The future of European competitiveness

Part A | A competitiveness strategy for Europe

SEPTEMBER 2024

Foreword

Contents

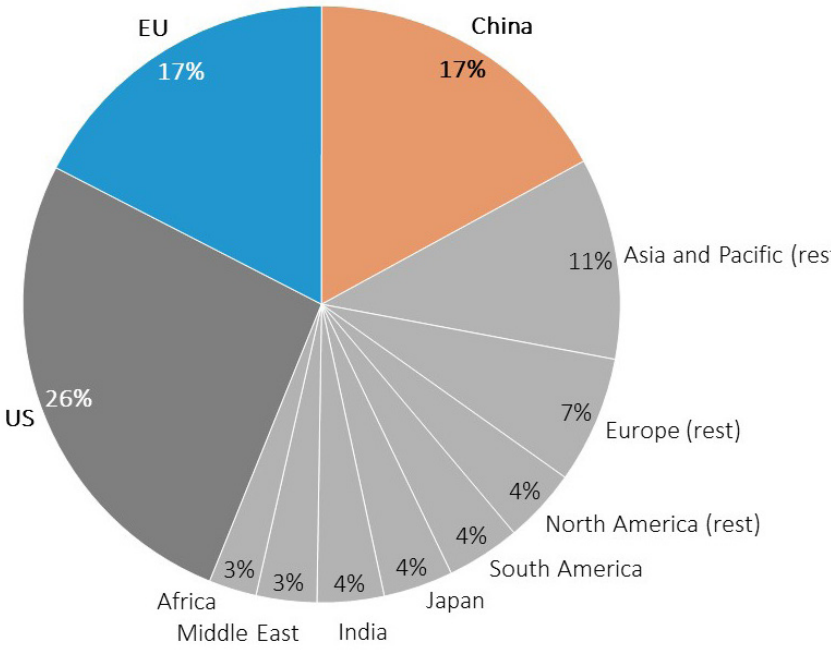
1. The starting point: a new landscape for Europe

Europe has the foundations in place to be a highly competitive economy. The European model combines an open economy, a high degree of market competition and a strong legal framework and active policies to fight poverty and redistribute wealth. This model has allowed the EU to marry high levels of economic integration and human development with low levels of inequality. Europe has built a Single Market of 440 million consumers and 23 million companies, accounting for around 17% of global GDP [see Figure 1], while achieving rates of income inequality that are around 10 percentage points below those seen in the United States (US) and China, according to some measures [see Figure 2]. At the same time, the EU's approach has delivered outstanding outcomes in terms of governance, health, education and environmental protection. Of the world's ten top-scoring countries for the application of the rule of law, eight are EU Member States[i]. Europe leads the US and China in terms of life expectancy at birth and low infant mortality[ii]. Europe's education and training systems deliver strong educational attainment, with a third of adults having completed higher education[iii]. The EU is also the world leader in sustainability and environmental standards and progress towards the circular economy, backed by the most ambitious global targets for decarbonisation, and can benefit from the largest exclusive economic zone in the world, covering 17 million square kilometres, 4 times the EUs land surface[01].

FIGURE 1

Share of World GDP

GDP at current prices, 2023

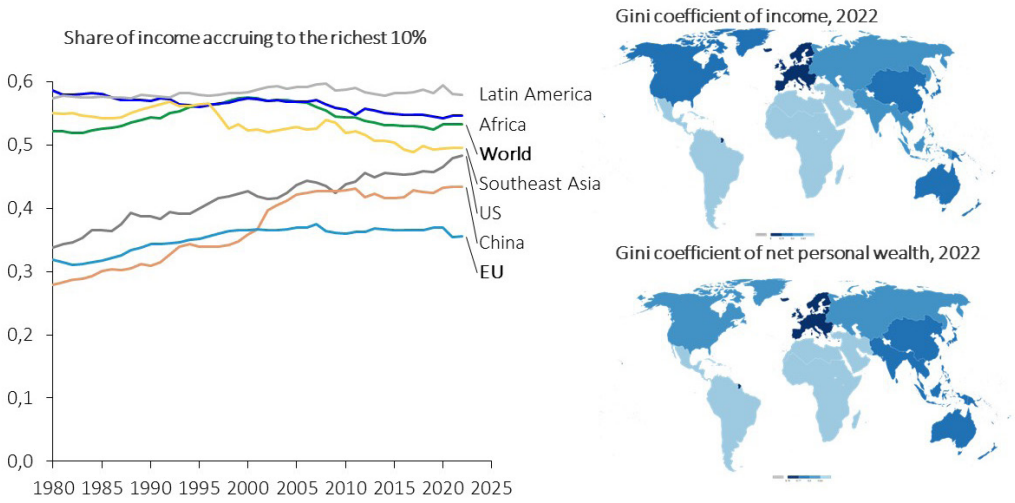


Source: IMF, 2024

01. The Exclusive Economic Zones (EEZs) are sea zones prescribed by the United Nations Convention on the Law of the Sea, extending up to 200 nautical miles from the coast of a country, within which the state has the rights to explore and exploit maritime resources. Leveraging this vast maritime area will contribute to competitiveness, security and sustainability.

FIGURE 2

Income and wage inequality in world regions



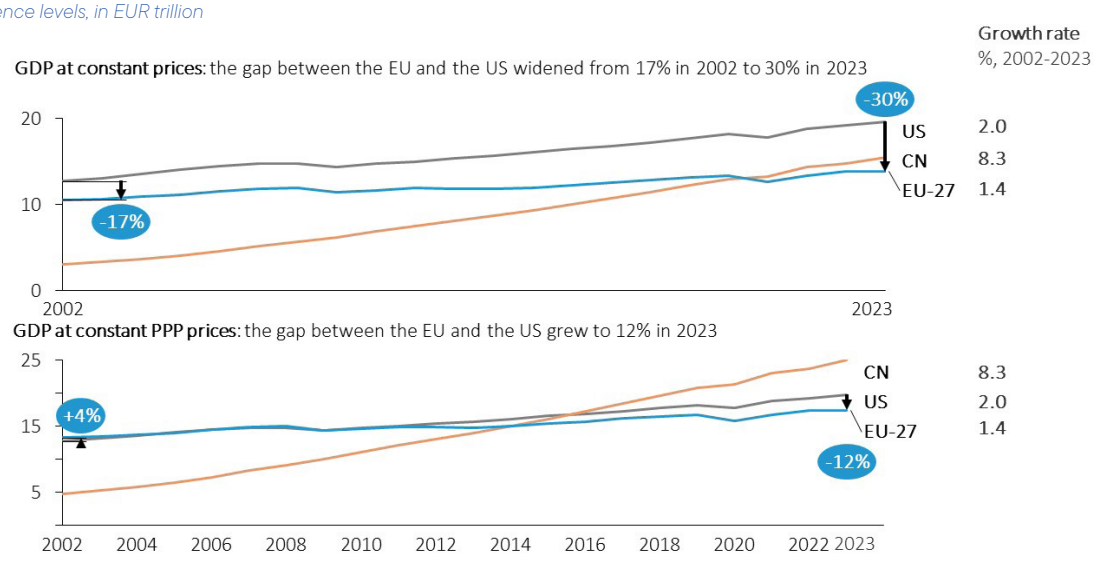
Source: World Inequality Database (WID), 2024

Yet growth in the EU has been slowing, driven by weakening productivity growth, calling into question Europe's ability to meet its ambitions. The EU has set out a range of ambitions – such as achieving high levels of social inclusion, delivering carbon neutrality and increasing geopolitical relevance – which depend on maintaining solid rates of economic growth. However, EU economic growth has been persistently slower than in the US over the past two decades, while China has been rapidly catching up. The EU-US gap in the level of GDP at 2015 prices[02] has gradually widened from slightly more than 15% in 2002 to 30% in 2023, while on a purchasing power parity (PPP) basis a gap of 12% has emerged [see Figure 3]. The gap has widened less on per capita basis as the US has seen faster population growth, but it is still significant: in PPP terms, it has risen from 31% in 2002 to 34% today. The main driver of these diverging developments has been productivity. Around 70% of the gap in per capita GDP with US at PPP is explained by lower productivity in the EU [see Figure 4]. Slower productivity growth has in turn been associated with slower income growth and weaker domestic demand in Europe: on a per capita basis, real disposable income has grown almost twice as much in the US as in the EU since 2000.

FIGURE 3

GDP evolution

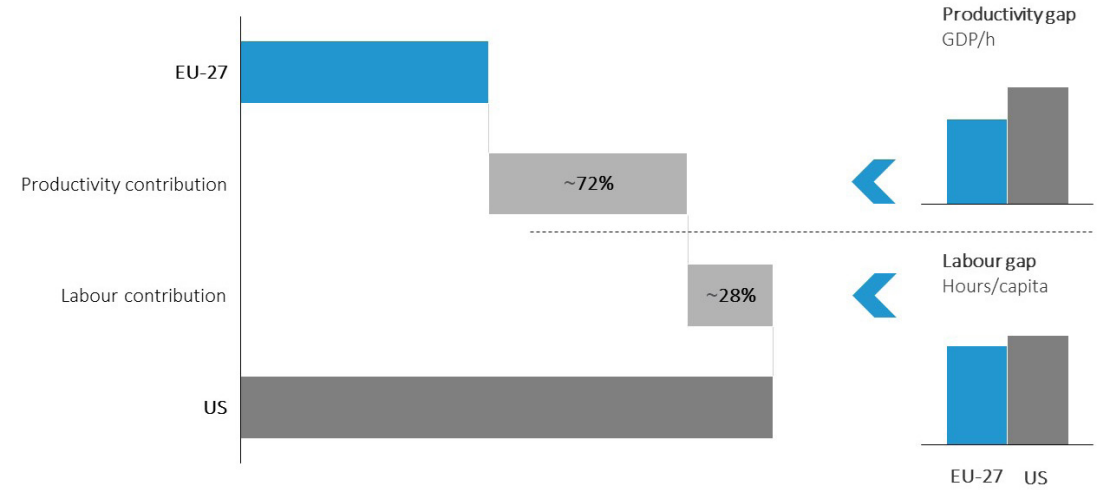
2015 reference levels, in EUR trillion



Source: OECD, 2024.

02. The value of the gap in GDP in any given year is only indicative. It should not be viewed as an exact estimate as price deflators and purchasing power adjustments are imperfect. When comparing GDP developments across countries, the price deflator and exchange rate have an important effect on results. Depending on the objective of the comparison, one or the other indicator may be more relevant. GDP at current prices offers insights into market value, GDP at constant prices into volume growth, while purchasing power adjustment allows a comparison from the consumer perspective.

FIGURE 4
GDP per capita gap
GDP per capita, 2023, constant PPP prices (EUR)



Source: AMECO, 2024.

