARDS A MORE RESILIENT EUROPE

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Executive Summary

President von der Leyen's political guidelines set a strategic long-term direction to achieve the transition towards a green, digital and fair Europe[1]. They lay out a path for Europe to become the first climate-neutral continent by 2050, to be fit for the digital age, and to cultivate its unique social market economy and democratic order.

The COVID-19 crisis has shocked the world, both exposing vulnerabilities and highlighting capacities within the EU. The pandemic has already claimed the lives of almost a million people globally and has led to economic, social and psychological hardship. In the EU, it has exacerbated social and economic inequalities: in 2020, despite various safety nets, unemployment is projected to rise to more than 9% and real disposable income to drop by 1%, disproportionately affecting women and poorer households[2]. The EU's strongly diversified trade has proven to be a strength, even if reliance on a limited number of non-EU suppliers for some critical goods and services has been exposed as a vulnerability. The EU and its Member States were also able to rely on their social market economies, sustainable ecosystems, robust financial systems and an effective governance framework. The recovery plan for Europe[3] now shows the way forward: Next Generation EU aims to build a more resilient, sustainable, and fair Europe through large-scale financial support for investment and reforms.

Strategic foresight will play a key role in helping future-proof EU policymaking by ensuring that short-term initiatives are grounded in a longer term perspective. To make the most of its potential, this Commission has a strong mandate to put *strategic foresight* at the heart of EU policymaking[4]. Strategic foresight can help build collective intelligence in a structured manner to better chart the way forward for the twin green and digital transitions and to recover from disruptions. With this Communication, the Commission sets out how it will integrate strategic foresight in EU policymaking and outlines related priorities. This is vital, as we are entering a new era, where action-oriented foresight will stimulate strategic thinking and shape EU policies and initiatives, including future Commission work programmes.

The central theme of this first report is resilience, which has become a new compass for EU policies with the COVID-19 crisis. *Resilience* is the ability not only to withstand and cope with challenges but also to undergo transitions in a sustainable, fair, and democratic manner. Resilience is necessary in all policy areas to undergo the green and digital transitions, while maintaining the EU's core purpose and integrity in a dynamic and at times turbulent environment. A more resilient Europe will recover faster, emerge stronger from current and future crises, and better implement the United Nations' Sustainable Development Goals.

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[1] A Union that strives for more. Political Guidelines for the next European Commission 2019-2024.
[2] European Commission, European Economic Forecast. Spring 2020.
[3] COM(2020)456 final, Europe's moment: Repair and Prepare for the Next Generation.
[4] https://ec.europa.eu/commission/sites/beta-political/files/mission-letter-maros-sefcovic-2019_en.pdf

This first annual Strategic Foresight Report outlines how foresight will inform policies with a view to strengthening the EU's resilience in four interrelated dimensions: social and economic, geopolitical, green, and digital. It analyses the EU's resilience in response to the COVID-19 crisis in the context of the acceleration or deceleration of relevant *megatrends*, long-term driving forces that will likely have a large influence on the future. This Communication shows how policies to improve resilience, by mitigating vulnerabilities and strengthening capacities, can open new opportunities in each of the four dimensions. This includes reconsidering the future of wellbeing, work, labour markets and skills, reconfiguring global value chains, supporting democracy, reforming our rules-based trading system, building alliances in emerging technologies, and investing in the green and digital transitions.

This new focus on resilience calls for close monitoring. This Communication proposes to move towards *resilience dashboards*, which, once fully developed in cooperation with the Member States and other key stakeholders, should be used for assessing the vulnerabilities and capacities of the EU and its Member States in each of the four dimensions. Such analysis can help answer the question: are we, through our policies and recovery strategy, effectively making the EU more resilient?

The strategic foresight agenda will encompass horizontal foresight activities and thematic forward-looking exercises. For the upcoming year, these include: open strategic autonomy, the future of jobs and skills for and in the green transition, and deepening the twinning of the digital and green transitions. This agenda will bring a dynamic perspective of synergies and trade-offs among EU policy goals, thereby supporting the coherence of EU policies.

1. Embedding strategic foresight into EU policymaking

The Commission has made use of foresight for many years, but now aims to mainstream it into policymaking in all fields. *Foresight*[5] – the discipline of exploring, anticipating and shaping the future – helps build and use collective intelligence in a structured and systematic way to anticipate developments and better prepare for change. Horizon scanning[6], the assessment of megatrends, emerging issues and their policy implications, as well as the exploration of alternative futures via visioning and scenario planning, are key to informing strategic political choices. Strategic foresight in support of EU policymaking was first developed under President Delors' *Cellule de Prospective*. Together with long-term modelling[7], it has since informed many policies, including climate action. To support its long-term ambition of a climate-neutral continent fit for the digital age, the von der Leyen Commission aims to mainstream strategic foresight into the preparation of major initiatives. This process is already under way – for instance, the recently adopted Communication on Critical Raw Materials makes significant use of foresight[8]. Over the coming years, establishing a forward-looking culture in policymaking will be crucial for the EU to strengthen its capacity to deal with an increasingly volatile and complex world[9] and to implement its forward-looking political agenda. It will ensure that short-term actions are grounded in long-term objectives and will allow the EU to lead the way in charting its own course and shaping the world around it.

Strategic foresight should inform major policy initiatives. As such, it will become an integral part of the Commission's Better Regulation toolbox, for example in *ex ante* impact assessments. This will ensure that EU policies draw on a clear understanding of possible future trends, scenarios and challenges, especially in policy areas subject to rapid structural change. Strategic foresight will also support the regulatory fitness and performance programme[10], which identifies opportunities to reduce Europe's regulatory burden and helps assess whether existing EU laws remain 'fit for the future'[11].

A regular stream of strategic foresight activities will support EU policymaking. The annual Strategic Foresight Reports will contribute to an inclusive reflection on questions of

[5] *Strategic foresight* draws useful insights for strategic planning, policymaking and preparedness, (European Commission, 2017, *Strategic Foresight Primer*). It is not about predicting the future but about exploring different plausible futures that could arise and the opportunities and challenges they could present. It involves identifying trends and emerging issues, using them to create visions and associated pathways to make better decisions and act in the present in order to shape the future we want. (https://www.sciencedirect.com/book/9780128225967/science-for-policy-handbook).

[6] *Horizon scanning* is part of trend analysis and is typically used to add context in foresight activities. It can act as a forum to review and share information about future developments, provide orientation, identify opportunities and serve as an early warning system.

[7] Modelling uses historical data as inputs to make informed estimates on the direction of future trends. Strategic foresight and modelling are complementary approaches for anticipatory- and evidence-based policy making.

[8] European Commission, 2020, Critical Raw Materials for strategic technologies and sectors – a foresight study (doi: 10.2873/58081), accompanying COM(2020)474 final, Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability.

[9] https://www.routledge.com/Transforming-the-Future-Open-Access-Anticipation-in-the-21st-Century/Miller/p/book/9781138485877.

[10] https://ec.europa.eu/info/law/law-making-process/evaluating-and-improving-existing-laws/refit-making-eu-law-simpler-and-less-costly.

[11] Foresight can for instance, help apply the innovation principle when designing and reviewing European laws (https://ec.europa.eu/info/news/innovation-principle-makes-eu-laws-smarter-and-future-oriented-experts-say-2019-nov-25_en).

strategic importance for Europe's future, analysing key trends, defining topics of critical interest for the EU and exploring ways to pursue our aspirations (Section 4). The preparation of future reports will be based on *full foresight cycles*[12], including in-depth and participatory foresight exercises on major initiatives, and will aim to feed into the annual State of the Union address, Commission work programmes, and multiannual programming exercises. Building on in-house resources[13], external expertise and cooperation with Member States, other key stakeholders and citizens, the Commission will expand its strategic foresight capacities to assess risks and opportunities, aid early warning and situational awareness[14], and explore alternative futures.

Strategic foresight will foster participatory and forward-looking governance in Europe and beyond. The Commission will build close foresight cooperation and alliances with other EU institutions, notably in the context of the European Strategy and Policy Analysis System (ESPAS)[15], reaching out to international partners and launching an EU-wide foresight network to develop partnerships that draw on Member States' public foresight capabilities, think tanks, academia and civil society. Embedding foresight in EU policymaking needs to happen in an iterative and systematic way, building on approaches that have already proven effective. It will help develop a shared vision of policymaking at the highest political level, while allowing for the upscaling of best practices and keeping the door open to experimentation.

2. Resilience as a new compass for EU Policies

The COVID-19 crisis has exposed a number of vulnerabilities in the EU and its Member States. An analysis of the impacts of the crisis, beyond its terrible human toll, reveals severe disruptions across Europe's economy and society. Preparedness and prevention, early warning systems and coordination structures were clearly under strain, thus underlining the need for more ambitious crisis management for large-scale emergencies at EU level. In the first months of the pandemic, many hospitals were overwhelmed, free movement of people and goods was severely restrained and essential medicines and equipment were in short supply. The need to treat COVID-19 patients affected the capacity of the system to deal with non-COVID-19 patients, while residential care facilities and essential support services for older people and persons with disabilities were particularly challenged. Schools and universities were forced to close, many ill-prepared to offer digital learning alternatives to classrooms, particularly to children from disadvantaged backgrounds

[12] A *foresight cycle* can take up to one year to complete and covers: a diagnosis of how past developments have led to the current situation, the likely future evolution based on trends and emerging issues if no action is taken, and alternative future possibilities; collective visions; alternative roadmaps and a timetable for their implementation; the selection of pathways and associated strategies, actions and partnerships; and the definition of adequate monitoring indicators, so that actions can be adapted along the way. The *external dimension* of foresight cycles includes engaging systematically in strategic discussions with Member States, European institutions, citizens, civil society and key stakeholders. The *internal dimension* includes the mainstreaming of strategic foresight into policy- and decision-making, through methods such as impact assessments, alternative scenario planning and testing and information sharing to build collective intelligence.
[13] The Commission's foresight capacities include the Joint Research Centre's *Competence Centre on Foresight* and the Commission's strategic foresight network, coordinated by the Secretariat-General.
[14] Situational awareness is the part of decision-making aimed to perceive environmental elements and events with respect to time or space, to understand what they mean, and to projection their future status.
[15] https://espas.secure.europarl.europa.eu/orbis/espas2018about.

or those with a disability. Overall, confinement measures have had a much more severe effect on the economy than the 2008 financial crisis.

After an uneasy start, the EU and its Member States pulled together to deal with the crisis. Agility and leadership at all levels of government played a key role in our response. Initial knee-jerk competition for scarce medical resources and unilateral actions by Member States in the single market and Schengen Area quickly evolved into improved cooperation and coordination, facilitated by the Commission. The EU devised innovative solutions and demonstrated its resilience capacities. EU manufacturers and 3D printing companies[16] swiftly adapted their production lines to produce facemasks, ventilators and hand sanitiser[17]. The Commission established the first-ever common strategic reserve of medical equipment as part of rescEU and helped facilitate more than 350 flights to bring stranded EU citizens back home. After initial border restrictions resulting in supply bottlenecks, the Commission implemented and coordinated the green lanes allowing freight transport to move unhindered18. Distance learning was established to compensate for closed schools and universities. Companies and administrations shifted to teleworking where possible. Consumers turned to e-commerce and home deliveries. Member States put in place safety nets to protect firms and workers during the confinement measures. Between April and May 2020, the Commission adopted a safety net package[19] and issued country-specific recommendations under the European Semester[20] that applied maximum flexibility to accommodate this extraordinary situation. It also put forward a coordinated strategy to lift confinement measures and a comprehensive recovery plan[21]. Therefore, the pandemic has also underlined Europe's capacity to act in the face of adversity.

Resilience refers to the *ability* not only to withstand and cope with challenges but also to transform in a sustainable, fair, and democratic manner[22]. In light of the COVID-19 crisis and of the transition-led political agenda, it is clear that Europe needs to further strengthen its resilience and bounce forward, i.e. not only recover but emerge stronger by intensifying these transitions. The EU needs to draw lessons from the pandemic, anticipate future developments, and strike the right balance between the wellbeing of current and future generations[23].

The EU's vulnerabilities and resilience capacities are analysed in the light of relevant megatrends, long-term driving forces that will most likely have a significant influence on the future. Fourteen global megatrends have been identified by the

[16] Formlabs produced 150 000 swabs with 250 printers each day. Similarly, Paris hospital workers scanned valves, syringe pumps and medical plug connections and produced medical material with 60 3D printers to avoid shortages.
[17] https://ec.europa.eu/info/live-work-travel-eu/health/coronavirus-response/coronavirus-european-solidarity-action_en#euindustrystepsintoprotecteuropeancitizens
[18] C(2020)1897 final, Communication from the Commission on the implementation of the Green Lanes under the Guidelines for border management measures to protect health and ensure the availability of goods and essential service.
[19] https://ec.europa.eu/info/live-work-travel-eu/health/coronavirus-response/overview-commissions-response_en#economic-measures
[20] https://ec.europa.eu/info/publications/2020-european-semester-country-specific-recommendations-commission-recommendations_en
[21] COM(2020)456 final, Europe's moment: Repair and Prepare for the Next Generation.
[22] Manca, A.R., Benczur, P., and Giovannini, E., 2017, *Building a scientific narrative towards a more resilient EU society.*
[23] Giovannini, E., Benczur, P., Campolongo, F., Cariboni, J., Manca, A.R, 2020. *Time for transformative resilience: the COVID-19 emergency*, Publications Office of the European Union, Luxembourg.

Commission's *Megatrends Hub*[24]. Section 3 provides a preliminary systematic analysis of the vulnerabilities and capacities revealed by the crisis in the EU and its Member States, in light of the possible acceleration or slowing down of these megatrends due to the crisis, as depicted in **Figure 2.1**. For instance, COVID-19 has deepened inequalities, as well as accelerated hyperconnectivity and demographic imbalances. The analysis also identifies major opportunities to strengthen Europe's resilience through relevant policy action.

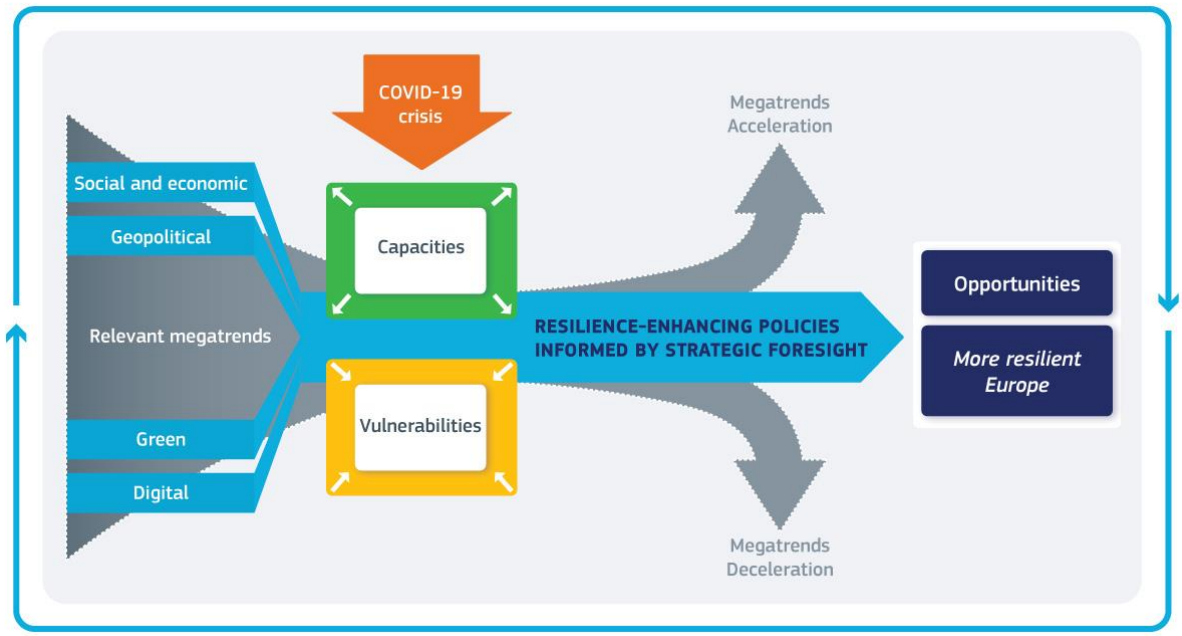
Figure 2.1 – Potential impact of COVID-19 on megatrends

Forward-looking policies supported by foresight will strengthen the EU's resilience. Foresight can help anticipate developments likely to have adverse impacts, to strengthen resilience through structural changes[25]. **Figure 2.2** shows one cycle of how strategic foresight can inform resilience-enhancing policies across the social and economic, geopolitical, green, and digital dimensions, taking into account the impact of the crisis on relevant megatrends. Policies benefitting from strategic foresight can better mitigate the vulnerabilities and strengthen the capacities revealed by the crisis, opening new opportunities and making Europe more resilient. This is a continuous process, with constant re-evaluation and feedback loops.

[24] These long-term driving forces are identified and monitored by the Commission's Joint Research Centre (JRC). They are continually reviewed by JRC experts to include updates and accommodate associated trends of relevance or interest for the EU Commission Services. The definitions of the 14 megatrends are available at: https://ec.europa.eu/knowledge4policy/foresight/tool/megatrends-hub_en. See also the ESPAS Report 2019: Global Trends to 2030 (https://ec.europa.eu/knowledge4policy/publication/espas-report-2019-global-trends-2030_en).

[25] European Parliamentary Research Service, 2020, Towards a more resilient Europe post-coronavirus. An initial mapping of structural risks facing the EU.

Figure 2.2 – Link between strategic foresight and resilience



3. A Four-Dimensional Analysis of Resilience

3.1. The social and economic dimension

The social and economic dimension of resilience refers to the ability to tackle economic shocks and achieve long-term structural change in a fair and inclusive way. It means building the social and economic conditions for a recovery geared towards the transitions, promoting social and regional cohesion, and supporting the most vulnerable in society, while taking into account demographic trends, and in line with the European Pillar of Social Rights.

Capacities

Europe's social and economic resilience rests on its population and its unique social market economy. It combines a highly skilled workforce and competitive economy with social systems that aim to protect people from adverse events and help them cope with change. Through social dialogue, social partners contribute to sustainable and inclusive growth. People across the EU have guaranteed access to education and social protection measures, such as sickness and unemployment benefits, family leave and flexible work arrangements. Although put under stress, this model played a key role in cushioning the effects of the crisis, for instance by safeguarding jobs and keeping companies afloat[26]. Some Member States have been hit harder by the crisis, mainly due to their different economic structures and fiscal space. Member States with higher levels of public debt might generally be more constrained in cushioning the impact of the crisis. However, national measures were complemented by those at EU level, in particular the three major safety nets for workers,

[26] https://esip.eu/new/details/2/82-COVID-19%20?social_security=

businesses and government, worth €540 billion, which were endorsed in April 2020 by the European Council[27]. Looking to the future, the EU's strong public education system helps deliver the skills needed to prepare for the jobs of tomorrow, a key element in ensuring a just transition towards the green and digital economy.

Europe can also rely on the strength of its single market[28]. The single market improves mobility, ensures that innovative business models can flourish, making it easier for retailers to do business across borders, and enhances access to goods and services throughout the EU. Transport infrastructure, the single currency and diversified economic sectors are amongst the key enablers of the economic resilience. Across the single market, economic, regional and social diversity equips the Union with an unparalleled competitive advantage on a global scale and underpins its collective resilience.

Europe's strong trade and investment links will help get the economy back on track. With 85% of the world's future growth projected to occur outside of the EU and with 35 million European jobs depending on exports and 16 million on foreign investment**,** trade and investment will be key to connect Europe to external sources of growth. This is especially true as demand is likely to pick up asymmetrically after the crisis.

The EU's financial system has drawn important lessons from the 2008 financial crisis. It proved resilient in the early days of the pandemic, thanks in part to the EU financial reform agenda, in particular the creation of the Banking Union. It is now far more robust, with banks better capitalised to focus on lending to households and companies than in 2008[29]. Opportunities for businesses to raise financing on capital markets have improved as well.

Collaborative and non-profit organisations strengthen social and economic resilience. Cooperatives, mutual societies, non-profit associations, foundations and social enterprises have helped public services cope with the crisis[30]. They have demonstrated their ability to provide a wide range of products and services across the single market in circumstances where for-profit companies would not have been able to generate adequate returns on capital, thus creating and preserving millions of jobs[31]. They are also a crucial engine for social innovation.

European solidarity is key to overcoming collective challenges like COVID-19. Cohesion policy and the EU Solidarity Fund play a key role in the Coronavirus Response

[27] https://ec.europa.eu/newsroom/ecfin/item-detail.cfm?item_id=675083&utm_source=ecfin_newsroom&utm_medium=Website&utm_campaign=ecfin&utm_content=EU%20leaders%20approve%20%20billion%20package%20of%20safety%20nets%20and%20task%20Commission%20&lang=en.

[28] The EU Single Market accounts for 450 million consumers and 22.5 million small and medium-sized enterprises (SMEs).

[29] Euro area banking sector resilient to stress caused by coronavirus, ECB analysis shows: https://www.bankingsupervision.europa.eu/press/pr/date/2020/html/ssm.pr200728~7df9502348.en.html.

[30] In COVID-19 crisis, for example, organisations such as *SOS Médecins* in France were alleviating the pressure on the health service and hospitals by providing doctor home visits for persons who needed it. In the UK over 30% of home nursing were provided by social enterprises (http://www.oecd.org/coronavirus/policy-responses/social-economy-and-the-covid-19-crisis-current-and-future-roles-f904b89f/#:~:text=The%20COVID%2D19%20crisis%20has%20allowed%20the%20social%20economy%20to,to%20provide%20goods%20and%20services).

[31] There are two million social economy enterprises in Europe, representing 10% of all businesses in the EU. More than 11 million people, about 6% of EU's employees, work for social economy enterprises: https://ec.europa.eu/growth/sectors/social-economy_en.

Investment Initiative, helping exposed sectors like healthcare, SMEs, and labour markets in the most affected Member States and regions[32]. The Emergency Support Instrument – a financing arm of the Joint European Roadmap towards lifting COVID-19 confinement measures – allows mitigating the consequences of the pandemic in a coordinated manner at EU level[33].

Vulnerabilities

The crisis exposed health and social vulnerabilities in Europe. Residential care facilities and support services for older people and persons with disabilities were structurally vulnerable and unprepared to cope with and control the spread of the coronavirus. Those with chronic diseases, especially with weak immune systems or respiratory problems, have been especially affected. Health systems in several Member States, as well as the pharmaceutical industry, were not fully prepared, experiencing problems including shortages of personal protective equipment and chemicals required for the production of pharmaceuticals. Notably, Europe struggled to prepare and coordinate when the first warnings began to emerge from China. There is a need to better anticipate health risks and prevent the spread of new infectious diseases and associated disorders. COVID-19 has shifted attention away from major health challenges like non-communicable diseases, notably cancer and obesity.

Confinement measures have affected overall wellbeing. Together with life satisfaction, it has dropped to its lowest level in over 40 years[34]. In the first 6 months of 2020, the feeling of loneliness in Europe almost tripled, especially among young and older people, and mental health challenges increased[35].

Economic, gender, skills, regional, and ethnic inequalities have all worsened[36]. COVID-19 increased the number of people in, or at risk of, poverty in Europe[37]. Some of those economically impacted by the pandemic were also impaired in accessing food[38]. Racial and ethnic minorities are statistically more at risk of contracting the virus and of facing financial insecurity[39]. Unequal access to digital infrastructure and services was also exposed by the crisis, widening the digital divide. Students from disadvantaged backgrounds were less likely to benefit from online learning, and lower skilled workers were more likely to be employed in 'contact jobs', risking greater exposure to the disease whilst having lower access to healthcare. (Tele-) working parents, and especially mothers, faced extra burdens with no

[32] In April 2020, the Commission launched two packages of measures to mobilise support against COVID-19: the Coronavirus Response Investment Initiative (CRII) and the Coronavirus Response Investment Initiative Plus (CRII+), which were swiftly endorsed by the European Parliament and the European Council.
[33] https://ec.europa.eu/info/live-work-travel-eu/health/coronavirus-response/emergency-support-instrument_en.
[34] https://www.mckinsey.com/featured-insights/europe/well-being-in-europe-addressing-the-high-cost-of-covid-19-on-life-satisfaction#
[35] The megatrend 'shifting health challenges' (https://ec.europa.eu/knowledge4policy/shifting-health-challenges_en) has accelerated.
[36] The megatrend 'diversifying inequalities' (https://ec.europa.eu/knowledge4policy/diversifying-inequalities_en) has accelerated.
[37] Using the assumptions of the Commission Spring 2020 Economic Forecast, the 'at risk of poverty' rate is expected to increase by 4.8 percentage points. The extra policies that Member States have introduced during the crisis can mitigate this increase (to 1.7 percentage points). Almeida, V., Barrios, S., Christl, M., De-Poli, S., Tumino, A., van der Wielen, W., 2020, Households' income and the cushioning effect of fiscal policy measures in the Great Lockdown. JRC Working Papers on Taxation and Structural Reforms No 06/2020, European Commission, Joint Research Centre, Seville. JRC121598. Similar findings have been presented in https://voxeu.org/article/inequality-and-poverty-effects-lockdown-europe.
[38] Foodbanks witnessed an exponential increase in demand worldwide (http://www.fao.org/food-loss-reduction/news/detail/en/c/1271024/).
[39] https://www.enar-eu.org/Evidence-of-the-impact-of-Covid-19-on-racialised-communities-exposes-need-to.

access to childcare. Front-line workers consisted of a disproportionate number of women, who represent 70% of all health and social services staff. Domestic violence rose significantly[40]. In addition, the crisis highlighted the social and economic vulnerability of extra-EU workers[41], as well as their crucial contribution to Europe's coronavirus response[42]. Economic hardship and recession may also lead to higher exposure to organised crime and a rise in corruption[43].

Economic sectors and firms have been hit hard by the crisis. In the second quarter of 2020, still marked by COVID-19 confinement measures in most Member States, seasonally adjusted GDP decreased by 12.1% in the euro area and by 11.7% in the EU compared with the previous quarter[44]. Cumulative net revenue losses of EU companies are estimated in the range of 13-24% of EU GDP[45]. A fragile corporate sector can lead to company failures, which can cause lasting economic damage by increasing unemployment, wasting capital, and destroying the equity of its owners. Business failures also disrupt economic networks and bring international supply chains to a halt. Even for companies that survive, their capacity to invest will shrink. The crisis has also further aggravated payment delays in business transactions[46]. For small businesses, late payments can make the difference between survival and bankruptcy, and compromise their ability to pay employees and suppliers, operate, produce and grow. Given the limited resources and existing obstacles in accessing capital, SMEs may have less resilience and flexibility in dealing with the costs associated with shocks such as COVID-19[47]. Public administrations were put under severe strain to provide services to firms and citizens.

Labour markets have been disrupted[48], with massive job losses that could have cascading long-term effects. Member States' capacities differ when it comes to financing safety nets for people and firms to absorb the impact of the crisis, with the ensuing asymmetries threatening regional and social cohesion. Unlike in previous crises, employment was hardest hit in the service sector, the engine of job creation over the last decade[49]. Almost 8% of all jobs in Europe, equivalent to 12 million full-time jobs, are forecast to be lost in 2020[50], without counting the devastating effect on atypical forms of labour and project-based work. This increases the risk of structural and long-term unemployment, resulting in

[40] Affecting particularly women, children and LGBTI+ communities (https://unric.org/en/who-warns-of-surge-of-domestic-violence-as-covid-19-cases-decrease-in-europe/).
[41] https://publications.jrc.ec.europa.eu/repository/handle/JRC120730.
[42] https://ec.europa.eu/knowledge4policy/sites/know4pol/files/key_workers_covid_0423.pdf.
[43] https://eucrim.eu/news/europol-how-covid-19-shapes-serious-and-organised-crime-landscape-eu/.
[44] https://ec.europa.eu/eurostat/documents/2995521/11156775/2-31072020-BP-EN.pdf/cbe7522c-ebfa-ef08-be60-b1c9d1bd385b.
[45] https://voxeu.org/article/eu-firms-post-covid-19-environment.
[46] In March 2020, payment delays in commercial transactions in France tripled compared to the same period in 2019. In Spain, 70% of SMEs declared to have payment terms unilaterally extended by their debtors. In Italy, payment delays to SMEs in the first quarter of 2020 were estimated at more than €15 billion.
[47] http://www.oecd.org/coronavirus/policy-responses/coronavirus-covid-19-sme-policy-responses-04440101/.
[48] COM(2020)112 final, Coordinated economic response to the COVID-19 outbreak.
[49] Hospitality, air travel, tourism and culture were hit particularly hard. Some areas like delivery and healthcare saw an increase in jobs, but these were mainly precarious. Cancelled cultural performances, shut down venues, halted productions, and the related impact on income, have made the situation of the cultural and creative sector more precarious than ever before. The media sector, playing a key role for democracy, has also been heavily impacted. Commission estimates of May 2020 foresaw a drop in turnover of over 50% in 2020, without taking into account further confinement periods. See: SWD(2020)98 final, Identifying Europe's recovery needs; Eurofound, 2020, COVID-19: Policy responses across Europe, Publications Office of the European Union, Luxembourg.
[50] https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_740893/lang--en/index.htm.

a deskilling of the labour force at precisely the moment when digital and other specialist skills are key for future employment and 2 out of 5 Europeans lack digital literacy[51]. Young people entering the workforce at this time will also find it harder to secure their first job[52]. Moreover, the pandemic hit when 21% of people living in the EU were already at risk of over-indebtedness[53].