At the same time, three external conditions – in trade, energy and defence – that supported growth in Europe after the end of the Cold War have been fading. First, even as domestic growth slowed, the EU benefitted significantly from burgeoning world trade under multilateral rules. Between 2000 and 2019, international trade as a share of GDP rose from 30% to 43% in the EU, whereas in the US it rose from 25% to 26%. Trade openness ensured that Europe could import freely goods and services it lacked, ranging from raw materials to advanced technologies, while exporting manufactured goods in which it specialised, particularly to the growing markets of Asia. However, the multilateral trading order is now in deep crisis and the era of rapid world trade growth looks to have passed: the IMF projects world trade to grow at 3.2% over the medium term, a pace well below its annual average from 2000-19 of 4.9%[iv]. Second, as relations normalised with Russia, Europe was able to satisfy its demand for imported energy by procuring ample pipeline gas, which accounted for around 45% of the EU's natural gas imports in 2021. But this source of relatively cheap energy has now disappeared at huge cost to Europe. The EU has lost more than a year of GDP growth while having to re-direct massive fiscal resources to energy subsidies and building new infrastructure for importing liquefied natural gas. Third, the era of geopolitical stability under US hegemony allowed the EU largely to separate economic policy from security considerations, as well as to use the "peace dividend" from lower defence spending to support its domestic goals. The geopolitical environment is however now in flux owing to Russia's unwarranted aggression against Ukraine, deteriorating US-China relations and rising instability in Africa, which is a source of many commodities that are critical to the world economy.

Raising the EU's competitiveness is necessary to reignite productivity and sustain growth in this changing world. The core focus of a competitiveness agenda should be to raise productivity growth, which is the most important driver of long-term growth and leads to rising standards of living over time. Promoting competitiveness should not be seen in a narrow sense of a zero-sum game focused on conquering global market shares and raising trade surpluses. It should also not lead to policies of defending "national champions" that can stifle competition and innovation, or using wage repression to lower relative costs. Competitiveness today is less about relative labour costs and more about knowledge and skills embodied in the labour force. Beyond this broad objective, a focus on sectoral or industrial competitiveness can be particularly useful in situations where otherwise productive companies are disadvantaged by an unlevel global playing field, be it asymmetries in regulation or large subsidies abroad. In such scenarios, levelling the playing field may be necessary for continued productivity growth. Finally, a modern competitiveness agenda must also encompass security. Security is a precondition for sustainable growth, as rising geopolitical risks can increase uncertainty and dampen investment, while major geopolitical shocks or sudden stops in trade can be extremely disruptive.

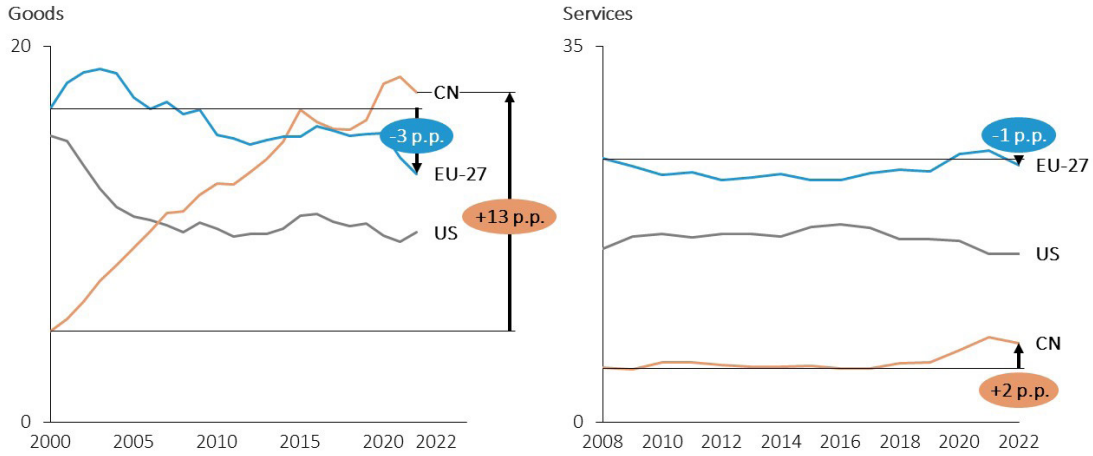
Three transformations ahead for Europe

Europe now faces three major transformations, the first of which is the need to accelerate innovation and find new growth engines. The EU's competitiveness is currently being squeezed from two sides. On the one side, EU companies are facing weaker foreign demand – especially from China – and rising competitive pressures from Chinese companies. The ECB finds that the share of sectors in which China is directly competing with the euro area exporters[03] is now close to 40%, up from 25% in 2002[v]. The EU's share in world trade is declining, with a notable fall since the onset of the pandemic[04] [see Figure 5]. On the other side, Europe's position in the advanced technologies that will drive future growth is declining. Only four of the world's top 50 tech companies are European and the EU's global position in tech is deteriorating: from 2013 to 2023, its share of global tech revenues dropped from 22% to 18%, while the US share rose from 30% to 38%. Europe urgently needs to accelerate its rate of innovation both to maintain its manufacturing leadership and to develop new breakthrough technologies. Faster innovation will, in turn, help raise the EU's productivity growth, leading to stronger growth in household incomes and stronger domestic demand. Europe still has an opportunity to change track. With the world now on the cusp of another digital revolution, triggered by the spread of artificial intelligence (AI), a window has opened for Europe to redress its failings in innovation and productivity and to restore its manufacturing potential.

FIGURE 5

Share in world trade in goods and services

% of global trade, excluding intra-EU trade



Note: The data refers to goods trade (lhs) and services trade (rhs), excluding intra-EU. The global total is the net of intra-EU trade.

Source: European Commission (JRC). Based on WTO.

Second, Europe must bring down high energy prices while continuing to decarbonise and shift to a circular economy. The energy landscape has changed irreversibly with the Russian invasion of Ukraine and the resulting loss of pipeline natural gas. While energy prices have fallen considerably from their peaks, EU companies still face electricity prices that are 2-3 times those in the US and natural gas prices paid are 4-5 times higher [see Figure 6]. Decarbonisation could be an opportunity for Europe, both to take the lead in new clean technologies and circularity solutions, and to shift power generation towards secure, low-cost clean energy sources in which the EU has generous natural endowments. However, whether Europe can seize this opportunity will depend on all policies being in sync with the EU's decarbonisation objectives. The energy transition will be gradual and fossil fuels will continue to play a central role in energy pricing for the remainder of this decade, threatening continued price volatility for end users. EU industries that use energy intensively face higher investment costs than their competitors to meet decarbonisation targets. At the same time, Chinese competition is becoming particularly acute in the key industries that will drive decarbonisation – such as clean tech and electric vehicles – driven by a powerful combination of

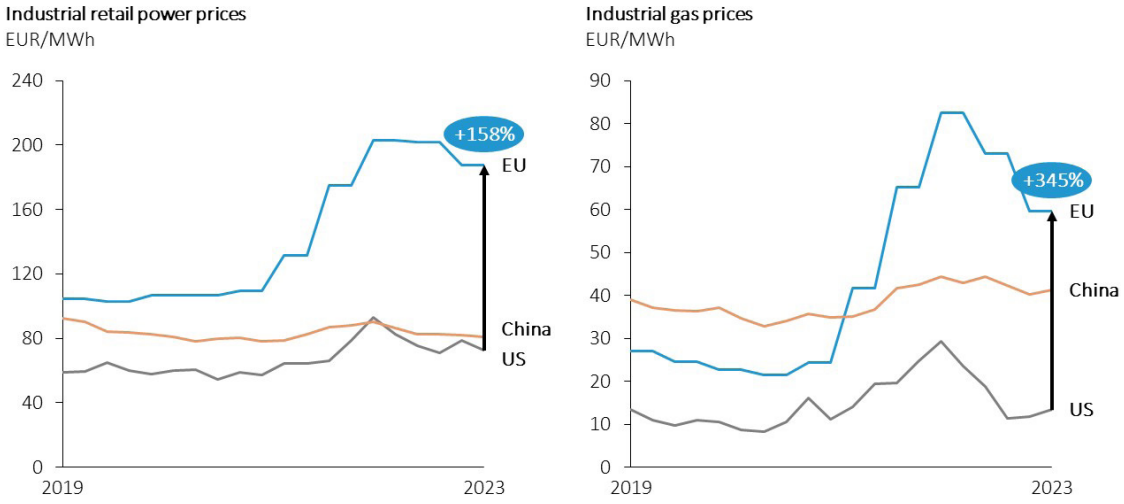
03. Based on analysis of revealed comparative advantage.

04. EU firms have also been experiencing competitiveness losses owing to increased input costs, exacerbated by elevated energy prices in Europe compared to other regions.

massive industrial policy, rapid innovation, control of raw materials and the ability to produce at continent-wide scale. For the EU to succeed, it will therefore need to engineer a coherent strategy for all aspects of decarbonisation, from energy to industry.

FIGURE 6

Gas and retail price gap for industry

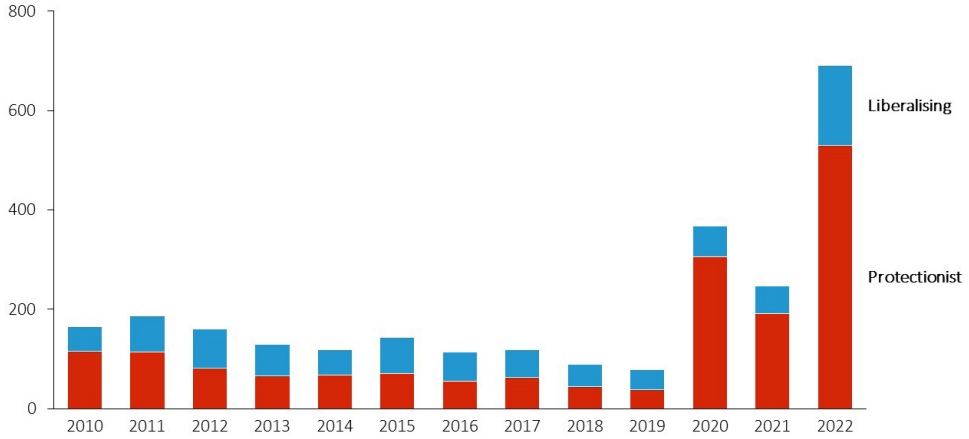


Source: European Commission, 2024. Based on Eurostat (EU), EIA (US) and CEIC (China), 2024.

Third, Europe must react to a world of less stable geopolitics, where dependencies are becoming vulnerabilities and it can no longer rely on others for its security. Decades of globalisation have produced a high level of "strategic interdependence" between major economies, raising the costs of any rapid disentanglement[vi]. For example, while the EU largely depends on China for critical minerals, China depends on the EU to absorb its industrial overcapacity. But this global equilibrium is shifting: all major economies are actively seeking to reduce their dependency and increase their scope for independent action. The US is investing in domestic capacity for semiconductor and clean tech production, while aiming to re-route critical supply chains through its allies. China is striving for technological autarchy and vertical supply chain integration, from mining of raw materials to processing and from manufacturing to shipping. While there is little evidence yet that these measures are leading to de-globalisation[vii], trade policy interventions are on the rise [see Figure 7]. Given its high trade openness, Europe is especially exposed should these trends accelerate. The EU must also respond to a radically changed security environment at its borders. Aggregate EU defence spending is currently one third of US levels and the European defence industry is suffering from decades of underinvestment and depleted stocks. To achieve genuine strategic independence and increase its global geopolitical influence, Europe needs a plan to manage these dependencies and strengthen defence investment.

FIGURE 7

Trade policy interventions



Note: Measures include tariffs, export-related measures, subsidies, contingent trade-protective measures, and trade-related investment measures.

Source: Global Trade Alert, 2024.

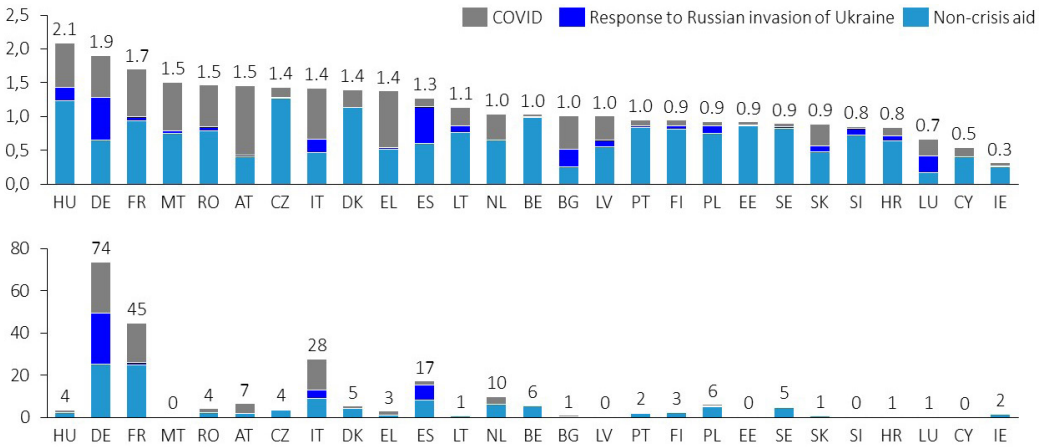
EU countries are already responding to this new environment with more assertive policies, but they are doing so in a fragmented way that undermines collective effectiveness. The use of industrial policy interventions is on the rise across advanced economies[viii]. But the effectiveness of these policies in Europe is hindered by three main coordination problems. First, there is a lack of coordination between Member States. Uncoordinated national policies often lead to considerable duplication, incompatible standards and failure to consider externalities. One particularly damaging externality in the EU context is its adverse impact on the Single Market when the largest countries with the most fiscal space can provide much more generous support than others [see Figure 8]. Second, there is a lack of coordination among financing instruments. While the EU collectively spends a large amount on its industrial goals, financing instruments are split along national lines and between Member States and the EU. This fragmentation hampers scale, preventing the creation of large capital pools in particular for investments in breakthrough innovation. It also hampers innovation by creating unnecessary complexity and bureaucracy for the private sector. Third, there is a lack of coordination across policies. Industrial policies today – as seen in the US and China – comprise multi-policy strategies, combining fiscal policies to incentivise domestic production, trade policies to penalise anti-competitive behaviour abroad and foreign economic policies to secure supply chains. In the EU context, linking policies in this way requires a high degree of coordination between national and EU policies. However, owing to its complex governance structure and slow and disaggregated policymaking process, the EU is less able to produce such a response.

FIGURE 8

Total State aid expenditure by Member State

2022, as % of GDP (top) and EUR billion (bottom)

Breakdown between COVID-19, State aid in response to the Russian invasion of Ukraine, and other State aid measures



Source: European Commission, 2024.

Towards a European response

GOALS

To manage these transformations, the report proposes a new industrial strategy for Europe. The three main areas for action outlined in the report correspond to the three main transformations with which Europe must contend. First, Europe needs to redress its slowing productivity growth by *closing the innovation gap*. This objective will entail accelerating significantly technological and scientific innovation, improving the pipeline from innovation to commercialisation, removing barriers that prevent innovative companies from growing and attracting finance, and undertaking concerted efforts to close skills gaps. Second, to lower energy prices and capture the industrial opportunities of decarbonisation, Europe needs *a joint plan for decarbonisation and competitiveness*. This plan will have to ensure that Europe's ambitious demand for decarbonisation can be matched by leadership on the technologies that will supply it. It will have to span industries that produce energy, those that enable decarbonisation, such as clean tech and automotives, and industries that use energy intensively and are "hard-to-abate". Third, Europe needs to *increase security and reduce dependencies*. Given its high trade openness and dependence on imports ranging from raw materials to advanced technology, the EU will need to develop a genuine "foreign economic policy" that coordinates preferential trade agreements and direct investment with resource-rich nations, the building up of stockpiles in selected critical areas, and the creation of industrial partnerships to secure the supply chain of key technologies. Europe will also need to develop a strong and independent defence industrial capacity that allows it to meet increasing demand for military assets and equipment and remain at the forefront of defence technology.

BUILDING BLOCKS

The EU's new industrial strategy rests on a series of building blocks, the first of which is full implementation of the Single Market. The Single Market is critical for all aspects of the strategy: for enabling scale for young, innovative companies and large industrials that compete on global markets; for creating a deep and diversified common energy market, an integrated multimodal transport market and strong demand for decarbonisation solutions; for negotiating preferential trade deals and building more resilient supply chains; for mobilising greater volumes of private finance; and as a result, for unlocking higher domestic demand and investment. Remaining trade frictions in the EU mean that Europe is leaving around 10% of potential GDP on the table, according to one estimate[ix]. Proposals to complete the Single Market for different sectors appear in many chapters of this report. However, as the Letta report has systematically analysed the key challenges facing the Single Market and provided recommendations, there is no chapter dedicated solely to the Single Market in this report[x].

The next building blocks are industrial, competition and trade policies, which interact closely and must be aligned as part of an overall strategy. Evidence that industrial policies can be effective under certain circumstances is growing[xi]. But to avoid the pitfalls of the past – such as defending incumbent companies or picking winners – these policies must be organised according to a set of key principles which embed best practice. Among others, the focus of such policies should be on sectors rather than companies; public support should be continuously evaluated, underpinned by a rigorous monitoring exercise; and market failures should be clearly specified and public authorities should avoid duplicating what the private sector would already do[xii]. The interaction with competition authorities is also critical for success[xiii]. For priority sectors, the EU should aim as far as possible to be competitively neutral and regulation should be designed to facilitate market entry. The evidence is overwhelming that competition stimulates productivity, investment and innovation[xiv]. At the same time, competition policy should continue to adapt to changes in the economy so that it does not become a barrier to Europe's goals [see the chapter on competition policy]. For example, since innovation in the tech sector is rapid and requires large budgets, merger evaluations should assess how the proposed concentration will affect future innovation potential in critical innovation areas. Important Projects of Common Interest (IPCEIs) should be expanded to all forms of innovation that could effectively push Europe to the frontier in strategically important sectors and benefit from EU financing. There are also sectors, such as defence, where security and resilience criteria should receive increasing weight considering geopolitical changes for trade policy. A pragmatic, cautious and consistent approach should be applied according to the needs of different sectors [see Box 1].

The third block is financing the main areas for action, which entail massive investment needs unseen for half a century in Europe. To digitalise and decarbonise the economy and increase the EU's defence capacity, the total investment-to-GDP rate will have to rise by around 5 percentage points of EU GDP per year to levels last seen in the 1960s and 70s. For comparison, the additional investments provided by the Marshall Plan in 1948-51 amounted annually to around 1-2% of GDP in receiving countries. This report contains simulations from the European Commission and the IMF which assess whether such a massive increase in investment is macroeconomically sustainable, and if so, how Europe can unlock investments of this size. The results suggest that the investment push can be carried out without the economy running into supply constraints, and that mobilising private financing will be critical in this respect. However, the private sector is unlikely to be able to finance the lion's share of this investment[05] without public sector support. Increasing productivity will be key to ease constraints on fiscal space for governments and enable this support. For example, a 2% increase in the level of total factor productivity within ten years could already be sufficient to cover up to one third of the required fiscal spending. There are two key implications for the EU. First, integrating Europe's capital markets to better channel high household savings towards productive investments in the EU will be essential. Second, the more willing the EU is to reform itself to generate an increase in productivity, the easier it will be for the public sector to support the investment drive. This connection underscores why raising productivity is fundamental. It also has implications for the issuance of common safe assets. To maximise productivity, some joint funding for investment in key European public goods, such as breakthrough innovation, will be necessary. At the same time, there are other public goods identified in this report – such as defence spending or cross-border grids – that will be undersupplied without common action. If the political and institutional conditions are met, these projects would also call for common funding.

The final building block is the will to reform the EU's governance, increasing the depth of coordination and reducing the regulatory burden. The "Community Method" has been a source of the EU's success, but it was established in a different era, when the Union was smaller and faced a different set of challenges. For much of the EU's history, the most important focus has been generating internal integration and cohesion, which Member States could afford to address at their own pace. However, the EU is now much larger, creating more veto players, and the challenges it faces are now often imposed on it from outside. To move forward, Europe must act as a Union in a way it never has before, based around a renewed European partnership among Member States. It will require refocusing the work of the EU on the most pressing issues, ensuring efficient policy coordination behind common goals, and using existing governance procedures in a new way that allow Member States who want to move faster to do so. In many areas, the EU can achieve a great deal by taking a large number of smaller steps, but doing so in a coherent way that aligns all policies behind the common goal. There are other areas, however, where a small number of larger steps are needed – delegating to the EU level tasks that can only be performed there. The case for delegation applies most of all to the type of European public goods described above. Such goods may not have direct spillovers on all countries which are called to contribute, but they have large indirect spillovers for the whole EU. There are still other areas where the EU should do less, applying the subsidiarity principle more rigorously and showing more "self-restraint". It will also be crucial to reduce the regulatory burden on companies. Regulation is seen by more than 60% of EU companies as an obstacle to investment, with 55% of SMEs flagging regulatory obstacles and the administrative burden as their greatest challenge[xv]. Kick-starting this partnership does not necessarily mean focusing all minds and energies on the long and burdensome process of a Treaty change from day one. To begin with, a small number of overarching, targeted institutional changes should be made – without the need for Treaty change.

05. The historical private-public split for investment in the EU is around 4/5 to 1/5.

Preserving social inclusion

While the EU should aim to move closer to the US example in terms of productivity growth and innovation, it should do so without the drawbacks of the US social model. As outlined above, the US has pulled ahead of the EU owing to its stronger position in breakthrough technologies, yet it displays higher rates of inequality. A European approach must ensure that productivity growth and social inclusion go hand-in-hand. Europe is entering an unprecedented period in its history, where rapid technological change and sectoral transitions will combine with a shrinking working age population. In this setting, Europe will have to ensure the best use of its available skills while keeping the social fabric intact. Technological change can imply significant disruption for workers in previously dominant industries that are no longer so, as well as increasing inequality: from 1980 to 2016, automation is found to have accounted for 50-70% of the increase in wage inequality in the US between more and less educated workers[xvi]. The European welfare state will therefore be critical to provide strong public services, social protection, housing, transport and childcare during this transition. At the same time, Europe will need a fundamentally new approach to skills. The EU must ensure that all workers have a right to education and retraining, allowing them to move into new roles as their companies adopt technology, or into good jobs in new sectors.