The Banking Union has been crucial to weathering the storm in the short term, but the Economic and Monetary Union remains incomplete. We see more than ever the long-term importance of a Capital Markets Union, at a time when the role of market finance for the real economy is indispensable. While opportunities for market finance of businesses have improved in general, measures to facilitate access to equity finance would make them more resilient. To build a sustainable future, the EU thus needs a more resilient financial market infrastructure, with deep and wide capital markets that can be leveraged in a world of strategic competition.

COVID-19 is likely to contribute to the ongoing trend of Europe's shrinking population. Demographers[54] expect even lower birth rates in Europe due to the uncertainty caused by the pandemic and ensuing recession[55]. As Europe's population is ageing, older people and persons with disabilities are also most prone to poverty and COVID-19[56], and are the most socially isolated by distancing measures[57]. Furthermore, demographic trends impact social and economic resilience as a whole.

Opportunities

Private and public investments are key to social and economic resilience and recovery. They must be in line with the EU's policy goals of inclusiveness, digitalisation, decarbonisation and sustainability, and foresight will be instrumental in developing a perspective that will ensure these conditions are met. The 2021-2027 multiannual financial framework and Next Generation EU will foster substantial investment, innovation and economic convergence between Member States, with safeguards for the rule of law. It will also ensure the good functioning of the single market. The Recovery and Resilience Facility (RRF) will foster social and economic resilience through the support of packages of investment and reforms.

Funding for companies, especially SMEs, needs to meet their present needs and those brought about by long-term transitions. Action to strengthen the banking sector, capital markets and equity financing, including fostering the Capital Markets Union and completing the Banking Union, will be important in bolstering the EU's resilience. Workers will benefit from such reforms, increasing the ability of firms to secure and create jobs.

[51] Digital Economy and Society Index 2020 (https://ec.europa.eu/digital-single-market/en/desi).
[52] European Commission 2020 Spring Economic Forecast.
[53] Eurofound, 2020, Addressing household over-indebtedness, Publications Office of the European Union, Luxembourg.
[54] The megatrend 'increasing demographic imbalances' (https://ec.europa.eu/knowledge4policy/increasing-demographic-imbalances_en) has accelerated.
[55] https://population-europe.eu/policy-brief/demography-and-coronavirus-pandemic.
[56] https://ec.europa.eu/info/sites/info/files/demography_report_2020_n.pdf.
[57] https://www.un.org/en/development/desa/policy/wess/wess_dev_issues/dsp_policy_01.pdf and https://www.brookings.edu/blog/future-development/2020/05/18/which-jobs-are-most-at-risk-because-of-covid-19/.

Adapting social protection systems to labour markets marked by the movement of workers between professions and countries will be important for preserving employment. Investment in human capital and innovation, well-functioning institutions and an attractive business environment are key.

COVID-19 has produced rapid shifts in labour markets. Changes predicted to happen over decades, such as entire organisations, national administrations, and companies teleworking, or virtual conferences and events replacing face-to-face gatherings[58], have taken place in weeks due to the pandemic[59]. While a part of this shift is likely to be temporary, it will open the door to new employment opportunities and strengthen integration of the European labour market. It also presents an opportunity to rethink and adapt forms of employment and career models.

Schools and universities had to go virtual almost overnight, presenting new opportunities for delivering education and learning[60]. Hyperconnectivity and cross-border cooperation between education institutions, new pedagogical approaches and delivery modes (e.g. virtual or blended), advancements in cognitive sciences, information availability and greater emphasis on lifelong learning are all contributing to changes in learning models and access to education.

Disruption of established lifestyles has intensified the debate on how we measure progress and conceive 'wellbeing'. As stressed in the 2020 annual sustainable growth strategy[61], economic growth is not an end in itself. In December 2019, the Commission presented the *European Green Deal*, the new EU growth strategy that aims to transform the Union into a modern, resource-efficient and competitive economy where climate and environmental challenges are turned into opportunities. The crisis has reignited the debate on what kind of economic growth is desirable, what actually matters for human wellbeing in a world of finite resources and on the need for new metrics to measure progress beyond GDP growth. The EU is well-placed to assume an international leadership role and promote inclusive growth and equality, with the United Nations (UN) Sustainable Development Goals (SDGs) at the centre of economic policy[62]. The SDGs can be regarded as a means to achieving greater resilience. In turn, strategic foresight can help identify the best ways to meet the SDGs.

Strategic foresight can help identify further social and economic opportunities and pathways to achieve the green, digital, and fair transitions. This includes designing new social and fiscal reforms and testing their long-term sustainability, to reinvigorate Europe's social market economy model while ensuring the EU's leading role in the global

[58] The megatrend 'changing nature of work' (https://ec.europa.eu/knowledge4policy/foresight/changing-nature-work_en) has accelerated.
[59] https://www2.deloitte.com/be/en/pages/covid-19/articles/workforce/workforce-strategy.html
[60] The megatrend 'diversification of education and learning' (https://ec.europa.eu/knowledge4policy/diversification-education-learning_en) has accelerated.
[61] https://ec.europa.eu/info/publications/2020-european-semester-annual-sustainable-growth-strategy_en.
[62] The SDGs (https://www.un.org/sustainabledevelopment/sustainable-development-goals/) are a roadmap for humanity encompassing almost every aspect of human and planetary well-being. They are a key tool to reboot Europe's growth strategy towards competitive sustainability, ensuring that the economy works for everyone and that growth is sustainable. To support the central role of SDGs in economic policymaking, and in particular in the European Semester, Eurostat publishes an annual monitoring report.

economy. Strategic foresight is also relevant for shaping the occupations of the future, identifying new skills necessary for the green and digital economy, learning patterns and partnerships, and understanding the related interplay between new technologies, jobs, education, and key stakeholders. In light of broader demographic trends affecting some rural areas, challenges exacerbated by regional and local inequalities, as well as a geography of discontent, a long term vision on rural areas will also be required, taking into account social and economic development, infrastructure needs, access to basic services, and territorial cohesion; this long-term vision should cut across several policy areas and require an integrated and coordinated approach at European, national, and regional level. Finally, strategic foresight could support the reflection on a new meaning for progress and wellbeing and on indicators that would be most meaningful for measuring these aspirations (Section 4).

3.2. The geopolitical dimension

Geopolitical resilience relates to Europe bolstering its 'open strategic autonomy'[63] and global leadership role. It is anchored in the expression of the EU's values within a highly interdependent world of competing powers, where COVID-19 has impacted geopolitical trends and power balances. As the United States turns further inwards, it leaves a void on the global stage, which other players such as China[64] are eager to fill. In mobilising strategic resources for humanitarian and development aid and striving to make a COVID-19 vaccine and medicines available worldwide, the EU is playing a leading role through its 'Team Europe' approach[65].

Capacities

The EU is considered a trusted partner and responsible leader. As the global order threatens to erode and fragment, the EU can act as an anchor of stability and a guarantor of peace. The EU mediates in situations of crisis, brokers international agreements and uses its convening power to craft global solutions to global problems. The pandemic shows that global challenges require effective, agile international cooperation and common solutions. The EU actively shapes cooperation in global governance structures, and its foreign and security policy is underpinned by multi-faceted diplomacy and strategic partnerships with key players and regions. The EU's foreign and security policy priorities are driven by its global strategy. Understanding the importance of security and defence cooperation, the EU has, amongst other things, established a European Defence Fund and the Permanent Structured Cooperation (PESCO)[66], and has launched a military mobility initiative.

[63] Open strategic autonomy is defined as the EU's commitment to open and fair trade, preserving the benefits of an open economy and supporting partners around the world to lead the renewed and reinvigorated form of multilateralism the world needs. At the same time, the EU is aware of the need to reduce its dependency and strengthen its security of supply across key technologies and value chains (COM(2020)456 final, Europe's moment: Repair and Prepare for the Next Generation).
[64] https://www.cfr.org/conference-calls/after-covid-19-chinas-role-world-and-us-china-relations.
[65] The objective of the "Team Europe" approach is to combine resources from the EU, its Member States, and financial institutions, in particular the European Investment Bank and the European Bank for Reconstruction and Development.
[66] Articles 42(6) and 46 TEU, and Protocol No 10.

Europe's extensive global trade capacity underpins its geopolitical power and resilience. An analysis of trade dependency for products relying on a small number of suppliers shows that, for almost all products imported into the EU, there are alternative sources of supply. Just 1% of the EU's total import value is sourced from a sole supplier, whereas 10% is sourced from no less than 67 alternative suppliers, and half of all products come from more than 25 suppliers worldwide[67]. In addition, over two-thirds of EU imports are intermediate inputs used in its production processes. The EU is therefore consistently able to use its economic leverage and bargaining power to deliver international agreements that protect its citizens.

The EU is a space power. It has developed critical space capabilities, which serve as a geopolitical tool to strengthen its global role in technology development and surveillance[68]. Several critical economic sectors rely on services provided by Europe's space-based assets.

The EU builds resilience in its neighbourhood and beyond. It is the world's largest donor of development and humanitarian aid, focusing in particular on its neighbourhood and Africa. Europe supports partner countries with funding, training and structural improvements to boost their development and resilience, as well as in implementing the SDGs. In addition, through the Eastern Partnership initiative, the EU contributes to increasing the stability, prosperity and resilience of its neighbours, by helping them progress in the green and digital transitions.

The EU has a long-standing capacity and legacy in shaping international standards and norms. It now needs to strengthen forward-looking alliances to continue shaping international norms and standards in a way that reflects European values and interests. Despite the EU's track record of proactive engagement with the UN family and other international organisations in various fora[69], such alliances are particularly relevant in the face of growing pressure from influential global players.

The EU can apply its geopolitical capacities and international clout coherently and effectively now and in the future. Europe will need to continue developing a strategic network of partnerships and alliances to reduce dependencies in critical value chains, help peace and stability in its neighbourhood, seek effective solutions to global problems and revitalise a rules-based multilateral global order, as well as to leverage its financial resources in support of its political objectives. The EU is in a strong position to shape the multilateral system of global economic governance, develop mutually beneficial relations to boost its competitiveness[70], and to advance and set global standards for the green and digital transitions. This should be done while promoting its democratic values and ensuring coherence with broader priorities in the areas of sustainability, climate change, digital economy and security.

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[67] https://ecipe.org/blog/how-survive-trade-apocalypse/.
[68] For instance, satellite navigation, Earth Observation, telecommunication, For Galileo Public Regulated Service.
[69] The United Nations Conference on Trade and Development (UNCTAD), the International Telecommunications Union (ITU), and the World Intellectual Property Organisation (WIPO). Also, with the G7, the G20, the OECD, the Council of Europe, Internet Cooperation for Assigned Names and Numbers (ICANN), the World Trade Organization (WTO), ASEAN and ASEM.
[70] COM(2020)102 final, A New Industrial Strategy for Europe; SWD(2020)98 final, Identifying Europe's recovery needs.

Vulnerabilities

Multilateralism and the global financial system are under increasing pressure from narrow national interests. Preserving a space for consensus-building and joint action to address global challenges and protect common public goods is central to geopolitical resilience.

The shift of power to the East and South is a global megatrend. Although it has temporarily decelerated as a result of the COVID-19 crisis, it is likely to continue as it is driven by the growing economic and political weight of emerging players, supported by their demographic weight. As the EU's share in the world population and in global GDP diminishes[71], this may have a further impact on its clout in many critical areas.

The security environment is continuously changing. It is marked by the shifting balance of power, increasing use of hybrid threats, space and cyber warfare, disinformation, and the growing role of non-state actors[72]. The crisis has also further exacerbated pressures that can lead to conflict. The impact of economic measures driven by political considerations, such as the extra-territorial impact of sanctions or protectionist measures, poses additional challenges to the EU. The COVID-19 pandemic has shown the fragility of key infrastructure and the need to protect it against physical and digital threats[73]. The crisis has also worsened existing vulnerabilities and inequalities in conflict-affected and fragile countries. To foster a coherent strategic vision, the EU needs a common understanding of the security environment as well as common goals and objectives. By the end of 2020, the High Representative will present an analysis of threats and challenges, as background for a Strategic Compass on security and defence, to be delivered by 2022. This will provide a crucial contribution to developing a common European security and defence culture, give new impetus to different defence initiatives and reinforce their coherence[74].

Managing migration in an orderly way will continue to be a priority. The root causes of migration, including local conflicts, poverty and inequalities exacerbated due to the COVID-19 crisis and climate change, will continue[75,76]. Addressing these challenges[77] will require enhanced attention, agility, resources, and diplomatic efforts underpinned by assistance, alongside strategic, balanced and tailor-made partnerships with key third countries in order to find sustainable and effective solutions to managing migration[78].

A lack of unity in specific foreign and security policy areas is a source of fragility. The EU's strength and credibility abroad has a direct correlation to its internal unity and

[71] https://ec.europa.eu/research/social-sciences/pdf/policy_reviews/global-europe-2050-report_en.pdf.
[72] COM(2020)605 final, The EU Security Union Strategy.
[73] *Ibidem*
[74] D. Fiott, 2020, Uncharted territory? Towards a common threat analysis and a strategic compass for EU security and defence, European Institute of Security Studies
[75] The World Bank estimates that, by 2050, climate change could force over 140 million people to become internal climate migrants across Africa, South Asia and Latin America (https://www.worldbank.org/en/news/press-release/2018/03/19/climate-change-could-force-over-140-million-to-migrate-within-countries-by-2050-world-bank-report).
[76] This also requires further evidences and research, analysing the complexity of long-term intertwined factors, as part of the foresight approach, as developed by the Knowledge Centre for Demography (https://ec.europa.eu/knowledge4policy/migration-demography_en).
[77] COM(2020)605 final, The EU Security Union Strategy.
[78] Solutions will be put forward by way of legislative and non-legislative initiatives under the new Pact on Migration and Asylum.

cohesion, which builds on its diversity. A lack of unity and coordination among Member States can, at times, limit the effectiveness and agility of action at EU level, which might enable foreign powers to apply divide-and-rule strategies.