The EU will also have to ensure that its cohesion policy remains consistent with a push towards increasing innovation and completing the Single Market. Accelerating innovation and integrating the Single Market may have different effects on intra-EU convergence than in the past. Traditionally, increasing intra-EU trade in goods has acted as a "convergence engine", spreading prosperity to poorer regions as supply chains relocate where production factors are cheaper[xvii]. However, much of the future growth in intra-EU trade will be in services, which tend to cluster in large and rich cities. Innovation and its benefits also tend to agglomerate in a few metropolitan areas. In the US, for example, a small set of superstar cities has been thriving in recent years and pulling away from the rest of the country. In 1980, average earnings in the top three US cities were 8% higher than average earnings in the rest of the top 10 cities. By 2016, average earnings in the same top three cities were 25% higher[xviii]. While the EU has a longstanding tradition of programmes that foster convergence across regions, these programmes should be updated to reflect the changing dynamics of trade and innovation. The EU must ensure that more cities and regions can participate in the sectors that will drive future growth, building on existing initiatives such as Innovation Valleys Net, Zero Acceleration Valleys and Hydrogen Valleys. This will require new types of investments in cohesion and reforms at the subnational level in many Member States. Specifically, cohesion policies will need to be re-focused on areas such as education, transport, housing, digital connectivity and planning which can increase the attractiveness of a range of different cities and regions.

Europe should learn from the mistakes that were made in the phase of "hyper-globalisation" and prepare for a fast-changing future. Globalisation brought many benefits for the European economy as well as lifting hundreds of millions out of poverty around the world. But policymakers were arguably too insensitive to its perceived social consequences, especially its apparent effect on labour income. In G7 economies, total exports and imports of goods as a share of GDP increased by around 9 percentage points from the early 1980s to the great financial crisis, while the labour share of income dropped around 6 percentage points in that time – the steepest drop since data for these economies became available in 1950. While this relationship may have owed more to automation than it did to open trade[xix], the notion that globalisation had exacerbated inequality infiltrated public perceptions, while governments were seen as indifferent. Policymakers should learn from this experience to reflect on how society will change in the future, and how they can ensure that the state is seen as on the side of citizens and attentive to their concerns. A key part of this process will be empowering people. Leaders and policymakers should engage with all actors within their respective societies to define objectives and actions for the transformation of Europe's economy. More effective and proactive citizens' involvement and social dialogue, combining trade unions, employers and civil society actors, will be central in building the consensus needed to drive the changes. Transformation can best lead to prosperity for all when accompanied by a strong social contract.

BOX 1

Key principles for trade policy in a European industrial strategy

The era of open global trade governed by multilateral institutions looks to be passing, and the EU's trade policy is already adapting to this new reality. The global trading order based on multilateral institutions is in deep crisis, and it remains uncertain whether it can be brought back on track. While the EU should continue efforts to reform the WTO – and especially to unlock the dispute settlement mechanism – the EU must adapt its trade policy to a new reality. This process is already underway. In June 2023, the EU adopted a new Economic Security Strategy furnishing itself with a range of instruments to deal with dumping, respond to coercion and address distortions caused by foreign subsidies within the EU, as well as adopting tools to address technology leakage and enforce sanctions. The EU has also continued to expand its bilateral trade network negotiating over 40 individual trade agreements with different countries and regions.

Trade policy needs to be fully aligned with the European industrial strategy. Trade policy should be based on careful, case-by-case analysis rather than on generic stances toward trade. In some cases, the EU should use its trade policy arsenal to keep barriers low, in others to level the playing field and in others still to secure critical supply chains. Accelerating innovation and technological progress in Europe will require a high degree of trade openness towards countries that provide key technologies in which the EU is currently deficient. For example, maintaining low trade barriers in digital goods, services and infrastructures with the US will be key to guarantee access to the latest AI models and processors. By contrast, a joint plan for decarbonisation and competitiveness could entail, in specific circumstances, defensive trade measures to level the playing field globally and offset state-sponsored competition abroad, in line with the new EU Economic Security Strategy. When it comes to increasing security and reducing dependencies, the EU must ensure access to critical resources and protect key value chains. This may require securing preferential trade agreements with key partners and guaranteeing critical supplies, including through offtake agreements and direct investment in production facilities abroad.

To avoid the pitfalls of protectionism, trade policy should be governed by a clear set of principles. First, the use of trade measures should be pragmatic and aligned with the overarching goal of raising the EU's productivity growth. Unless there is an overriding geopolitical imperative, defensive measures should therefore not be applied systematically. Measures should aim to distinguish genuine innovation and productivity improvements abroad, which are beneficial for Europe, from state-sponsored competition and demand suppression, which lead to lower employment for Europeans. Second, the EU's trade policy should be consistent. Tariffs should avoid creating perverse incentives that undermine European industry, and therefore need to be assessed consistently across all stages of production. For example, imposing tariffs on imports of raw materials or intermediate goods, but not on final goods that use those materials intensively, could lead to de-localisation. Finally, trade measures must be balanced against consumer interests. Even in cases when the EU is the victim of foreign subsidies, there may be some industries where domestic producers have fallen so far behind, that making imports more expensive would only impose excessive deadweight costs on the economy. In these circumstances, it would be preferable for the EU to fund higher investments in more advanced technologies while allowing foreign taxpayers to contribute to higher consumption by European consumers.

There should be enhanced coordination in the EU's foreign direct investment (FDI) decisions. The US administration has recently imposed wide-ranging tariffs on Chinese imports, coupled with progressive measures tightening inward FDI rules, to protect strategic sectors. As a result, the economies of the US and China have started to decouple[06]. So far, the EU has pursued a different strategy, with Member States encouraging inward FDI from Chinese companies. Chinese greenfield investment in the EU has increased substantially in recent years, particularly in Central and Eastern Europe. This strategy can leverage technological progress abroad and promote technological development in Europe, as well as the creation of high-quality jobs, but only if executed in a coordinated manner. Asymmetries arising from small Member States negotiating

06. Data from the Bureau of Economic Analysis indicate that exports from China to the US have declined since 2018, and inward net FDI from China has decreased from a peak inflow of USD 18 billion in 2016 to an outflow of around USD 2 billion in 2023.

with large foreign investors could lead to unwelcome concessions being extracted by foreign countries, which is particularly concerning when a potential security threat and a geopolitical rival of the EU are involved. To counter these risks, the EU should strengthen its Investment Screening Mechanism. At present, FDI screening is a national competence, with Member States only required to exchange notifications and information. This fragmentation prevents the EU from leveraging its collective power in FDI negotiations and complicates the formulation of a common FDI policy. As outlined in chapter 3, coordination is important for the emergence of joint ventures in strategic sectors and ensuring that EU companies retain relevant know-how and can drive the next wave of innovation.

ENDNOTES

i World Justice Project, Rule of Law Index 2023, 2023.

ii World Bank, World Development Indicators 2023, 2024.

iii Eurostat, Educational attainment statistics 2023, 2024.

iv IMF, World Economic Outlook, April 2024.

v ECB, 'Why competition with China is getting tougher than ever', The ECB Blog, 3 September 2024.

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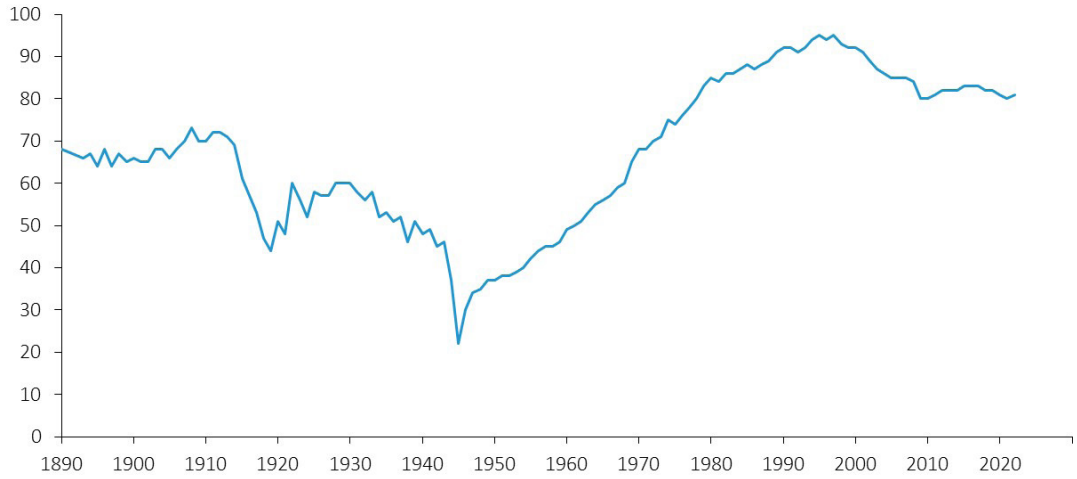
2. Closing the innovation gap

Europe's productivity challenge

Europe needs faster productivity growth to maintain sustainable growth rates in the face of adverse demographics. After the second world war, the EU experienced strong catch-up growth driven by both rising productivity and a growing population. However, both drivers of growth are now slowing. EU labour productivity[01] converged from 22% of the US level in 1945 to 95% in 1995 but labour productivity growth has subsequently slowed by more than in the US and fallen back below 80% of the US level [see Figure 1][i]. At the same time, Europe is entering the first period in modern history in which GDP growth will not be supported by sustained net growth of the labour force [see Box 1]. By 2040, the EU's workforce is projected to shrink by close to 2 million workers each year, while the ratio of working to retired people is expected to fall from around 3:1 to 2:1. On this trajectory, growth in Europe will stall. If the EU were to maintain its average labour productivity growth rate since 2015 of 0.7%, it would only be enough to keep GDP constant until 2050. In an environment of historically high public debt-to-GDP ratios, potentially higher real interest rates than seen in the last decade and rising spending needs for the decarbonisation, digitalisation and defence, stagnant GDP growth could eventually lead to public debt levels becoming unsustainable and Europe being forced to give up one or more of these goals.

FIGURE 1
EU versus US labour productivity 1890-2022
Index (US=100)



Note: The EU is proxied by backdating national accounting data from Germany, France, Italy, Spain, the Netherlands, Belgium, Ireland, Austria, Portugal, Finland and Greece. To build the labour productivity data, five different series were used: GDP, capital stock, employment, average hours worked, and population. Capital stock is built using two series of investment – construction and equipment. Investment and GDP are taken in volume and in national currency of 2010, they are then turned into $2010 using a ppp conversion rate.

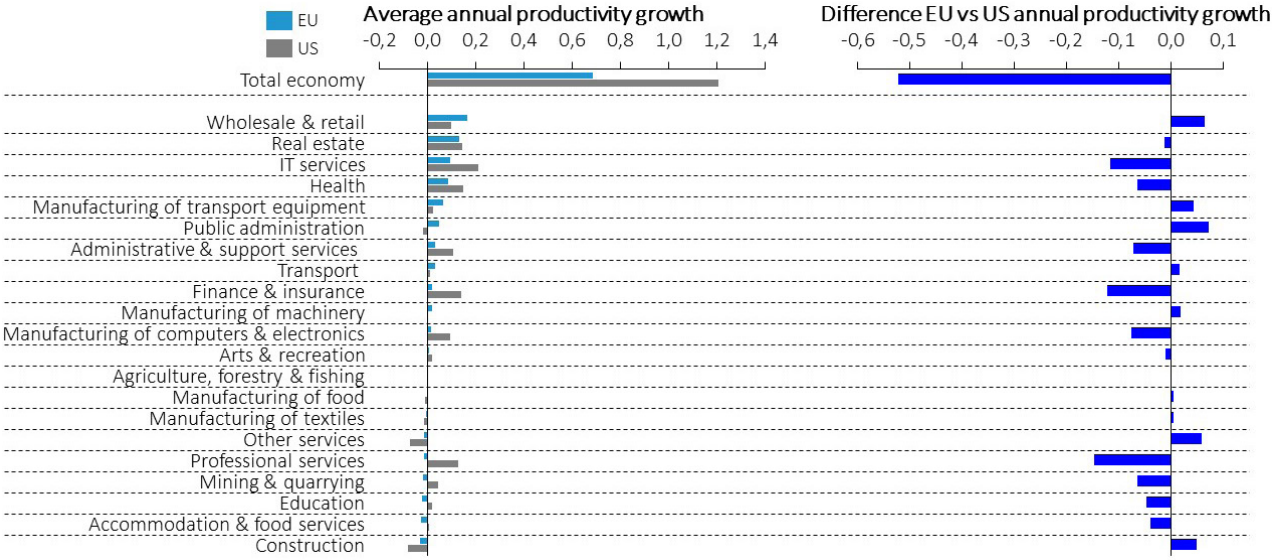
Source: Bergeaud, A., Cette, G., & Lecat, R., Productivity Trends in Advanced Countries between 1890 and 2012, Review of Income and Wealth, Vol. 62, No. 3, 2016, pp. 420-444

01. Measured in 2010 constant PPP prices.

The key driver of the rising productivity gap between the EU and the US has been digital technology ("tech") – and Europe currently looks set to fall further behind. The main reason EU productivity diverged from the US in the mid-1990s was Europe's failure to capitalise on the first digital revolution led by the internet – both in terms of generating new tech companies and diffusing digital tech into the economy. In fact, if we exclude the tech sector, EU productivity growth over the past twenty years would be broadly at par with the US [see Figure 2 and Box 2]. Europe is lagging in the breakthrough digital technologies that will drive growth in the future. Around 70% of foundational AI models have been developed in the US since 2017 and just three US "hyperscalers" account for over 65% of the global as well as of the European cloud market. The largest European cloud operator accounts for just 2% of the EU market. Quantum computing is poised to be the next major innovation, but five of the top ten tech companies globally in terms of quantum investment are based in the US and four in China. None are based in the EU.

FIGURE 2

Decomposition of average annual labour productivity growth
Selected sectors, US and EU (pp, 2000-2019)



Note: EU is the GDP-weighted average of AT, BE, DE, DK, ES, FI, FR, IT, NL, SE. The values are the average annual labour productivity (GVA per hour worked) growth contributions over the period 2000-2019.

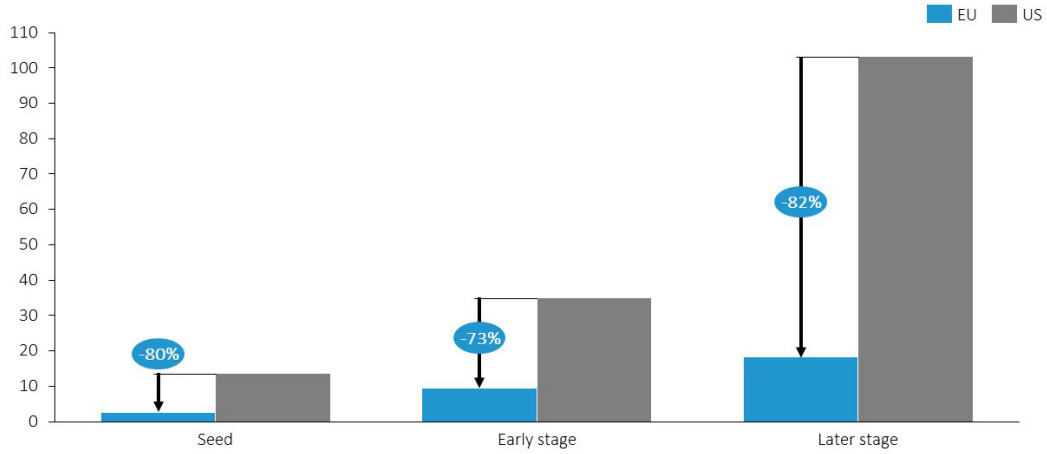
Source: Nikolov, P., Simons, W., Turrini, A. Voigt, P., forthcoming.

While some digital sectors are likely already "lost", Europe still has an opportunity to capitalise on future waves of digital innovation. The EU's competitive disadvantage will likely widen in cloud computing, as the market is characterised by continuous massive investments, economies of scale and multiple services offered by a single provider. However, there are multiple reasons why Europe should not give up on developing its domestic tech sector. First, it is important that EU companies maintain a foothold in areas where technological sovereignty is required, such as security and encryption ("sovereign cloud" solutions). Second, a weak tech sector will hinder innovation performance in a wide range of adjacent fields, such as pharma, energy, materials and defence. Third, AI – and particularly generative AI – is an evolving technology in which EU companies still have an opportunity to carve out a leading position in selected segments. Europe holds a strong position in autonomous robotics, hosting around 22% of worldwide activity, and in AI services, hosting around 17% of activity[02]. But innovative digital companies are generally failing to scale up in Europe and attract finance, reflected in a huge gap in later-stage financing between the EU and the US [see Figure 3]. In fact, there is no EU company with a market capitalisation over EUR 100 billion that has been set up from scratch in the last fifty years, while in the US all six companies with a valuation above EUR 1 trillion have been created over this period[03].

02. JRC, Examples of AI services, Policy Brief, 2024. Examples of AI services include the use of any AI technology, such as machine learning, computer vision, natural language processing, to perform high level applications such as business intelligence, predictive analytics, forecasting, optimisation, failure detection, applied to different business functions.

03. "From scratch" refers to starting a company from its inception as a new entity, rather than through mergers, acquisitions or spinoffs from established firms.

FIGURE 3
Venture capital investment by development stage
USD billion, 2023



Source: Pitchbook data. Accessed 20 November, 2023.

Integrating AI 'vertically' into European industry will be a critical factor in unlocking higher productivity [see the Boxes on AI use cases in the thematic chapters]. Quantitative estimates of the effects of AI on aggregate productivity are still uncertain[ii]. However, there are already clear signs that AI will revolutionise several industries in which Europe specialises and will be crucial for EU companies ' ability to remain leaders in their sector. For example, AI will radically change the pharma sector via so-called "combination products" – therapeutic and diagnostic products combining drugs, devices and biological components – which integrate medicine delivery systems with AI algorithms and process feedback data in real time. Gains of USD 60-110 billion per year are estimated from the use cases of AI in the pharma and medical device industries. AI will likewise transform the automotive sector, as AI-powered (generative) algorithms enhance vehicle design by optimising structures and components, improve performance and reduce material use, and optimise supply chains by predicting demand and streamlining logistics operations. AI is expected to reduce inventories in the automotive sector, accelerate the time to market from R&I and increase labour productivity. AI uptake in freight and passenger transport will enable increasingly automated functions to deliver safety and quality, navigation and route optimisation, predictive maintenance and fuel or power reduction. The energy sector is already heavily deploying AI, with more than 50 use cases today ranging from grid maintenance to load forecasting. Large gains are however still available: estimates of the market value for future AI applications in the sector reach USD 13 billion.

Although technology is crucial to protect Europe's social model, AI could also undermine it without a strong focus on skills. AI is already a source of anxiety for European workers: almost 70% of respondents in a recent survey favoured government restrictions on AI to protect jobs[iii]. The impact of AI in Europe has so far been labour-enhancing rather than labour-replacing: there is a positive association between AI exposure and the sector-occupation employment share[iv]. However, this association may be transitory as businesses are still in the early stage of understanding how to deploy these technologies. Research from the US finds that around 80% of the workforce could have at least 10% of their work tasks affected by the introduction of the large language modules, while almost 20% of workers could see at least 50% of their tasks affected[v]. Unlike previous waves of computerisation, the jobs of higher-skilled workers are likely to be more exposed. Providing workers with adequate skills and training to make use of AI can nevertheless help to make the benefits of AI more inclusive. In one recent study, access to AI assistance was found to increase productivity for all workers, but less experienced or low-skilled staff benefitted the most[vi]. While Europe should strive to match the US in innovative potential, it should aim to exceed it in providing opportunities for education and lifelong learning – ensuring that the benefits of AI are widely shared and any negative impacts on social inclusion are minimised.

BOX 1

Demographic developments and the labour force

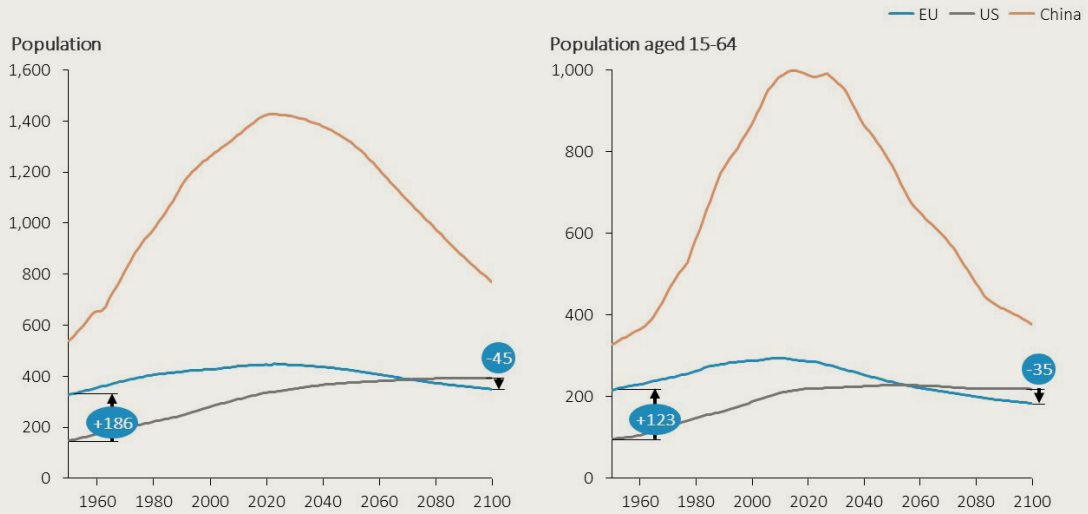
Historically, labour force growth was a significant driver of GDP growth across all major economies as the working age population increased steadily. In the EU, however, growth of the working age population has slowed since the 1990s and has started declining on aggregate over the past decade, mainly owing to declining birth rates. Positive net inward migration does not compensate for the EU's population decline.

Long-term population projections suggest a further continued decline of the EU's population. This decline stands in contrast to the US, whose population is expected to continue to grow during the next decades, albeit at a slowing pace.

FIGURE 4

Long-term population developments and projects

Population, million



Note: The population projections are based on the probabilistic projections of total fertility and life expectancy at birth. These projections were made using a Bayesian Hierarchical Model. The figures display the median projections. The projections reflect a contribution of historical migration patterns. Paper on methodology.