The COVID-19 crisis has revealed Europe's overreliance on non-EU suppliers for critical raw materials[79], and has highlighted how supply disruptions can affect industrial ecosystems and other productive sectors. While there are alternative sources of supply for most products, Europe is increasingly reliant on a limited number of external suppliers for some critical goods, components, and raw materials (**Box 3.1**), as well as agricultural products. Factory closures in COVID-19 hotspots in China and northern Italy led to Europe-wide shutdowns of automotive plants, resulting in losses equivalent to 12.5% of the total production for 2019[80]. A similar picture emerges for pharmaceuticals from India leading to shortages in generic drugs[81]. In April 2020, European industrial production had decreased by 27% over 12 months[82]. Moreover, Europe relies heavily on third countries for advanced components for data processing, in particular microprocessors, with only around 10% of global production in the EU[83]. With escalating global tensions, European supply chains are increasingly vulnerable.

[79] Global supply chains are highly complex. Multinational enterprises are responsible for two thirds of international trade with a high fragmentation of production of intermediate goods shipped between different production sites (https://iap.unido.org/articles/lessons-past-disruptions-global-value-chains; https://www.entrepreneur.com/article/349229).
[80] https://www.acea.be/press-releases/article/298-automobile-factories-operating-across-europe-new-data-shows.
[81] https://www.wto.org/english/tratop_e/covid19_e/trade_related_goods_measure_e.htm.
[82] https://ec.europa.eu/eurostat/documents/2995521/10294900/4-12062020-AP-EN.pdf/93c51a4c-e401-a66d-3ab3-6ecd51a1651f
[83] https://www.economist.com/leaders/2018/12/01/chip-wars-china-america-and-silicon-supremacy.

Box 3.1: CASE STUDY – Critical raw materials

Irrespective of supply disruptions during the COVID-19 crisis, the EU is heavily dependent on non-EU countries for critical raw materials that are essential for staying at the forefront of global competition – be it in economic or defence terms (Figure 3.1). Addressing over-dependency on non-EU countries for critical raw materials[84], such as graphite, cobalt, lithium and rare earths[85], is therefore one of the crucial elements to bolster Europe's open strategic autonomy in key technologies needed to achieve a carbon-neutral and digital society. These include batteries, fuel cells, solar and wind energy, as well as hydrogen. As more of these technologies are deployed, the EU risks replacing its reliance on fossil fuels with a dependency on a range of raw materials, many of which are sourced from abroad. According to a high demand scenario, the EU would need 18 times more lithium by 2030 and 60 times more by 2050[86]. **Figure 3.2** indicates that global extraction of raw materials, including critical raw materials, is projected to more than double by 2050.

High dependency calls for greater resilience and diversification of supply, notably by making better use of EU domestic sourcing, the circularity of raw materials or the extension of products' lifetime with a focus on reuse, repair and recycling, as well as through our strategic trade policy and diplomacy.

Exploiting the *urban mines*, that is, recovering raw materials from urban waste through recycling, could eventually satisfy a large share of the EU's demand for critical raw materials[87]. Europe is a global leader in its infrastructure for recycling metals, and European industry produces over half of its base metals from recycled sources, compared to 19% in the rest of the world. But more needs to be done if the EU is to secure the resources it needs to realise the green and digital transitions.

Europe's own mineral resources are under-exploited, and the EU has vulnerabilities in processing, recycling, refining and separation[88]. This is due to high production costs compared to global market prices, high environmental standards and current low levels of public acceptance. Investment in the production of primary and secondary raw materials would benefit employment in all manufacturing industries. Mining and refining in the EU already employs 3.4 million workers, while related manufacturing accounts for a further 25 million jobs. Repair and materials recovery provide 2.2 million jobs, a number which is growing. These investments could help retain existing geological and metallurgical high-tech skills and develop new ones to boost the EU's global competitiveness in a sector that has solid growth potential in the 21st century. However, investments in the EU's mining capacities should not come at the expense of environmental standards.

[84] Strategies to overcome dependencies include diversifying sources, developing substitutes, or prolonging the life of related products.
[85] European industry, especially battery, motor and wind generator production, depends on imports of graphite (of which 48% comes from China), cobalt (of which 68% comes from the Democratic Republic of Congo), lithium (of which 78% comes from Chile) and rare earths (of which nearly 100% come from China).
[86] European Commission, *Critical Raw Materials for strategic technologies and sectors – a foresight study*, 2020 (doi: 10.2873/58081).
[87] www.prosumproject.eu.
[88] https://minatura2020.eu.

Figure 3.1[89] Supply risk of raw materials for key technologies[90]

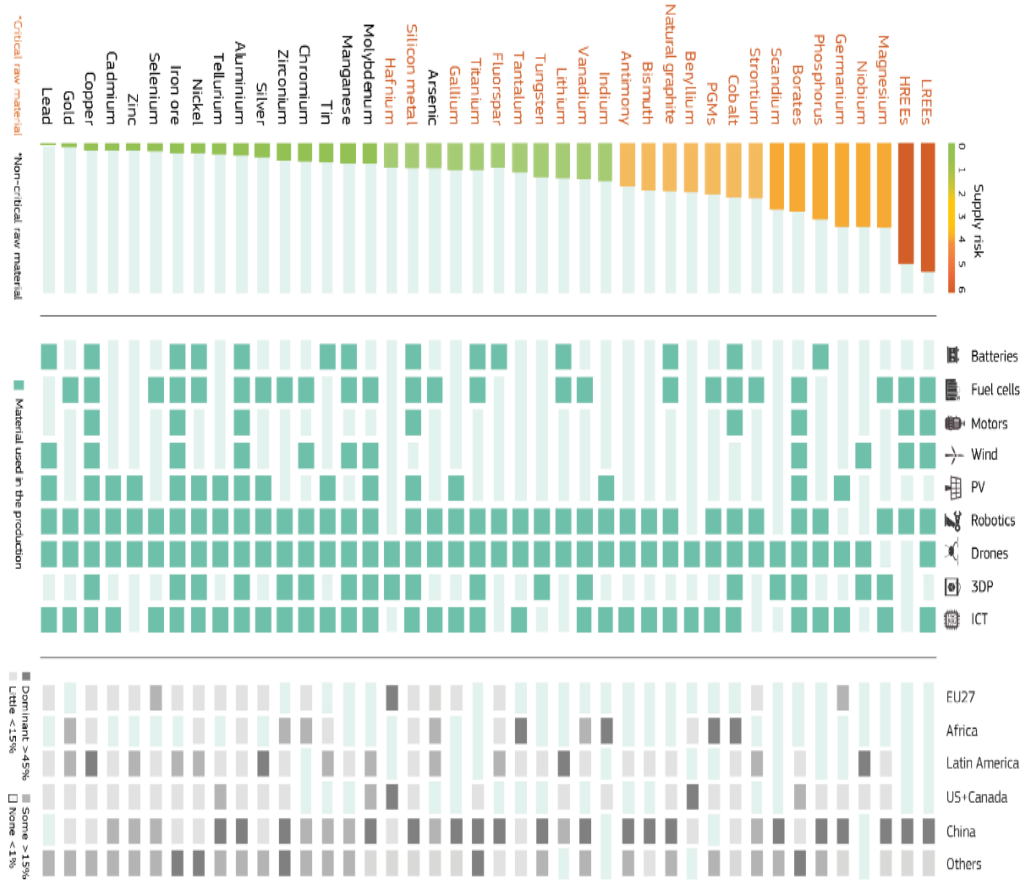
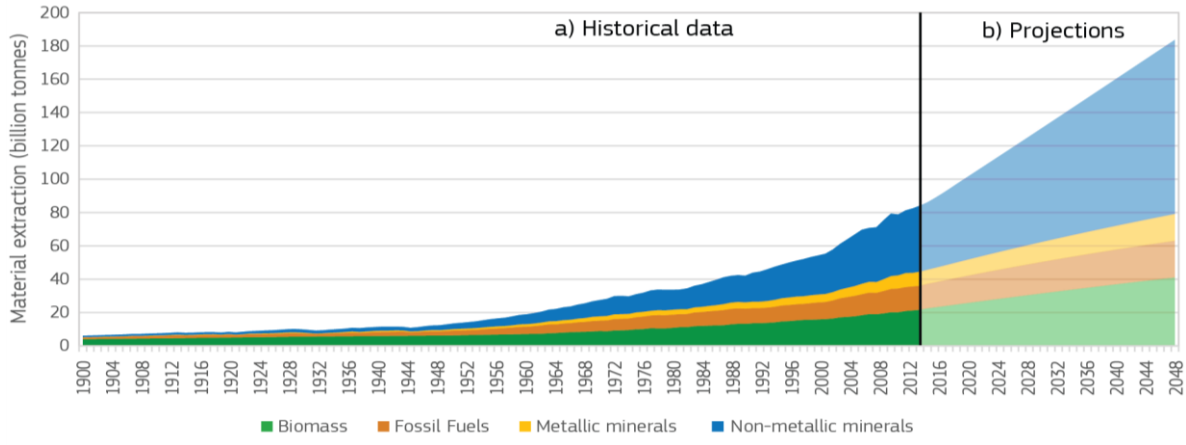


Figure 3.2. Global material extraction by resource type[91]



[89] Figure 3.1 shows supply risks for raw materials (on a scale of 1 to 6), key technologies in which they are used and their geographical sources.
[90] European Commission, 2020, Critical Raw Materials for strategic technologies and sectors – a foresight study (doi: 10.2873/58081).
[91] OECD, 2019, Global Material Resources Outlook to 2060: Economic Drivers and Environmental Consequences, OECD publishing, Paris...

Trade and investment have plunged, undermining global prosperity and stability. According to estimates, world trade volumes will drop by between 9% (IMF) and 32% (WTO) in 2020, while foreign direct investment has decreased by 28.2% in the first half of 2020 compared to the same period in 2019[92].

Europe's economic sovereignty is at stake. Other global powers are combining geopolitical and economic interests to increase their influence in the world. This includes protectionism, export control and the international role of currencies. While the international role of the euro is rising, it is still far from challenging that of the US dollar. COVID-19 put Europe's industrial and corporate assets under stress, which calls for protecting its economic sovereignty through an integrated strategy[93]. Insolvencies due to the pandemic are exposing the EU's strategic industries to hostile foreign takeovers. This raises the chances of foreign investors attempting to acquire strategic European assets, especially in the health, defence and space supply chains[94], as well as for critical infrastructures. To preserve EU companies and critical assets, the EU's openness to foreign investment needs to be balanced by the appropriate tools[95]. The regulation on Foreign Direct Investment Screening[96] will help safeguard Europe's security and public order through a cooperation mechanism between the Commission and the Member States to address concerns on incoming foreign direct investment. Foreign subsidies should also be addressed as they can distort the EU's internal market and undermine the level-playing field[97].

The crisis accelerated attacks from authoritarian regimes against democratic systems via misleading narratives. The spread of mis- and disinformation and conspiracy theories represents a threat to democracy[98]. Conspiracy theories about COVID-19 and the propagation of general vaccine hesitancy are continuing to put people's lives at risk[99]. Such 'infodemics'[100] are both cause and consequence of rising distrust of governments and media[101], raising the pressure on the EU to protect more energetically the values it was built on and step up efforts to defend democracy and the rule of law. The EU institutions are contributing to the fight against mis- and disinformation[102], thereby increasing democratic resilience, which is at the core of the upcoming European Democracy Action Plan.

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[92] The drop refers to the number of deals regarding acquisition of equity stakes of at least 10% of the total capital between January and June 2020 compared to 2019. The drop is -33.5% for intra-EU cross-border investments, and -23% for non-EU investments in Europe. Source: JRC Foreign Investment Bulletin, July 2020, JRC 121392.

[93] https://ec.europa.eu/commission/presscorner/detail/en/ip_20_528,https://www.bruegel.org/wp-content/uploads/2019/06/PC-09_2019_final-1.pdf, https://peacediplomacy.org/2019/10/25/how-eu-can-achieve-economic-sovereignty/.

[94] C(2020)1981 final, Guidance to the Member States concerning foreign direct investment and free movement of capital from third countries, and the protection of Europe's strategic assets, ahead of the application of Regulation (EU) 2019/452 (FDI Screening Regulation).

[95] *Ibidem.*

[96] Regulation (EU) 2019/452 of the European Parliament and of the Council of 19 March 2019 establishing a framework for the screening of foreign direct investments into the Union. The regulation will apply as from 11 October 2020.

[97] COM(2020)253 final, White Paper on levelling the playing field as regards foreign subsidies.

[98] JOIN(2020)8 final, Tackling COVID-19 disinformation - Getting the facts right; see also https://euvsdisinfo.eu/eeas-special-report-update-short-assessment-of-narratives-and-disinformation-around-the-COVID-19COVID-19-pandemic/.

[99] A hoax about the connection of 5G, chipping and COVID-19 spread widely on social media (Downing, J., Ahmed, W., Vidal-Alaball, J. & Lopez Seguí, F., 2020, Battling fake news and (in)security during COVID-19. E-International Relations).

[100] Infodemics are the result of the simultaneous action of multiple human and non-human sources of fake or unreliable news (https://arxiv.org/pdf/2004.03997.pdf).

[101] https://www.cogitatiopress.com/politicsandgovernance/article/view/2478.

[102] https://www.europol.europa.eu/staying-safe-during-covid-19-what-you-need-to-know; https://ec.europa.eu/info/live-work-travel-eu/health/coronavirus-response/fighting-disinformation_en.

Opportunities

The shift towards an increasingly multipolar world offers a new opportunity for Europe to reinforce its role in the global order and lead the revival of multilateral governance structures. The globalisation process, which has temporarily slowed down, is likely to resume once the crisis is over. At the same time, *glocalisation* – combining global business models with more consideration for localisation of production, consumption, and taxation – offers renewed opportunities for the EU to position itself as a frontrunner and role model to the world, provided the right conditions are in place (e.g. taxation, availability of funding, standards).

Strong cooperation with like-minded democracies is increasingly important. The EU must protect the openness and democratic nature of its model, and needs to rally its partners in these efforts, safeguarding its fundamental values from foreign interference. Upholding democracy, human rights and the rule of law must start at home and should continue to be the guiding principle of the EU's external relations, including with regards to digital technologies. Issue-based cooperation and partnerships with like-minded countries, and other countries where possible, is an investment in multilateral governance and initiatives. With its convening power, the EU can be a first-choice partner for countries around the world.

Boosting Europe's open strategic autonomy is an imperative. The crisis offers an economic, social, and ecological opportunity to strengthen the EU's resilience to future shocks and secure its place in next-generation global value chains. As stated in the European recovery plan, this means shaping global economic governance and developing mutually beneficial bilateral relations, while protecting ourselves from unfair and abusive practices. This is key to helping the EU diversify and solidify global supply chains in critical sectors, intensifying ties with partners, including in Africa, re-shoring production where necessary, developing substitutes through innovation, and increasing our strategic reserves[103].

A reliable supply of food also needs to be ensured across the EU. The Commission will thus continue monitoring food security and competitiveness. It will further assess the resilience of the food system and step up its coordination of a common European response to crises. As the biggest importer and exporter of agri-food products, the EU will further promote the global transition to sustainable food systems.

Being more strategic about raw materials is fundamental. The EU must secure a sustainable supply of critical raw materials. This means building diversified value chains, decreasing dependence, raising circularity, supporting innovation for alternatives and ensuring a greener and socially-responsible level playing field in the single market and beyond. Key opportunities include the upcoming European Raw Materials Alliance[104] and the EU Raw Materials Intelligence Capacity[105], to explore these issues with industry and other key stakeholders.

[103] COM(2020)102 final, The new industrial strategy.
[104] COM(2020)474 final, Critical Raw Materials Resilience: Charting a Path towards greater Security and Sustainability.
[105] https://publications.jrc.ec.europa.eu/repository/bitstream/JRC109889/jrc109889_mica_jrc_technical_report_1.pdf.

A stable rules-based trading system and a level playing field are key objectives for the EU. Only a strong trade and investment policy can support the post-COVID-19 economic recovery, create jobs, protect EU companies from unfair practices at home and abroad, and ensure coherence with broader priorities in the areas of sustainability, climate change, the digital economy and security[106]. The current crisis may provide an opportunity to drive meaningful reforms of the World Trade Organization (WTO) and build more competitive, sustainable and resilient economies. The EU has already launched a health initiative in the framework of the WTO to further support the global availability and provision of essential health products. The EU is now in the process of reviewing its trade policy, in view of strengthening its open strategic autonomy.

Industrial alliances can be at the forefront of this change, bringing together investors, public institutions and industrial partners to help industry develop strategic technologies. This approach is already showing results in the areas of batteries and hydrogen. In this context, a number of existing and forthcoming alliances[107] will help Europe lead the green and digital transitions, maintain industrial leadership and benefit European businesses and society while reinforcing Europe's resilience.

Strategic foresight can be used to identify possible scenarios for the EU's place in the future global order and chart the best path towards the desired future. It can help develop a forward-looking analysis of how to leverage the EU's power to support its strategies for cooperation and partnerships. It also helps identify possible alliances, analyse different ecosystems and assess risks, opportunities and future needs for strategic industries. Moreover, foresight helps define strategic options for the best combination of approaches to open strategic autonomy, from diversifying trading partners to strengthening the EU's own capacities.

3.3. The green dimension

Green resilience is about reaching climate neutrality by 2050, while mitigating and adapting to climate change, reducing pollution and restoring the capacity of ecological systems to sustain our ability to live well within planetary boundaries. This entails eliminating our dependency on fossil fuels, reducing our impact on natural resources, preserving biodiversity, developing a clean and circular economy, achieving a toxic-free environment, changing lifestyles, production and consumption patterns, climate-proofing infrastructure, creating new opportunities for healthy living, green business and jobs, actively pursuing ecosystem restoration, as well as saving our seas and oceans.

[106] https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1058.
[107] The European Battery Alliance, the Plastic Alliance, the European Clean Hydrogen Alliance, the European Alliance for Industrial Data and Clouds and the European Raw Materials Alliance.

Capacities

The European Green Deal aims to achieve a climate-neutral society by 2050, while pursuing resilience to both mitigate and adapt to the impact of climate change, environmental degradation and biodiversity loss. This is an integral part of this Commission's strategy to implement the UN's 2030 Agenda and the SDGs. It implies a full decarbonisation of the power sector and a substantial electrification of energy demand. Land use emissions need to be zeroed and the land use sink needs to be enhanced by restoring the environment and adapting the farming sector, while ensuring a higher quality of life for everyone in the EU in a cost-efficient manner so as to bring further economic growth and enable Europe to act as a beacon of transformation for the rest of the world. To pursue this path, the EU's capacities should be boosted to recover from the crisis and invest in long-term sustainability (**Box 3.2**).

Box 3.2: Foresight scenarios for the EU 2050 climate strategy & relevance for the Green Deal

The last two decades have witnessed 18 of the warmest years on record[1]. If temperatures continue rising at just 0.2 °C per decade, the yearly damage from river floods in Europe could increase from €5 billion to €112 billion and 16% of the present Mediterranean climate zone may become arid and non-productive by the end of the century. By 2050, climate change, biodiversity loss and flooded coastal areas could force over 140 million people to become internal migrants across Africa, South Asia and Latin America[1].

The EU's greenhouse gas emissions reduction strategy submitted to the United Nations Framework Convention on Climate Change (UNFCCC)[1], has been informed by **eight scenarios with foresight dimensions**[1]. The first five scenarios addressed the *well below 2°C* ambition, aiming at greenhouse gas emissions reduction levels in 2050 of around 80% compared to 1990. They considered differentiated portfolios of options for decarbonisation and identified trade-offs: for example, pathways that focus more on electrification for end-use also need high deployment of storage (six times today's levels) to deal with variability in electricity production, but pathways which deploy more hydrogen require more electricity to produce it in the first place[1]. Actions and technologies from the first category's five scenarios were combined into a sixth scenario (COMBO). This results in net greenhouse gas emissions reduction in 2050 close to 90% compared to 1990, with little reliance on negative emissions technologies and without changes to consumer preferences.

Finally, the two last scenarios considered what is necessary for the EU to reach net zero greenhouse gas emissions by 2050, thus doing its share in the global effort towards the Paris Agreement's goal to pursue efforts to limit temperature increase to 1.5°C compared to pre-industrial levels. The seventh scenario looks at carbon capture and storage, and the eighth scenario assumes a drive towards a more circular economy brought about by EU business and consumption patterns. The latter includes a continuation of the trend towards less carbon-intensive diets, the sharing economy in transport, the use of more sustainable transport modes and more rational use of energy for heating and cooling.

The scenarios showed the portfolio of options mobilising existing and new technologies in all economic sectors for Europe to be climate-neutral by 2050. While scenario work continues to support the development of climate policy, the green transition requires all

hands on deck. **The European Green Deal has set up a transformative agenda built around the following elements**, while being committed to mainstreaming sustainability in all EU policies and to ensure a just transition:

1. increasing the EU's climate ambitions for 2030 and 2050;
2. supplying clean, affordable and secure energy;
3. mobilising industry for a clean and circular economy;
4. building and renovating in an energy- and resource-efficient way;
5. accelerating the shift to sustainable and smart mobility;
6. from 'farm to fork': a fair, healthy and environmentally-friendly food system;
7. preserving and restoring ecosystems and biodiversity;
8. a zero pollution ambition for a toxic-free environment.

The EU's regulatory power, notably in the environmental field, can lead to the highest standards being used to underpin competitive sustainability. In recent decades EU action has significantly improved not only the quality of Europe's environment, but also the lives of its citizens. In many areas, EU environmental standards have been emulated by other countries. The EU was the first global region to pass binding legislation to enshrine climate and energy targets and become a highly energy-efficient climate-neutral economy[108].

The EU is a global leader in the shift towards a clean and circular economy. European consumers are an important force in this effort. According to the circular economy action plan[109], EU support should target priority value chains, while taking into consideration sectors and business models with opportunities for job creation[110]. Circular economy investments and policy tools (e.g. ecodesign[111], energy labelling, green public procurement, digitally-enabled circular business models, and the Eco-Management and Audit Scheme) will help reduce overall environmental and climate footprints.

EU industrial frontrunners are demonstrating how clean, bio and circular production and services are important drivers of competitiveness and growth. Resource efficiency improvements, pollution prevention and control, water protection, adoption of new circular business models, cleaner production, eco-innovation, and the development of green markets are turning many European industries into global leaders. The Commission aims to ensure consistency and synergies between environmental, climate, energy and industrial policies[112]. This entails going beyond 'punishing polluters' to providing a framework conducive to avoiding pollution and increasing energy and material efficiency. Moreover, EU support to a sustainable bioeconomy seeks the transformation of Europe's

[108] https://ec.europa.eu/clima/sites/clima/files/docs/factsheet_climate_change_2015_en.pdf.
[109] https://ec.europa.eu/environment/circular-economy/pdf/new_circular_economy_action_plan.pdf.
[110] https://ec.europa.eu/environment/circular-economy/pdf/leading_way_global_circular_economy.pdf.
[111] It should be noted that up to 80% of products' environmental impacts are determined at the design phase.
[112] https://ec.europa.eu/environment/industry/.

agricultural and industrial base through the creation of new bio-based value chains, as well as greener, more cost-effective industrial processes. It also enhances the overall status of our natural resources and ecosystems. Bio-based industries could create a million new jobs by 2030[113].

The massive investment to assist the recovery will boost the green transition. To move towards a climate-neutral society and environmentally sustainable economy, there is a need to pool funding sources at all levels. The EU budget and recovery package including, among others, specific instruments like the Sustainable Europe Investment Plan[114] and the Innovation Fund[115] aim to mobilise private and public resources over the next decade to target climate, environmental and social investments related to the sustainable transition[116]. The Commission is also preparing a renewed sustainable finance strategy, to create sustainable investment opportunities and enhance sustainability-related risk management. As stated by the European Council, 30% of the €1.82 trillion agreed under the 2021-2027 multiannual financial framework and Next Generation EU will go to climate-related spending[117]. Funding in all areas must be based on the 'do no harm' principle[118]. The Just Transition Mechanism, including the Just Transition Fund, will support Member States and regions most affected by the transition towards climate neutrality[119].

Europe's blue economy plays an important role in contributing to resilience. Preserving marine ecosystems is key to ensuring the future of maritime economic sectors. In addition to natural resources for the economy, Europe's oceans and seas provide a habitat for marine life, carbon sequestration, renewable energy, and coastal protection against climate change.

Vulnerabilities

Climate change is making extreme weather events more frequent and more intense, including in Europe[120]. The global average temperature increases hide even more extreme regional impacts. These range from unprecedented forest fires and heatwaves above the Arctic Circle to increasingly devastating droughts in the Mediterranean region; and from accelerating coastal erosion on the Atlantic coast to more severe flooding and decimated forests in Central and Eastern Europe. All this comes with a terrible price tag – recent projections show that exposing the EU economy to global warming of 3°C would result

[113] COM(2018)673 and SWD(2018)431, A sustainable Bioeconomy for Europe: Strengthening the connection between economy, society and the environment; EuropaBio Report, 2016, Jobs and growth generated by industrial biotechnology in Europe.
[114] https://ec.europa.eu/clima/policies/innovation-fund_en.
[115] https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_24.
[116] https://ec.europa.eu/commission/presscorner/detail/en/fs_20_48.
[117] So-called 'climate mainstreaming'. See: https://www.consilium.europa.eu/media/45109/210720-euco-final-conclusions-en.pdf.
[118] The 'do no harm' principle means that no activity or funding will undermine or counteract climate or environmental objectives.
[119] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu/just-transition-mechanism/just-transition-funding-sources_en.
[120] The 2020 State of the European Environment report concludes that climate change has substantially increased the occurrence of climate and weather extremes.

in an additional annual loss of at least €170 billion (1.36% of GDP) and would cost tens of thousands of lives[121].

Our current production and consumption model is increasingly exposing people and the environment to the impact of hazardous substances. Chemical pollution affects health and the antibody response to vaccines[122], increasing morbidity and mortality from communicable diseases[123]. The world is failing to reach the agreed target for the sound management of chemicals and waste[124], while global chemical production is set to double by 2030[125], and the impact on people and the environment will be exacerbated without adequate policy measures. In the European Green Deal, the Commission has committed to move towards a toxic-free environment. This major goal will however require joint efforts by all societal actors to promote a real shift towards safe and sustainable chemicals, as well as a renewed global commitment.

Lower environmental protection standards and related costs in third countries may push some polluting activities and waste outside the EU with a higher risk of carbon leakage[126]. In addition, there are not always effective measures preventing exports of toxic and pollutant waste to non-EU countries[127]. At the same time, the economic crisis caused by COVID-19 risks intensifying these practices as countries seek to boost growth at all costs. The EU should promote its values and standards internationally, which is key to protecting its environmental norms, industries, workers and consumers. Otherwise, the EU is likely to lose further competitiveness and fail to see a reduction in trade exports in polluting sectors, while gaining comparative advantages in less polluting industries[128].

The increasing exploitation of renewable and non-renewable natural resources cannot be sustained, as they are jeopardising prospects for future sustainable development. Biodiversity loss on land and at sea, the rising extraction costs of minerals, soil, water and air pollution[129], as well as unrelenting greenhouse gas emissions from unsustainable levels of consumption of raw materials, energy, water, food and land use, are threatening the long-term livelihood of millions of people, including in Europe. Although the pressure on nature has temporarily slowed down as a result of the economic downturn due to confinement measures, the challenge in the future will be to decouple growth and

[121] https://ec.europa.eu/jrc/en/peseta-iv.
[122] Epidemiological studies support the conclusion that PFOS and PFOA are associated with reduced antibody response to vaccination; EFSA's scientific opinion on PFAS.
[123] C&en, 2019, Linking pollution and infectious disease; Science Daily, 2 October 2019, Environmental toxins impair immune system over multiple generations. Exposure to endocrine disruptors can damage the development of the endocrine, immune or neurological systems.
[124] SDG 12.4, to be reached by 2020.
[125] Global Chemical Outlook II, 2019.
[126] Carbon leakage refers to the situation that may occur if, for reasons of costs related to climate policies, businesses were to transfer production to other countries with laxer emission constraints.
[127] Interpol Strategic Analyse Report, 2020, Emerging criminal trends in the global plastic waste market since January 2018 (https://www.interpol.int/News-and-Events/News/2020/INTERPOL-report-alerts-to-sharp-rise-in-plastic-waste-crime).
[128] http://www.oecd.org/economy/greeneco/How-stringent-are-environmental-policies.pdf.
[129] Exposure to air pollution can lead to adverse health effects, including respiratory and cardiovascular diseases. A number of health authorities have warned that those citizens with certain pre-existing conditions, such as respiratory illnesses, may have an increased vulnerability to COVID-19. However, at present it is not clear whether and to what extent ongoing exposure to air pollution might worsen the condition of those infected by the virus. Further epidemiological research is needed (https://www.eea.europa.eu/themes/air/air-quality-and-covid19).

wellbeing from consumption of natural resources and its resulting environmental impacts on a long term basis.