Source: United Nations World Population Prospects, 2022.

Projected overall population dynamics are also reflected in the growth of the European working age population, which started to decline around 2010. The projected decline in the Chinese working age population exceeds that of the EU. It is expected to drop from about 1 billion people aged 15-64 years to around 600 million in the next 40 years.

BOX 2

A closer look at the role of the ICT sector in the EU-US labour productivity gap

The EU's aggregate gap in labour productivity growth compared with the US reflects differences in industry composition, sectoral innovation and technology diffusion. The EU economy has traditionally been strong in all mid-technology sectors that are not at the centre of radical technological advances. The EU has less activity in sectors in which much of the productivity growth has originated in recent years, notably the ICT sector and the exploitation of large-scale digital services. Due to slow technology diffusion within industries, the EU's productivity growth gap compared to the US was particularly pronounced in these industries with very high productivity growth.

Excluding the main ICT sectors (the manufacturing of computers and electronics and information and communication activities) from the analysis, EU productivity has been broadly at par with the US in the period 2000-2019. The remaining disadvantage in productivity growth versus the US is significantly reduced to 0.2 percentage points (0.8% productivity growth for the US versus 0.6% for the EU). The actual EU-US gap can be considered close to zero as EU 27 productivity growth is 0.2 to 0.3percentage points higher than the EU10 selection (for which EU KLEMS data is available). For 2013-2019 the role of ICT is even more striking, as the EU productivity growth excluding the main ICT sectors exceeded that of the US by some margin.

This analysis may underestimate the total impact of ICT developments on the productivity gap. In addition to ICT sectors, the US also has high productivity growth in professional services and finance and insurance, reflecting strong ICT technology diffusion effects. These sectors are amongst the biggest contributors to intangible investment in the total economy in the US. Also, some part of fintech is in the sector Finance and Insurance. On the other hand, the EU outperforms the US in mid-technology sectors like manufacturing of transport equipment, agriculture and in the wholesale and retail sectors. The latter reflects catching up effects to key innovations that had been introduced in the US in the previous decade such as in e-commerce and online retail reaching larger customer bases, implementation of advanced inventory management systems, digital payment systems, data analytics and robotics, and automation.

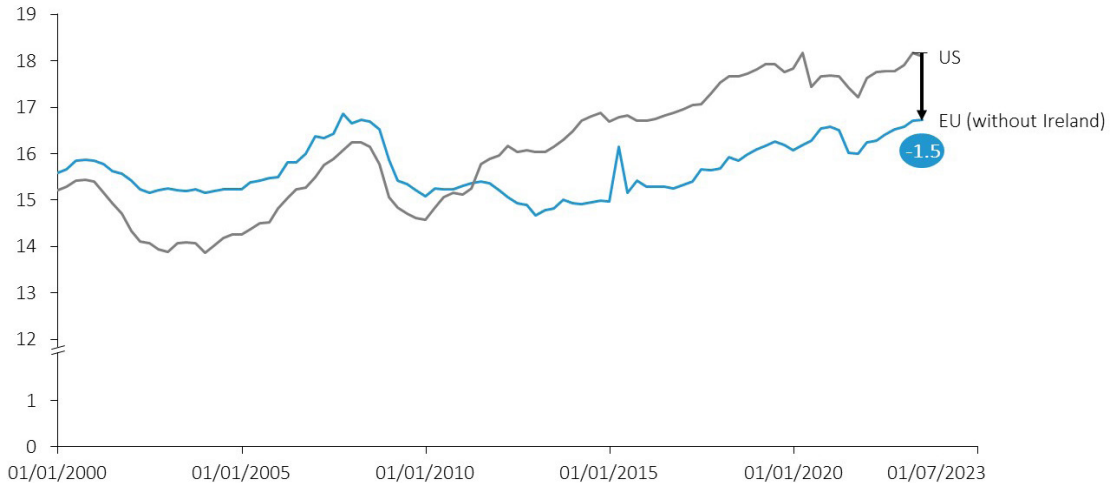
Key barriers to innovation in Europe

At the root of Europe's weak position in digital tech is a static industrial structure which produces a vicious circle of low investment and low innovation [see the chapter on innovation]. Over the past two decades, the top-three US companies for spending on Research and Innovation (R&I) have shifted from the automotive and pharma industries in the 2000s, to software and hardware companies in the 2010s, and then to the digital sector in the 2020s. In contrast, Europe's industrial structure has remained static, with automotive companies consistently dominating the top 3 R&I spenders. In other words, the US economy has nurtured new, innovative technologies and investment has followed, redirecting resources towards sectors with high potential for productivity growth; in Europe investment has remained concentrated on mature technologies and in sectors where productivity growth rates of frontier companies are slowing. In 2021, EU companies spent about half as much on R&I as share of GDP as US companies – around EUR 270 billion – a gap driven by much higher investment rates in the US tech sector. This innovation gap also translates into a gap in overall productive investment between the two economies, which is driven mainly by lower investment in tangible ICT assets and in software, databases and intellectual property [see Figure 5][vii]. The resulting cycle of low industrial dynamism, low innovation, low investment and low productivity growth in Europe has been termed "the middle technology trap"[viii].

FIGURE 5

Productive investment

Real gross fixed capital formation excluding residential investment, % of GDP



Source: EIB, 2024.

Europe's lack of industrial dynamism owes in large part to weaknesses along the "innovation lifecycle" that prevent new sectors and challengers from emerging. These weaknesses begin with obstacles in the pipeline from innovation to commercialisation. Public sector support for R&I is inefficient due to a lack of focus on disruptive innovation and fragmented financing, limiting the EU's potential to reach scale in high-risk breakthrough technologies. Once companies reach the growth stage, they encounter regulatory and jurisdictional hurdles that prevent them from scaling-up into mature, profitable companies in Europe. As a result, many innovative companies end up seeking out financing from US venture capitalists (VCs) and see expanding in the large US market as a more rewarding option than tackling fragmented EU markets. Finally, the EU is falling behind in providing state-of-the-art infrastructures necessary to enable the digitalisation of the economy.

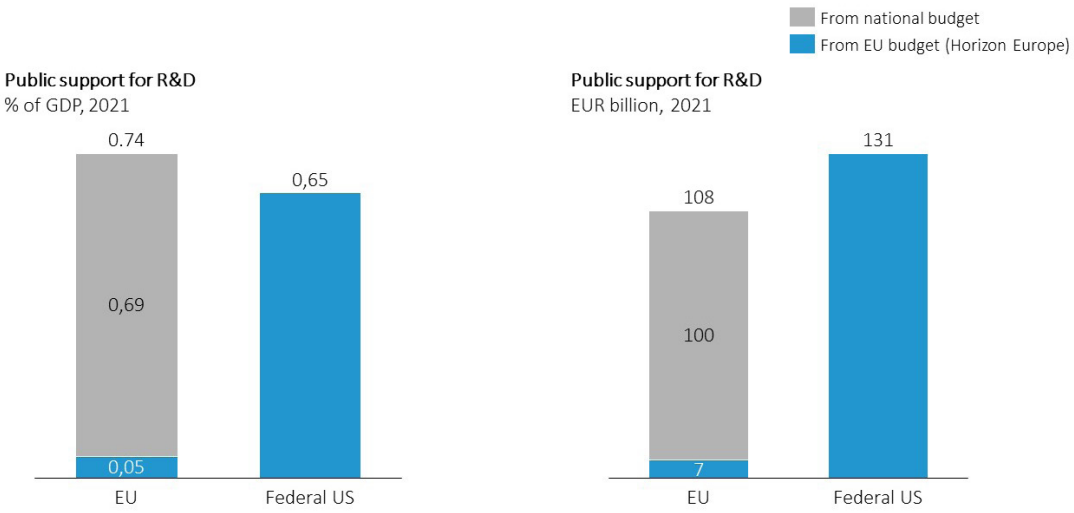
There are not enough academic institutions achieving top levels of excellence and the pipeline from innovation into commercialisation is weak [see the chapter on innovation]. Universities and other research institutions are central actors in early-stage innovation, generating breakthrough research and producing new skills profiles for the workforce. Europe has a strong position in fundamental research and patenting: in 2021, it accounted for 17% of global patent applications versus 21% for the US and 25% for China. However, while the EU boasts a strong university system on average, not enough universities and research institutions are at the top. Using volume of publications in top academic science journals as an indicative metric, the EU has only three research institutions ranked among

the top 50 globally, whereas the US has 21 and China 15. The innovation pipeline in the EU is also weaker at the next stage of commercialising fundamental research. Much of the knowledge generated by European researchers remains commercially unexploited. According to the European Patent Office, only about one-third of the patented inventions registered by European universities or research institutions are commercially exploited. A key reason for this failure is that researchers in Europe are less well integrated into innovation "clusters" – networks of universities, start-ups, large companies and venture capitalists (VCs) – which account for a large share of successful commercialisations in high-tech sectors. Such clusters have been critical to the more dynamic industrial structure seen in the US. Europe has no innovation "clusters" in the top 10 globally, while the US has 4 and China has 3.

Public spending on R&I in Europe lacks scale and is insufficiently focused on breakthrough innovation. In the US, the vast majority of public R&I spending is carried out at the federal level. In the EU, governments overall spend a similar amount to the US on R&I as a share of GDP, but only one tenth of spending takes place at the EU level, despite the large spillovers from public R&I investment to the private sector[ix] [see Figure 6]. The EU has an important programme for R&I – Horizon Europe – with a budget of close to EUR 100 billion. But it is spread across too many fields and access is excessively complex and bureaucratic. It is also insufficiently focused on disruptive innovation. The EU's key instrument to support radically new technologies at low readiness levels – the European Innovation Council's (EIC) Pathfinder instrument – has a budget of EUR 256 million for 2024, compared with USD 4.1 billion for US Defence Advanced Research Projects Agency (DARPA) and USD 2 billion for the other "ARPA" agencies. It is also mostly led by EU officials rather than top scientists and innovation experts. Lack of intra-EU coordination affects the wider innovation ecosystem as well. Most Member States cannot achieve the necessary scale to deliver world-leading research and technological infrastructures, in turn constraining R&I capacity. By contrast, the examples of CERN and the European High-Performance Computing Joint Undertaking (EuroHPC) showcase the importance of coordination when developing large R&I infrastructure projects.

FIGURE 6

State versus federal source of R&D funding in the EU and US



Source: European Commission, 2024. Based on Eurostat and OECD.