COVID-19 appears to have spread more quickly in dense urban areas and poor neighbourhoods. Over 70% of Europe's population live in cities; this number is expected to increase to over 80% by 2050130. This translates into 36 million new urban dwellers, who will need housing, employment and care, thereby increasing pressure on city infrastructure. On the one hand, population density does facilitate the spread of diseases. On the other hand, urban areas have capacities that some of their rural counterparts still lack, such as proximity to healthcare facilities and digital infrastructure.

COVID-19 illustrates the connection between human development and the environment. Contemporary pandemics like COVID-19 and previous ones such as AIDS or Ebola find their origin in humans encroaching on natural wildlife habitats and the destruction of ecosystems[131]. This occurs due to environmental crime (e.g. logging and trade of exotic species), some forms of farming, mining, and urbanisation, driven by resource-intensive lifestyles.

Opportunities

The fast improvement of some environmental parameters resulting from the confinement showed how resilient nature can be. Nature-based solutions[132], like green-space initiatives and nature restauration plans, can contribute to the cost-effective greenhouse gas emission reductions needed by 2030, while having numerous co-benefits like flood protection, cooling during heatwaves and recreational use. Pollution reduction also dramatically improves human health[133]. For the first time since the 1970s, the date at which we will exceed the resources of the planet beyond the global sustainability rate has been shifted backwards[134]. While many of the pollution reductions linked to the confinement are likely to be only short-term, they do offer the opportunity to inform more long-term, economically sustainable green transitions and more sustainable consumption patterns in order to guarantee prosperity and health.

Using fewer primary resources in a circular economy benefits the environment and the economy. This includes resource efficiency measures and sustainable use of renewable resources, circular business models and product policy. The new circular economy action plan highlights the importance of these factors in delivering on our climate ambition by reducing environmental footprints, the emission of greenhouse gases and other harmful substances, and biodiversity loss. They are also key to creating business opportunities for the EU,

[130] https://ec.europa.eu/research/environment/index.cfm?pg=nbs .
[131] Around 75% of all emerging infectious diseases cross over from wildlife to humans (www.ncbi.nlm.nih.gov/pmc/articles/PMC5711319/).
[132] Nature-based solutions can pave the way to a more resource-efficient, competitive and greener economy and create new jobs and economic growth by manufacturing and delivering new products and services that improve nature rather than depleting it (https://ec.europa.eu/research/environment/index.cfm?pg=nbs).
[133] https://www.ethicalcorp.com/wake-call-we-must-live-within-our-planetary-boundaries-avoid-future-pandemics.
[134] https://www.overshootday.org.

facilitating market access, and decreasing our dependency on non-EU countries for raw materials[135].

COVID-19 has highlighted the importance of strengthening the resilience of urban areas. These are important hubs of innovation and key to making the most of the green transition, which calls for reinforced participatory governance and collective engagement towards a fairer and more sustainable future. Cooperation between EU institutions and cities, as well as partner cities around the globe, has great potential to make Europe a world reference point in identifying, experimenting with and applying solutions to current and future challenges that cities will face, including those related to climate change. For example, repurposing spaces like office buildings or brownfield sites provides abundant opportunities for bringing nature back to cities and improving the wellbeing of people in the urban environment, including through reconsidering mobility and consumption behaviours. Strategic foresight can be used to analyse and identify potential areas for bottom-up innovations and solutions to city problems, thus connecting those directly affected with innovators, investors and start-ups[136].

Box 3.3: CASE STUDY – Green jobs

The preservation or restoration of environmental quality is at the heart of many jobs of the future. These jobs will occur in agriculture, (re)manufacturing, construction, research and development, administration and services. They include, for instance, sustainable food production and distribution, green and efficient building, water quality and regeneration, green design, forestry, urban and landfill mining, repair and recycling of raw materials, pharmaceuticals, low-emissions mobility and transport, renewable energy, ocean acidity, and footprint managers. Resource constraints and the need for increased efficiency will transform many professions, bringing in new business models and requiring new skills.

Our environmental policies are contributing to a structural shift in the labour market. Some analyses estimate that a large proportion of EU jobs may evolve in a way that contributes to reducing greenhouse gas emissions and addressing environmental degradation. Jobs in heavily polluting industries represent a mere fraction of employment in the EU[137] and there are significant job opportunities in reducing the impact of those industries. The eco-industry, which directly mitigates environmental damage, is in itself becoming an important source of new jobs[138]. Moreover, increasing material productivity (i.e. resource efficiency) drives labour intensity and value added products, hence

[135] https://ec.europa.eu/environment/circular-economy/pdf/leading_way_global_circular_economy.pdf.
[136] For example, the research project 'The Future of Government 2030+' by the Commission's Joint Research Centre explored changing power relationships in society and new governance models and actors. The project examined stronger alliances of local governments through new types of political institutions (such as the European Parliament of Mayors) and stronger inclusion of individuals in policymaking through Citizen Councils. It has also proposed better synergies between the public and private sectors (especially the start-up culture) (https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/future-government-2030-policy-implications-and-recommendations). The Commission is also experimenting with 'doughnut economics', as successfully tested at city level in Amsterdam (https://www.kateraworth.com/wp/wp-content/uploads/2020/04/20200416-AMS-portrait-EN-Spread-web-420x210mm.pdf).
[137] https://ec.europa.eu/social/main.jsp?catId=738&langId=en&pubId=8219,https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/clean-energy-technologies-coal-regions.
[138] The eco-industry comprises activities which produce goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems.

increasing employment opportunities. Europe is already a leader in innovation to improve material productivity, but company-level and systemic inefficiencies persist.

The green sector can generate millions of jobs. The eco-industry sector has grown by 20% since 2000 and provides around 4.2 million jobs in Europe, with a turnover of more than €700 billion. A shift to a greener economy could create 24 million new jobs globally by 2030 if the right policies are put in place, according to the International Labour Organisation (ILO)[139], who also predicts that 72 million full-time jobs will be lost by 2030 due to heat stress and temperature increases.

The recovery from the COVID-19 crisis suggests that the impact of green labour policies could be significantly larger. Given the number of people out of work, steering recovery plans towards the green transition could result in far more green jobs than previously thought.

Job creation due to climate change policies will contribute to more inclusive job growth, countering trends which can exacerbate labour market inequalities, such as automation, robotics and artificial intelligence. By 2050, employment in the electricity sector is projected to grow by 25%[140], as industry, transport and other services become increasingly electrified. Renewable energy jobs in the EU are expected to reach 2.7 million or 1.3% of EU employment by 2050[141].

Effective green reskilling, especially for the built-in environment and services, can protect middle class jobs. The same is true with remanufacturing, reuse, repair, and recycling. Also, energy production and energy-intensive sectors such as steel, cement, car manufacturing, machinery and chemicals will need to shift to new production processes as part of the transition, which will also require new skills.

Strategic foresight can help explore the drivers of change and individual and collective behaviours and assumptions about the future in a participatory way. More immediately, it can help understand future structural shifts in the labour market as part of the transition towards a climate-neutral society by 2050. This will help guide the reskilling of people who have lost their jobs during the COVID-19 crisis, or who are likely to lose their jobs due to accelerated technological change and automation. Foresight also helps scan the horizon for new developments, including emerging technologies that could either accelerate or disrupt the green transition. The European Green Deal and a just transition will require the active and coordinated contribution of all of society.

3.4. The digital dimension

Digital resilience is about ensuring that the way we live, work, learn, interact, and think in this digital age preserves and enhances human dignity, freedom, equality, security, democracy, and other European fundamental rights and values. This is increasingly important as hyperconnectivity continues to accelerate, with physical-digital integration, the Internet of Things, smart home technology, the use of big data, augmented

[139] ILO flagship report, World employment and social outlook 2018 'Greening with Jobs'.
[140] https://ec.europa.eu/social/main.jsp?catId=738&langId=en&pubId=8219.
[141] https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Feb/IRENA_Transition_jobs_2020.pdf.

and virtual reality, machine learning, and other increasingly capable Artificial Intelligence technologies. Digital technologies blur the distinction between the physical and virtual world, and between humans, machines and nature, with implications for our own selves and the policy frameworks[142]. They have been instrumental in keeping our economies and societies running during the pandemic.

Capacities

Europe has a long and successful history of technological and societal innovation and cooperation. The EU is stronger when it works together with Member States, involving regions and municipalities, academia, civil society, financial institutions, firms, and social enterprises. Recent agreements in areas such as high-performance computing[143] and microelectronics[144] have reaffirmed this capacity. Continuing to promote the digital transformation of public administrations and justice systems throughout Europe is also crucial to support this process[145].

Europe has unique capacities to shape international standards on privacy and data flows. The European General Data Protection Regulation (GDPR) established data protection rules for all firms and actors processing the data of individuals in the EU, offering people more control over their personal data and benefits to businesses through a level playing field[146]. The role of the EU as a rule-maker in the digital sphere is being reinforced through engagement with non-EU countries that are currently adopting or modernising data protection legislation. India has followed the example of the EU GDPR in creating a plan for a Personal Data Protection Bill[147]. The California Consumer Privacy Act went in a similar direction[148]. Europe now needs to continue building alliances and maximising its regulatory power, support for structural improvements, diplomacy and finance to promote the European digital model[149].

Vulnerabilities

Sophisticated hybrid attacks by state and non-state actors threaten our cybersecurity and democracy. Vulnerabilities within the EU have been exploited through a combination of cyberattacks and cybercrime that have resulted in damage to critical infrastructure[150]. There has been a significant increase in the number of cyberattacks reported against supercomputers, healthcare and financial systems[151], such as hacking sensitive research from medical organisations and pharmaceutical companies[152]. ICT threats

[142] Online Manifesto (https://ec.europa.eu/digital-single-market/sites/digital-agenda/files/Manifesto.pdf).
[143] https://ec.europa.eu/digital-single-market/en/eurohpc-joint-undertaking, https://eurohpc-ju.europa.eu/.
[144] https://www.ipcei-me.eu/, https://ec.europa.eu/digital-single-market/en/ecsel.
[145] https://ec.europa.eu/info/sites/info/files/communication-shaping-europes-digital-future-feb2020_en_4.pdf.
[146] https://ec.europa.eu/info/law/law-topic/data-protection_en.
[147] https://hbr.org/2019/12/how-india-plans-to-protect-consumer-data.
[148] EIT Report, European Digital Infrastructure and Data Sovereignty (https://www.eitdigital.eu/fileadmin/files/2020/publications/data-sovereignty/EIT-Digital-Data-Sovereignty-Summary-Report.pdf).
[149] https://ec.europa.eu/commission/presscorner/detail/en/ip_20_273.
[150] Critical infrastructures are essential for vital societal functions, such as health, safety, security and economic or social wellbeing, whose disruption/destruction has a significant impact (Council Directive 2008/114/EC).
[151] https://www2.deloitte.com/ng/en/pages/risk/articles/covid-19-impact-cybersecurity.html.
[152] Craglia, M. *et al.*, 2020, Artificial Intelligence and Digital Transformation: early lessons from the COVID-19 crisis. JRC Science for Policy Report, JRC121305.

have also been flagged as a key source of systemic risk to electoral processes and the EU financial system[153]. These events show a worrying acceleration towards asymmetrical virtual crime[154]. Cybercrime, for example online dissemination of child sexual abuse material, has also reached unprecedented heights[155].

The rapidly escalating US-China technological confrontation is disrupting global digital supply chains. It will have a direct impact on the single market and reinforce the need for the EU to pursue its technological sovereignty agenda and strengthen its key digital capacities.

The digital divide between urban and rural areas is a cause for concern. In 2019, the coverage of Next Generation Access (NGA) networks, able to deliver download speeds of at least 30 Mbps, increased to 86% of households. Fixed Very High Capacity networks (VHCNs), able to provide at least gigabit connectivity, were available to 44% of households. However, in rural areas NGA coverage stood at only 59% in 2019, while VHCNs reach just 20% of households. This confirms that more investment is needed in rural areas to close the gap. Development of digital capacities in rural areas will considerably increase their attractiveness.

The crisis revealed a lack of readiness in the data economy. There was a significant lack of almost all types of data on which models are built (such as employment, consumer confidence, and production data), together with delays in producing data[156]. Data on stock, production capacity, and demand for key supplies like personal protective equipment was missing[157], and data on cases of COVID-19 infections was collected differently throughout Europe. This demonstrated that we still need a significant leap forward on data collection and governance for economic and societal benefits. In turn, this calls for a 'European way' of governing the use of data, not least to avoid data monopolies[158].