Fragmentation of the Single Market hinders innovative companies that reach the growth stage from scaling up in the EU, which in turn reduces demand for financing. The huge gap in scale-up financing in the EU relative to the US [see Figure 3] is often attributed to a smaller capital market in Europe and a less developed VC sector. The share of global VC funds raised in the EU is just 5%, compared to 52% in the US and 40% in China. However, the causality is likely more complex: lower levels of VC finance in Europe reflect lower levels of demand. As the Single Market is fragmented and incomplete in the areas that matter for innovative companies, scaling up in the EU offers weaker growth prospects and requires lower financing. Many EU companies with high growth-potential prefer to seek financing from US VCs and to scale up in the US market where they can more easily generate wide market reach and achieve profitability faster. Between 2008 and 2021, 147 "unicorns" were founded in Europe – startups that went on the be valued over USD 1 billion. 40 of these have relocated their headquarters abroad, with the vast majority moving

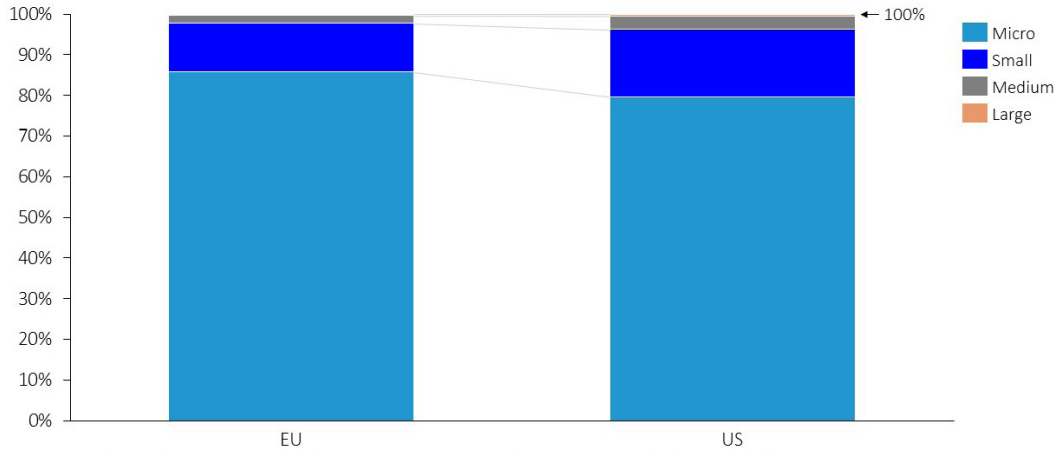
to the US[x]. The lack of growth potential in Europe is particularly relevant for tech-based innovative ventures, and even more so for deep tech ones. For example, 61% of total global funding for AI start-ups goes to US companies, 17% to those in China and just 6% to those in the EU. For quantum computing, EU companies attract only 5% of global private funding compared with a 50% share attracted by US companies.

Regulatory barriers to scaling up are particularly onerous in the tech sector, especially for young companies [see the chapters on innovation, and digitalisation and advanced technologies]. Regulatory barriers constrain growth in several ways. First, complex and costly procedures across fragmented national systems discourage inventors from filing Intellectual Property Rights (IPRs), hindering young companies from leveraging the Single Market. Second, the EU's regulatory stance towards tech companies hampers innovation: the EU now has around 100 tech-focused laws[xi] and over 270 regulators active in digital networks across all Member States. Many EU laws take a precautionary approach, dictating specific business practices ex ante to avert potential risks ex post. For example, the AI Act imposes additional regulatory requirements on general purpose AI models that exceed a pre-defined threshold of computational power – a threshold which some state-of-the-art models already exceed. Third, digital companies are deterred from doing business across the EU via subsidiaries, as they face heterogeneous requirements, a proliferation of regulatory agencies and "gold plating"[04] of EU legislation by national authorities. Fourth, limitations on data storing and processing create high compliance costs and hinder the creation of large, integrated data sets for training AI models. This fragmentation puts EU companies at a disadvantage relative to the US, which relies on the private sector to build vast data sets, and China, which can leverage its central institutions for data aggregation. This problem is compounded by EU competition enforcement possibly inhibiting intra-industry cooperation. Finally, multiple different national rules in public procurement generate high ongoing costs for cloud providers. The net effect of this burden of regulation is that only larger companies – which are often non-EU based – have the financial capacity and incentive to bear the costs of complying. Young innovative tech companies may choose not to operate in the EU at all.

The lack of a true Single Market also prevents enough companies in the wider economy from reaching sufficient size to accelerate adoption of advanced technologies. There are many barriers that lead to companies in Europe to "stay small" and neglect the opportunities of the Single Market. These include the high cost of adhering to heterogenous national regulations, the high cost of tax compliance, and the high cost of complying with regulations that apply once companies reach a particular size. As a result, the EU has proportionally fewer small and medium-sized companies than the US and proportionally more micro companies [see Figure 7]. However, there is a close link between the size of companies and technology adoption. Evidence from the US show that adoption rises with firm size for all advanced technologies[xii]. Likewise, while in 2023 30% of large businesses in the EU had adopted AI, only 7% of SMEs had done the same[xiii]. Size enables adoption because larger companies can spread the high fixed costs of AI investment over greater revenues, they can count on more skilled management to make the necessary organisational changes, and they can deploy AI more productively owing to larger data sets. In other words, a fragmented Single Market puts EU companies at a disadvantage in terms of the speed of adoption and diffusion of new AI applications.

04. Regulatory gold-plating refers to the practice where national governments or authorities go beyond the minimum requirements set by European Union legislation when implementing it into domestic law.

FIGURE 7
Size distribution of firms in EU and US
2021



Note: Does not include the self-employed. EU data refer to the following sectors: industry, construction and market services (except public administration and defence; compulsory social security; activities of membership organizations). For the EU, to discount the self-employed, data on businesses with 0 employees has been used as a proxy.US data refers to the private sector, which includes agriculture but represents around 1% of the total firms. Data for the US is based on the 1st quarter of the year.

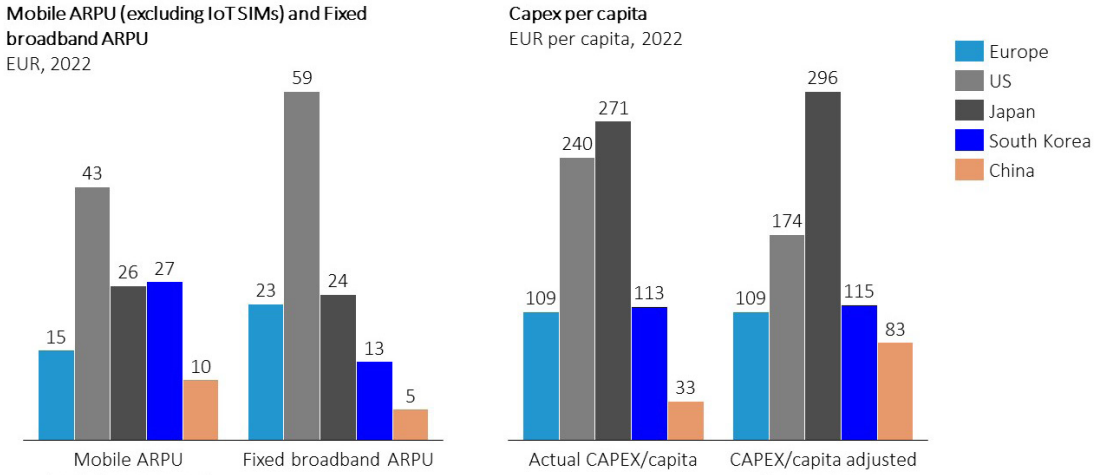
Source: ECB calculations based on Eurostat and Bureau of Labour Statistics data

Competition for computing power and lack of investment in connectivity could soon translate into digital bottlenecks [see the chapter on digitalisation and advanced technologies]. Training new foundation models and building vertically integrated AI applications requires massive increases in computing power, which is triggering an ongoing global "AI chip race" at huge expense. This is a race in which smaller and less well-funded EU companies may struggle to compete. Mainly due to the computational power required, the cost of training frontier AI models is estimated to have grown by a factor of 2 to 3 per year for the past eight years, suggesting that training next-generation AI systems could soon be as expensive as USD 1 billion and reach USD 10 billion by the end of the decade[xiv]. At the same time, deploying AI will require faster, lower latency and more secure connections. Yet, the EU is behind its 2030 Digital Decade targets for fibre and 5G deployment. The investment levels required to support EU networks are estimated at around EUR 200 billion to ensure full gigabit and 5G coverage across the EU. But Europe's per capita investment is markedly lower than other major economies [see Figure 9]. A key reason for lower rates of investment is Europe's fragmented market. For example, there are 34 mobile network operator groups in the EU and only a handful in the US or China, in part because the EU and Member States have tended to view mergers in the sector negatively. This fragmentation makes the fixed costs of investing in networks relatively more onerous for EU operators than for continent-scale companies in the US or China. Fragmentation also makes it harder to capitalise on new technologies. Europe currently has virtually no presence in edge computing[05], while opening network services to third-party developers and innovators using Application Protocol Interfaces (APIs) is hindered by lack of coordination of standards.

05. Edge computing refers to the distribution of computational tasks across smaller nodes closer to customers, reducing data transport to smaller distances. As the EU builds highly automated manufacturing plants requiring low latency and significant data volumes steered by AI, edge computing for industrial applications could better enable performance and reduce latency for industrial connected robotics, keeping data transfers more secure. While the Digital Decade sets the goal of deploying at least 10,000 climate-neutral, secure edge nodes by 2030, there are today only three commercially deployed edge computing nodes in the EU.

FIGURE 8

Average monthly revenue per unit and CAPEX per capita

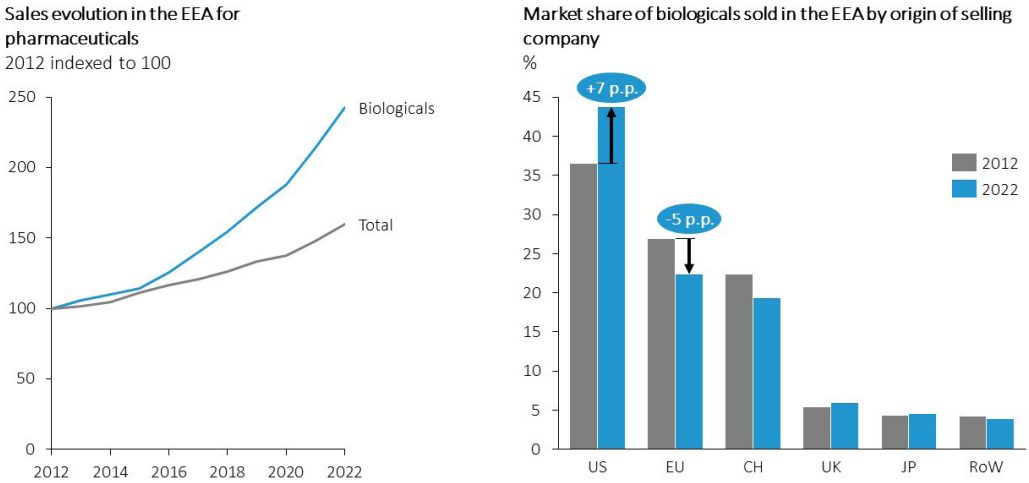


Source: ETNO, 2023

The EU's position in other innovative sectors like pharma is declining due to the same challenges of low investment in R&I and regulatory fragmentation [see the chapter on pharma]. While the EU's pharma sector still leads globally in trade measured by value, it is falling behind in the most dynamic market segments and losing market share to US-based companies. Of the top ten best-selling biological medicines in Europe in 2022, just two were marketed by EU companies while six were marketed by US-based companies [see Figure 9]. The EU is struggling in particular to establish its position in products with market exclusivity as orphan medicines[06] and advanced therapy medicinal products[07]. At the root of this emerging gap is lower spending on innovation. Total EU public sector R&I spending on pharma stands at less than half the level of the US, while total EU private R&I investment is about a quarter as large as the US. Innovation in the EU is also hindered by a slow and complex regulatory framework, which is currently under review. In 2022, the median approval time for new medicines by regulatory agencies in Europe was 430 days compared with 334 days in the US. Moreover, access to health data is one of the preconditions for the development of AI in the pharma industry but is constrained by fragmentation. In particular, although GDPR contains options to use patient data for health research, take up has been uneven across Member States, preventing the industry from tapping into a wealth of available electronic data.