Digital technologies and related business models, including Artificial Intelligence (AI) and the platform economy, will impact the job market. While the interplay between potential job obsolescence and creation caused by AI and robotics is still unclear[159], it is evident that these and other digital technologies[160], as well as related business models, will change the way we work. Issues such as health, work-life balance, and safety at work will be impacted[161]. Demand for skills in emerging technologies such as AI, high-performance

[153] https://www.esrb.europa.eu/pub/pdf/reports/esrb.report200219_systemiccyberrisk~101a09685e.en.pdf.
[154] The megatrend 'changing security paradigm' (https://ec.europa.eu/knowledge4policy/changing-security-paradigm_en) is accelerating.
[155] COM(2020)605 final, EU Security Union Strategy; COM(2020)607 final, EU strategy for a more effective fight against child sexual abuse.
[156] https://www2.deloitte.com/be/en/pages/strategy-operations/articles/covid-19-and-data-economy.html.
[157] The Commission set up a clearing house for medical equipment to address market failures and facilitate the timely availability of supplies during the pandemic (https://ec.europa.eu/info/live-work-travel-eu/health/coronavirus-response/emergency-support-instrument/covid-19-clearing-house-medical-equipment_en).
[158] Duch-Brown, Martens and Mueller-Langer, 2017, The economics of ownership, access and trade in digital data, JRC Working Papers on Digital Economy 2017-01, Joint Research Centre (https://ec.europa.eu/jrc/sites/jrcsh/files/jrc104756.pdf); Crémer, J., Y-A de Montjoye and H. Schweitzer, 2019, Competition policy for the digital era, Report for Commissioner Vestager, European Commission.
[159] https://ec.europa.eu/digital-single-market/en/news/future-work-work-future.
[160] With global quantum race ongoing, the investment levels in Europe are still below those of the other major global players.
[161] https://ec.europa.eu/info/sites/info/files/research_and_innovation/ege/ege_future-of-work_opinion_122018.pdf; https://ec.europa.eu/digital-single-market/en/news/final-report-high-level-expert-group-impact-digital-transformation-eu-labour-markets.

computing and whole-of-society cybersecurity[162] are very acute, and the problem is growing as the offer lags behind market demand. Levels of preparedness and awareness are also unequal across the EU.

Opportunities

The COVID-19 pandemic has accelerated hyperconnectivity[163]. There is an opportunity to draw lessons from this real-time experience and achieve a balance between physical and digital interactions in the future that meets the public's expectations. During the COVID-19 crisis, over one-third of the EU's labour force temporarily shifted to teleworking arrangements[164]. Connectivity increased in all areas[165] and the spectacular rise in internet traffic, estimated at between 10% and 30% worldwide[166], remained even as countries relaxed confinement measures. The total amount of data generated worldwide is estimated to grow to around 175 billion terabytes by 2025.

Digital technologies could contribute to further advances in healthcare. AI and high-performance computing have the potential to accelerate the development of treatments, vaccines and diagnostics, predict the spread of diseases and plan the distribution of medical resources[167]. Such innovations could also be used to analyse individual health risks for preventive medicine. Leveraging AI also brings opportunities for enhancing our defences against cyberattacks, notably against critical infrastructure such as hospitals.

Digital technologies have enabled some continuity in training and education while schools have been closed during the crisis. When used properly, digital technologies can increase the effectiveness, efficiency and inclusiveness of our education and training systems. Strengthening the digital capacities of education and training systems and bridging digital gaps in equipment and connectivity is key.

Addressing challenges associated with the implementation of the EU data strategy will open up wide-ranging opportunities for Europe. These include the promotion of the EU data protection model, the possibility to improve data availability, reuse, interoperability and governance, and the ability to avoid inadequate data infrastructures, as well as rely on adequate tools that can empower individuals to exercise their rights.

Open strategic autonomy is key to develop the European digital economy. 5G connectivity, in combination with the Internet of Things, could boost the digitalisation of services (e.g. energy, transport, banking, and health) and processes, reduce costs and increase efficiency. The creation of a cloud infrastructure would be the first step to making

[162] Nai Fovino I., *et al.* (eds), 2020, Cybersecurity, our digital anchor, Science for Policy Report, Joint Research Centre (https://ec.europa.eu/jrc/en/facts4eufuture/cybersecurity-our-digital-anchor).
[163] The megatrend 'accelerating technological change and hyperconnectivity' (https://ec.europa.eu/knowledge4policy/accelerating-technological-change-hyperconnectivity_en) has accelerated.
[164] https://www.eurofound.europa.eu/sites/default/files/ef_publication/field_ef_document/ef20058en.pdf.
[165] Netflix doubled its paid subscriptions globally, with an additional 15.7 million subscribers (which is believed to be temporary) by April 2020 (https://orbi.uliege.be/bitstream/2268/247652/1/MAY-2020-_-N%C2%BA4.pdf).
[166] https://www.forbes.com/sites/markbeech/2020/03/25/covid-19-pushes-up-internet-use-70-streaming-more-than-12-first-figures-reveal/#4ba355cd3104.
[167] For instance, the EU-funded consortium Exscalate 4CoV uses one of the world's most powerful high-performance computing platforms to screen the potential impact of known molecules against the genomic structure of coronavirus.

the most of data generated in Europe[168]. Concerted legislative and financial support for the creation of a single market for data, based on the deployment of common European data spaces, will ensure better access to data and bring benefits for the public and the growth of the European data economy[169].

Digital technologies can contribute to greening the economy. They can optimise the operation of utilities, mobility and transport, products, industrial processes and buildings and other assets, leading to energy savings, pollution reduction and increased resource efficiency by enabling the transition to a circular economy. They can also improve environmental and risk management through early warning systems for extreme weather events, based on, for instance, earth observation data and big data technologies. However, attention needs to be paid to the energy consumption of data technologies and the short life span of digital devices that makes e-waste, including critical raw materials, the fastest growing waste category[170]. There is a fundamental shift to decentralised data systems brought by edge[171] and fog[172] computing, combined with the deployment and uptake of new mobile generation technologies (e.g. 5G and 6G in the future) and low energy processors that can curb the growing energy consumption of digital technologies by processing data closer to users, through applications related to the Internet of Things, and by reducing network latency.

Strategic foresight can foster the human-centric shaping and appropriation of digital technologies, as well as their effectiveness in boosting overall sustainability. This includes anticipating how technologies could develop and ways to seize underlying and upcoming opportunities. It also means exploring how digital technologies impact all walks of life and bring new challenges, such as dealing with an increasing flow of information and the artificial soliciting of human attention. It can help identify how the EU can shape global digital standards and rules to the benefit of people and businesses while also greening the economy. To respect fundamental rights and EU values and create the necessary trust for citizens to uptake AI technologies, a horizontal framework on AI is needed. With foresight and anticipation, it is possible to explore how digital technologies can effectively enable governments to provide universal access to quality basic services, and how to make institutions fully accountable. It can explore ways to deploy secure digital infrastructures (high speed networks including future 6G, cloud and data) to avoid a digital divide between regions and individuals.

[168] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Degree_of_dependence_on_cloud_computing,_by_economic_activity,_EU-28,_2018_(%25_of_enterprises_using_the_cloud).png&oldid=415896.
[169] COM(2017)9 final, Building a European Data Economy.
[170] For example, people in northern Europe produced the most e-waste – 22.4kg per person in 2019. The amount was half as much in Eastern Europe. Europe had the highest recycling rate in 2019, at 42%, with Asia second at 12%. (https://www.theguardian.com/environment/2020/jul/02/10bn-precious-metals-dumped-each-year-electronic-waste-un-toxic-e-waste-polluting).
[171] This brings processing close to the data source and it does not need to be sent to a remote cloud or other centralised system. By eliminating the distance and time it takes to send data to centralised sources, it can improve the speed and performance of data transport, as well as devices and applications on the edge.
[172] This is a standard that defines how edge computing should work and it facilitates the operation of computing, storage and networking services between end devices and cloud computing data centres. In data centres, fog is often used as a jumping-off point for edge computing.

Box 3.4: CASE STUDY – Green ICT

Are the EU's green and digital ambitions always complementary? Information and communication technologies (ICT) can fuel unsustainable consumption, but with the right policy framework they also hold great promise for reducing energy consumption and optimising resource, product and asset use. Digital technologies could help reduce global emissions by up to 15% through innovative solutions in areas including energy, manufacturing, agriculture and land use, buildings, services, transportation, and traffic management[173]. For instance, transferring and storing one gigabyte of data through the internet uses between 3.1 kWh and 7 kWh, instead of 0.000005 kWh if done locally[174]. This calls for the establishment of interoperable European cloud and edge infrastructures that can accommodate large-scale digital solutions in Europe while ensuring the EU's technological sovereignty.

However, digitalisation could negatively affect the environment, climate and human health via higher production, use and disposal of electronic equipment, and data centres[175]. For example, the energy consumption from mining bitcoins is estimated to be responsible for 0.3% of global energy consumption. This might not sound like much, but 68.11 TWh per year is higher than the annual consumption of Austria (64.60 TWh) and Czechia (62.34 TWh)[176].

Material efficiency is an important challenge to address. Every year, $10 billion worth of gold, platinum and other precious metals is dumped in the growing mountain of electronic waste. Material efficiency of digital technologies might have an even larger environmental impact than energy efficiency.

Energy consumption of computing is growing at an unsustainable rate. Newer generations of wireless technologies are less energy consuming than earlier ones (e.g. 5G antennas are set to consume less than the 4G ones[177]). However, the fact that 5G will bring denser networks and the rising number of devices connected via 5G (e.g. connected and autonomous driving)[178] might lead to an overall growth of energy consumption, at least in the first years of deployment. The tech sector's estimated global footprint in 2020 is comparable to that of the aviation industry[179].

This highlights the growing need to continue working on greening ICT. Therefore, there is a need to further consider ways to rapidly reverse the rising energy and material resource consumption of Europe's digital technologies and infrastructures while ensuring that they are available for applications required for climate action, health, sustainability and resilience.

Greening ICT should be done within the framework of the circular economy, including building local material and digital ecosystems enabling innovative product designs and business models.

[173] https://exponentialroadmap.org/wp-content/uploads/2018/09/Exponential-Climate-Action-Roadmap-September-2018.pdf.
[174] https://medium.com/stanford-magazine/carbon-and-the-cloud-d6f481b79dfe.
[175] The EU Environmental Foresight System (FORENV) cycle: Emerging issues at the environment-social interface.
[176] Cambridge Bitcoin Electricity Consumption Index (https://www.cbeci.org).
[177] https://www.ericsson.com/en/blog/2019/9/energy-consumption-5g-nr; https://hellofuture.orange.com/en/5g-energy-efficiency-by-design/.
[178] AI Now Institute (https://ainowinstitute.org/AI_Now_2019_Report.pdf).
[179] Data centres will make up 45% of this footprint (up from 33% in 2010) and network infrastructure 24%. See: Belkhir and Elmeligi, 2018, AI and Climate Change: How they're connected, and what we can do about it (https://medium.com/@AINowInstitute/ai-and-climate-change-how-theyre-connected-and-what-we-can-do-about-it-6aa8d0f5b32c).

4. Strategic foresight agenda

4.1 Monitoring resilience

As resilience becomes a new compass for EU policymaking, proper monitoring tools are required. This Communication suggests moving towards *resilience dashboards* and co-creating them in exploratory discussions with Member States and key stakeholders. It presents here prototypes. The purpose of these prototypes, in view of more detailed analysis, is to highlight vulnerabilities and resilience capacities in the EU and its Member States. These dashboards will need further work, building on existing threads and collective intelligence. The list of dashboard indicators will be dynamic and chosen based on a participatory process involving Member States and key stakeholders, relying on quality data comparable across Member States and over time.

The resilience dashboards will be complementary and will add value to other monitoring tools. They will draw upon existing sectoral indicators and monitoring tools, such as the Social Scoreboard and the Monitoring report on progress towards the SDGs in an EU context[180]. They will provide clear added value through the following specificities: (i) the dashboards will be informed by strategic foresight, helping to identify emerging issues and challenges and propose new forward-looking indicators of vulnerabilities or resilience capacities; (ii) while existing tools aim to assess progress in the EU and its Member States, for instance along the transitions or in specific sectoral policies, the dashboards will assess resilience, i.e. *the ability* to make progress and reach policy targets; and (iii) while many existing tools tend to be sectoral or focus on single topics or policies, the dashboards will focus on multiple dimensions of resilience and their interlinkages, providing a holistic picture.

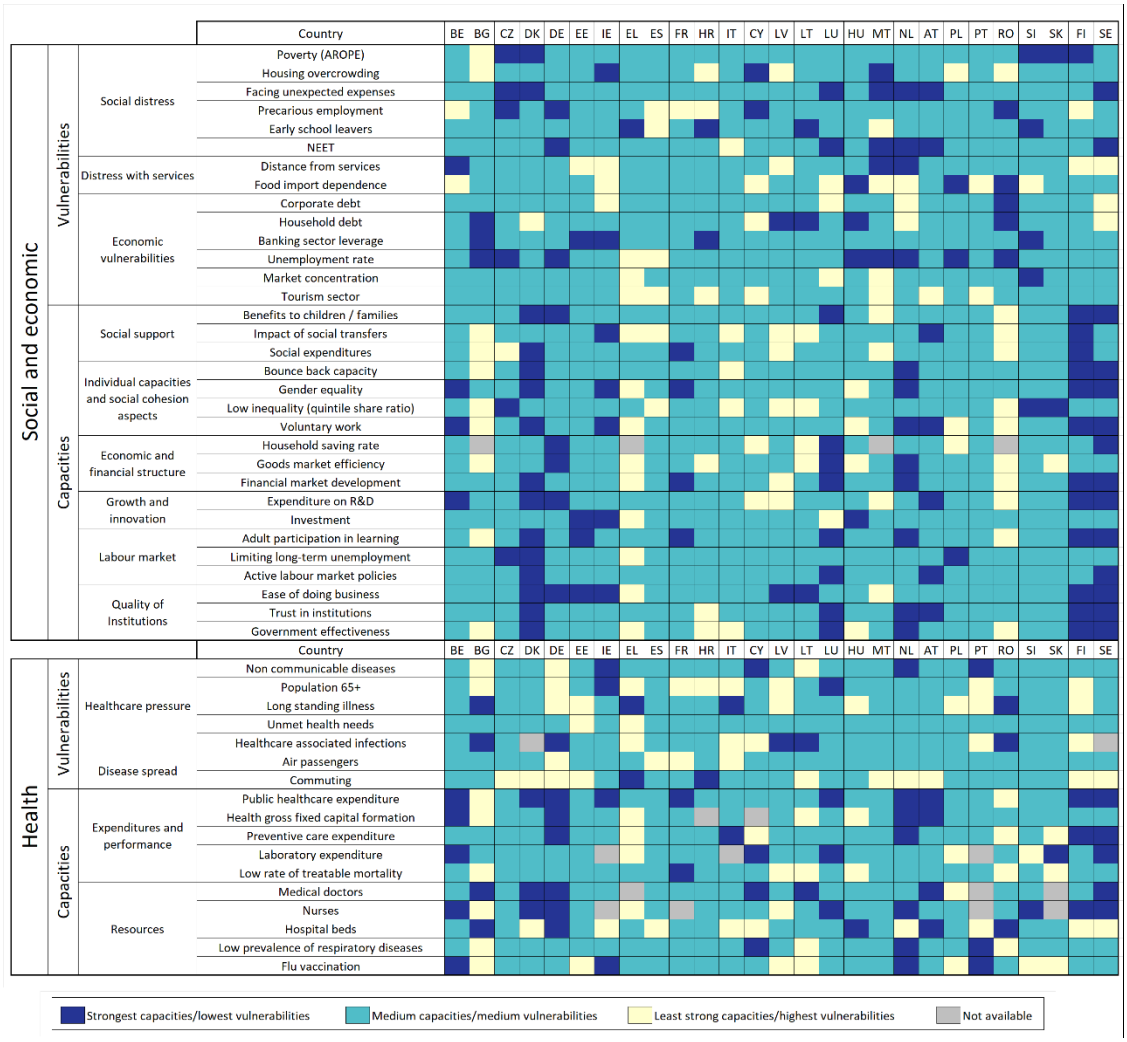
4.1.1 Prototype resilience dashboards

This Communication proposes to develop prototype dashboards for the social and economic, geopolitical, green, and digital dimensions of resilience. What is presented below as an example is a preliminary and yet-to-be-finalised set of indicators of *vulnerabilities* and *resilience capacities* at EU and Member States level based on publicly available data[181]. **The illustrative prototypes provide an example of the look and feel of such a dashboard**. For each variable, a scale of three colours indicates the countries' relative situation in the last year for which data is available versus the pooled values of available data since 2007[182]. Colours are assigned based on the distance from the mean of the underlying distribution[183].

[180] https://ec.europa.eu/eurostat/web/products-statistical-books/-/KS-02-20-202.
[181] The complete list of indicators, corresponding definitions, and sources are available in the following technical papers of 9 September 2020 from the Commission's Joint Research Centre (JRC): (i) 'Prototype dashboard for monitoring the social and economic dimension of resilience', JRC121729; (ii) 'Prototype dashboards for monitoring the geopolitical, green, and digital dimensions of resilience', JRC121633.
[182] Data availability may vary between countries from year to year and countries with longer data series are more prominent in the distribution. If no data is available for a variable at the beginning of the period, the 2007-2019 distribution automatically refers to the latest available values. If variables are available only for a single year, relative performance is assessed only for that year.
[183] For each indicator, the mean and standard deviation are calculated for the pooled distribution across countries and years. Yellow/blue indicates countries that, in the latest available year, perform at least one standard deviation worse/better than the average. Light blue refers to the intermediate range.

The illustrative prototype dashboard for social and economic resilience looks at social, economic, and health issues in connection with COVID-19. **Figure 4.1**[184] gives a sense of relative vulnerabilities, resilience capacities, and common patterns in the EU and its Member States. For example, in this preliminary work, population ageing and rising travel in the pre-crisis period appear as common vulnerabilities.

Figure 4.1 – Prototype dashboard for social and economic resilience linked to the COVID-19 crisis



The illustrative prototype dashboard for the geopolitical dimension of resilience focuses on raw materials. A secure supply of raw materials is a prerequisite for a resilient economy. A prototype dashboard, presented in the top panel of **Figure 4.2**[185], has been prepared to give a sense of Member States' relative vulnerabilities and capacities in relation

[184] Sources include Eurostat and the Commission, complemented by variables from JRC's LUISA territorial platform, the European Institute for Gender Equality, the Global Competitiveness Index of the World Economic Forum, the World Bank, the European Quality of Life Survey, Eurobarometer and research (https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2018.23.46.1800516).

[185] The starting points are the Raw Materials Scoreboard 2018 (https://ec.europa.eu/growth/content/raw-materials-scoreboard-2018_en) and the methodology of the criticality assessment (Blengini *et al.*, 2017, https://doi.org/10.2760/73303). Sources include the Commission, the World Mining Database, the British Geological Survey's World Mineral Production database, and the US Geological Survey's historical statistics.

to raw materials supply. At this stage, there is no possibility to reflect the economic structure of individual Member States in the prototype, which is a significant limitation. Nevertheless, as an example, the dashboard indicates that many countries fare well in relative terms with respect to import dependence of base metals, but less so to import dependence of non-metallic minerals for construction[186]. Among capacities, the spending on innovation in material sectors is a strong point in many countries.

Figure 4.2 – Prototype dashboards for the geopolitical, green, and digital dimensions of resilience

The illustrative prototype dashboard for the green dimension of resilience focuses on climate change and the environment. It is presented in the middle panel of **Figure 4.2**[187]. In this illustrative example, indicators like the share of population covered by the Covenant of Mayors and the size of Natura 2000 protected areas provide a relatively positive picture for many countries. By contrast, water exploitation, biodiversity loss, greenhouse gas

[186] In absolute terms, however, import dependence of base metals is higher than for non-metallic minerals.

[187] The starting point is the index of the EU Global Climate Change Alliance (Miola *et al.*, 2015, https://doi.org/10.2788/516387), complemented with additional variables describing Member States' efforts and achievements towards climate adaptation and mitigation. Data sources include the World Bank, the FAO, the European Environmental Agency, and the Emergency Events Database of the Centre for Research on the Epidemiology of Disasters (EM-DAT), the data collections of various research institutions, Eurobarometer and Eurostat.

absorption by ecosystems, public expenditure on environmental protection and the frequency and fatality of floods, storms and wildfires highlight potential weaknesses.

A digital resilience dashboard could be further developed starting from the Digital Economy and Society Index (DESI). The bottom panel of **Figure 4.2** presents a set of DESI indicators of digital resilience capacities, like e-governance and digital skills. They are complemented with others whose importance was highlighted by the COVID-19 crisis, like teleworking and e-health. According to these indicators, many countries show strong capacities in e-government and the overall digital economy reflecting improving penetration and adoption of new technologies. At the same time, digital skills, teleworking capacities and the use of e-health show a more contrasted picture.

4.1.2 Work ahead for monitoring resilience

The prototype dashboards are presented as an example. In cooperation with Member States and other key stakeholders, the Commission will develop the resilience dashboards further in a forward-looking perspective. The dashboards will be informed by strategic foresight, which can help identify emerging challenges and propose new forward-looking indicators to assess vulnerabilities or capacities. As resilience is a characteristic that must be enhanced over time, the focus of this work will be on the medium-to-long term, to give the best conditions for foresight-informed policies to mitigate vulnerabilities and strengthen capacities. This will take into account the impact of megatrends and anticipated risks. For instance, the dashboard for social and economic resilience would be broadened beyond the COVID-19 context, in close connection with the Social Scoreboard. Moreover, broader issues such as trade, including value chains, security, and other aspects of foreign policy such as international cooperation could be considered for a more comprehensive geopolitical dashboard. For the green resilience dashboard, issues beyond climate change, such as the preservation of natural resources, the impact of pollution, water and soil quality, the role of ecosystem services or job reallocation and innovation prompted by the green transition, could also be contemplated. The utmost attention will be paid to ensure consistency and coherence with existing EU monitoring systems under development in the context of the European Green Deal. A digital resilience dashboard should be used to identify digital technology areas where the strategic autonomy of the EU is at risk and where investments should be targeted. In addition, strategic foresight could be used to adjust the list of indicators to include for instance necessary skills or vulnerabilities linked to the widespread use of future technologies such as AI[188], the number of jobs at risk as a result of increasing automation, or new jobs that could be created by the implied shift towards personal services.

Aggregate indicators at EU level and a synthetic resilience index could also be envisaged. Building on the resilience dashboards, as well as existing knowledge and indicators, future discussions with key stakeholders will aim to develop these indicators at

[188] A leading source is the Commission's *AI Watch* initiative (https://ec.europa.eu/knowledge4policy/ai-watch_en), monitoring industrial, technological and research capacity, uptake and technical development of Artificial Intelligence and its impact on the economy and society.

EU level and explore the feasibility of a synthetic resilience index. Its rationale would be similar to the logic underlying the work on the forthcoming *Transition Performance Index*[189]. This exploratory work could follow a participatory process. An EU-wide approach, combined with the snapshot provided by the index, would complement the more comprehensive view provided by the underlying resilience dashboards.

This broad approach to measuring and monitoring resilience should feed into an integrated approach to measuring people's wellbeing. The COVID-19 crisis has called into question our ordering of priorities and reignited the public debate on the importance of many aspects of the quality and sustainability of human life, such as education, income, jobs and health[190]. Since the 2007 Istanbul Declaration on Measuring Social Progress and the 2009 report of the Stiglitz-Sen-Fitoussi Commission, there has been a strong consensus in the international community on the need to go beyond conventional economic measures like gross domestic product (GDP), to make wellbeing a policy target for the generation of today as well as tomorrow[191,192]. The 'Beyond GDP' initiative has led to the creation of major international measurement frameworks[193] and efforts by countries to develop similar, sometimes highly elaborate systems of national objectives, targets and measurement schemes. The Commission supports this paradigm shift and takes a similarly comprehensive approach, acknowledging the complex interaction among social, economic and environmental systems influencing resilience and its importance for measuring wellbeing and sustainability[194].

4.2 Horizontal foresight activities to foster effective EU transition-led policies

Strategic foresight will be applied to bring a dynamic and forward-looking perspective of synergies and trade-offs among various EU policy goals and policies, leading to a coherent strategic approach. This can provide relevant input for surveillance and governance processes, particularly multidisciplinary and periodic ones like the European Semester and SDGs monitoring. By supporting a systemic understanding of the strategic objectives across policy areas, strategic foresight can be used to provide a dynamic analysis of synergies and trade-offs between them and across time horizons. Strategic foresight should contribute to testing and strengthening the coherence of the

[189] The Commission is exploring the possibility of measuring the transition to sustainability by way of a scoreboard. Based on the annual monitoring reports from Eurostat, this scoreboard would provide an internationally comparable overview of all four dimensions of sustainability (economic, environmental, social and institutional), with the aim of encouraging a broad public debate throughout the EU.
[190] Gadredy, J., Jany-Catrice, F., *et al.,* 2020, Se libérer du PIB pour mesurer ce qui compte vraiment, Le Monde.
[191] See: the first Stiglitz-Sen-Fitoussi Report from 2009 (https://ec.europa.eu/eurostat/documents/8131721/8131772/Stiglitz-Sen-Fitoussi-Commission-report.pdf); COM(2009)433 final, GDP and beyond: measuring progress in a changing world; SWD(2013)303 final, Progress on 'GDP and beyond' actions; and the two volumes of the second Stiglitz-Fitoussi-Durand report from 2018 (https://doi.org/10.1787/9789264307292-en and https://doi.org/10.1787/9789264307278-en).
[192] The high-level conference 'Beyond GDP', hosted by the Commission, the European Parliament, the Club of Rome, the OECD and the WWF in 2007 focused attention on the most appropriate indices to measure progress, and how these can best be integrated into the decision-making process. Méda, D., 2020, Promouvoir de nouveaux indicateurs de richesse: 'histoire d'une cause inaboutie', Fondation maison des sciences de l'homme, Collège d'études mondiales; and Durand, M. and Exton, C., 2019, Adopting a Well-Being Approach in Central Government: Policy Mechanisms and Practical Tools, Chapter 8 of the Global Happiness and Wellbeing Policy Report, OECD.
[193] Leading examples are the OECD Better Life Index and the United Nations' Sustainable Development Goals and Human Development Index.
[194] De Smedt, M., Giovannini, E. and Radermacher, W.J., 2018, Chapter 9: Measuring sustainability, in Stiglitz J.E., Fitoussi Jean-Paul, Durand Martine (Eds.), 2018, For Good Measure: Advancing Research on Well-being Metrics Beyond GDP, OECD Publishing, Paris, pp. 241-276, (https://doi.org/10.1787/9789264307278-11-en).

Commission's monitoring, forecasting and modelling capacities. Currently, different indicators and scoreboards are used across the Commission to serve various policy goals. The Commission also relies on expert-based forecasts and a wide range of models. A review and assessment of existing monitoring tools could identify where and how coherence can be improved.

Strategic foresight will help enhance resilience. This Communication starts to show how the impact of COVID-19 on megatrends can shed a new dynamic light on Europe's evolving resilience. Work will continue on this forward-looking task. As part of this, the Commission is proposing to develop a set of shared **reference foresight scenarios** as a robust forward-looking framework. These scenarios will help identify potential pathways for the twin transition. They will: (i) provide a reference for debating shared or alternative visions of preferred futures amongst leaders; (ii) help ensure coherence across policies; and (iii) serve as a common forward-looking framework for stress-testing policy proposals or launching *ex ante* impact assessments. This exercise can also contribute to the Conference on the Future of Europe.

4.3 Thematic strategic foresight agenda

The EU strategic foresight agenda will address cross-cutting topics where strategic foresight can deepen our understanding of the dynamics at play across policy tracks. Among the high-impact topics identified, the Commission will next explore:

- **Open strategic autonomy**: to secure Europe's competitiveness and global leadership in the future and strengthen its resilience, strategic foresight could help explore scenarios for a new global order and the EU's place in it, as well as the capacities needed to match its ambitions. This could include defining pathways for achieving the twin transitions and the pace with which they can be achieved, mapping critical emerging technologies, sectors and products, and options for new industrial alliances and diversification of trading partners. In this context, foresight could *inter alia* allow horizon scanning, including as regards international standardisation, to be used as a strategic lever by the EU. Possible future work on this topic would also need to be seen in light of the forthcoming review of the EU's trade policy that will identify its contribution to open strategic autonomy.
- **The future of jobs and skills for and in the green transition**: As acknowledged in the European Skills Agenda, the green transition requires a major shift and reallocation of jobs and skills, in a wide range of sectors and public services. A systemic view of the shifts in the labour market driven by the green transition is still missing. Foresight could explore the means by which such a systemic view could be developed, integrating also the lessons that can be learned from previous industrial transitions. Such a view will inform the strategies for reskilling and accompanying people, whose jobs are transformed or lost due to the industrial transition. This is

also important to guide the EU's future priorities for education, lifelong learning and legal migration pathways, as well as to ensure a just transition.

- **Deepening the twinning of the digital and green transitions**: the digitalisation of our society and the green transition are happening concurrently and are intimately related. However, their interactions need to be better understood and exploited. Strategic foresight will explore how emerging technologies can make the most of both transitions, how they relate to each other, and how, for instance, the environmental impact of the digital transition can be reduced. It will also explore the skills required to exploit the technologies of the future, the ways in which AI can be deployed to transform our digital economy and facilitate the green transition, and the associated impacts on European actors and value chains. In addition, it will analyse ways in which investment in strategic projects, including as part of the recovery, can benefit both the green and digital transitions.