FIGURE 9

Market share erosion in the key segment of biologics



Note: Based on IQVIA MIDAS® quarterly volume sales data for period 2012 – 2022 reflecting estimates of real-world activity. Copyright IQVIA. All rights reserved. Data for EEA markets (no data for CY, MT, IS and LI; retail data only for DK, EE, EL, LU, SI) and EC data (JRC R&D scoreboard) for regional allocation of companies.

Source: European Commission.

06. Orphan medicines are pharmaceutical products developed specifically to treat, prevent, or diagnose rare diseases or conditions. These medications are called "orphan" because, under normal market conditions, pharmaceutical companies have little financial incentive to develop and market products intended for only a small number of patients. Currently, 55% of orphan medicines are biologicals.

07. Advanced Therapy Medicinal Products (ATMPs) are innovative medicines for human use that are based on genes, tissues, or cells. Many ATMPs are orphan medicines.

A programme to tackle the innovation deficit

Europe must improve the conditions for breakthrough innovation by addressing the weaknesses in its common programmes for R&I [see the chapter on innovation]. The report recommends reforming the EU's next Framework Programme for R&I in terms of its focus, budget allocation, governance and financial capacity. First, the programme should be refocused on a smaller number on commonly agreed priorities. Second, an increased share of the budget allocation should be allocated towards financing disruptive innovation and, to make efficient use of this funding, the EIC should be reformed to become a genuine "ARPA-type agency", supporting high-risk projects with the potential of delivering breakthrough technological advances. Third, the governance of the programme should be managed by project managers and by people with proven track record at the frontier of innovation and – to maximise access for young, innovative companies – application processes should be faster and less bureaucratic. The organisation of the programme should be redesigned and streamlined to become more outcome-based and efficient. Finally, conditional on reforms, the budget of the new Framework Programme should be doubled to EUR 200 billion per 7 years.

In parallel, better coordination of public R&I across Member States is necessary. A Research and Innovation Union should be established and lead to a joint formulation of a common European R&I strategy and policy. To improve coordination, the EU could promote a "European Research and Innovation Action Plan", designed by Member States, together with the Commission, the research community, and stakeholders from the private sector.

It is also essential to establish and consolidate European academic institutions at the forefront of global research. The European Research Council (ERC) has been crucial to the competitiveness of European science but many promising proposals remain unfunded owing to a lack of financial resources. The report recommends doubling the support for fundamental research through the ERC, significantly increasing the number of grant recipients without diluting the amount they receive. In parallel, the EU should introduce an excellence-based, highly competitive "ERC for Institutions" programme to provide the required resources for academic institutions. A new regime for world-class researchers ("EU Chair" position) is also proposed, to attract and retain the best academic scholars by hiring them as European officials. This regime should be supported by a new EU framework for private funding to enable public universities and research centres to design more competitive compensation policies for top talents and to provide additional support for research. Beyond academic institutions, increased funding and stronger coordination is required to develop world-leading research and technological infrastructures, when scale is needed.

Europe needs to make it easier for "inventors to become investors" and facilitate scaling up of successful ventures. The EU should become as attractive for inventors as other leading regions for innovation. The report recommends a number of measures to support the transition from invention to commercialisation in Europe. First, to overcome bureaucratic barriers in universities and research institutions to managing intellectual property rights with their researchers, a new blueprint for fair and transparent royalty sharing is recommended. Second, to lower application costs for young companies and to offer uniform protection of intellectual property, it is proposed to adopt the Unitary Patent in all EU Member States. Third, the EU should carry out a thorough impact assessment of the effect of digital and other regulation on small companies, with the aim of excluding SMEs from regulations that only large companies are able to comply with. Finally, the EU should support rapid growth within the European market by giving innovative start-ups the opportunity to adopt a new EU-wide legal statute (the "Innovative European Company"). This status would provide companies with a single digital identity valid throughout the EU and recognised by all Member States. These companies would have access to harmonised legislation concerning corporate law and insolvency, as well as a few key aspects of labour law and taxation, to be made progressively more ambitious, and they would be entitled to establish subsidiaries across the EU without incorporating separately in each Member State.

A better financing environment for disruptive innovation, start-ups and scale-ups is needed as barriers to growth within the European markets are removed [see the chapters on innovation, and investment]. While high-growth companies can typically obtain finance from international investors, there are good reasons to further develop the financing ecosystem within Europe. Very early-stage innovation would benefit from a deeper pool of angel investors. Ensuring sufficient local capital to fund scale-ups would concentrate the spillovers of innovation within Europe. Increasing the appeal of European stock markets for IPOs would improve funding options for founders, encouraging more start-up activity in the EU. To generate a significant increase in equity and debt funding available to start-ups and scale-up, the report proposes the following measures. First, expanding incentives for business

"angels" and seed capital investors. Second, assessing whether further changes to capital requirements under Solvency II are warranted, which establishes capital adequacy rules for insurance companies, and issuing guidelines for EU Pension Plans, with the aim of stimulating institutional investment in innovative companies in selected sub-sectors. Third, increasing the budget of the European Investment Fund (EIF), which is part of the EIB Group and provides finance to SMEs, improving coordination between the EIF and the EIC, and eventually rationalising the VC funding environment in Europe. Finally, enlarging the mandate of the EIB Group to enable co-investment in ventures requiring larger volumes of capital, while also enabling it to take on more risk to help "crowd in" private investors.

The EU has a unique opportunity to lower the cost of AI deployment by increasing computational capacity and making available its network of high-performance computers [see the chapter on digitalisation and advanced technologies]. Since the launch of the Euro-HPC Joint Undertaking in 2018, the EU has created a large public infrastructure for computing capacity located across six Member States, which is one-of-a-kind globally. Three of its supercomputers are in the top ten worldwide and the launch of two exascale computers is planned. While so far this capacity has been mostly used for scientific research, the Commission is progressively opening it to AI start-ups, SMEs and the broader AI community. The report recommends building on this initiative by significantly increasing the computing capacity dedicated to the training and algorithmic development of AI models in HPC centres. At the same time, the EU should finance the expansion of Euro-HPC to additional cloud and storage capabilities to support AI training in multiple locations. A "federated AI model" should be developed based on cooperation between public and private infrastructures to provide AI training power and cloud services to increase the EU's competitive scale. To help finance the additional resources invested in the network, it is recommended to create an EU-wide framework allowing public sector "computing capital" to be provided to innovative SMEs in exchange for financial returns. For example, public HPC facilities or research centres could offer free computing capacity in exchange for equity options, royalties or dividends to be reinvested in capacity and maintenance.

The EU should promote cross-industry coordination and data sharing to accelerate the integration of AI into European industry. Developing AI verticals hinges on industrial players working together with AI researchers and the private sector to enable problem definition across different sectors. For instance, discovering whether an innovative product can be developed by a factory using an AI-powered digital twin requires replication of the factory, its robots, processes and the overlay of an AI algorithm. To facilitate this cooperation, EU companies should be encouraged to participate in an "AI Vertical Priorities Plan". The aim of this plan would be to accelerate AI development across the ten strategic sectors where EU business models will benefit most from rapid AI introduction (automotives, advanced manufacturing and robotics, energy, telecoms, agriculture, aerospace, defence, environmental forecasting, pharma and healthcare). Companies that participate in the plan would benefit from EU funding for model development and a specific set of exemptions regarding competition and AI experimentation. In particular, to overcome the EU's lack of large data sets, model training should be fed with data freely contributed by multiple EU companies within a certain sector. It should be supported within open-source frameworks, safeguarded from antitrust enforcement by competition authorities. Experimentation should be encouraged via the opening up, EU-wide coordination and harmonisation of national "AI Sandbox regimes" to companies participating in the plan. These experimental "sandboxes" would enable regular assessments of regulatory hindrances deriving from EU or national legislation and provide feedback from private companies and research centres to regulators.

Given the dominance of US providers, the EU must find a middle way between promoting its domestic cloud industry and ensuring access to the technologies it needs. It is too late for the EU to try and develop systematic challengers to the major US cloud providers: the investment needs involved are too large and would divert resources away from sectors and companies where the EU's innovative prospects are better. However, for reasons of European sovereignty, the EU should ensure that it has a competitive domestic industry that can meet the demand for "sovereign cloud" solutions. To achieve this goal, the report recommends adopting EU-wide data security policies for collaboration between EU and non-EU cloud providers, allowing access to US hyperscalers' latest cloud technologies while preserving encryption, security and ring-fenced services for trusted EU providers. At the same time, the EU should legislate mandatory standards for public sector procurement, thereby levelling the playing field for EU companies against larger non-EU players. Outside of "sovereign" market segments, it is recommended to negotiate a low barrier "digital transatlantic marketplace", guaranteeing supply chain security and trade opportunities for EU and US tech companies on fair and equal conditions. To make these opportunities equally attractive beyond large tech companies, SMEs on both sides of the Atlantic should benefit from the same easing of regulatory burdens for small companies that is proposed above.

Facilitating consolidation in the telecoms sector is needed to deliver higher rates of investment in connectivity [see the chapters on digitalisation and advanced technologies, and competition policy]. The cornerstone initiative is modifying the EU's stance towards scale and consolidation of telecoms operators to deliver a true Single Market, without sacrificing consumer welfare and quality of service. To encourage consolidation, the report recommends defining telecoms markets at the EU level – as opposed to the Member State level – and increasing the weight of innovation and investment commitments in the EU's rules for clearing mergers. Country-level ex ante regulation should be reduced in favour of ex post competition enforcement in cases of abuse of dominant position. It is also proposed to harmonise EU-wide spectrum licensing rules and processes and to orchestrate EU-wide auction design features to help create scale. To ensure that EU players remain at the forefront of new technological developments, it is recommended to establish an EU-level body with public-private participation to develop homogenous technical standards for the deployment of network APIs and edge computing, as was the case for roaming in the 1990s. To increase the capacity of EU operators to invest in these technologies, it is recommended to support commercial investment sharing between network owners and Very Large Online Platforms that use EU data networks to a massive extent but do not contribute to financing them.

Sustaining and expanding R&I will also be crucial for key manufacturing sectors such as pharma [see the chapter on pharma]. Opening up the secondary use of health data for research purposes has significant potential to anchor pharma R&I activities within the EU. The report therefore recommends accelerating the digitisation of health systems and the European Health Data Space (EHDS), achieved through EU-level support for national investments which facilitate access to and sharing of electronic health records. In addition, it is proposed to further scale up genome sequencing capacities in the EU and to present a strategic blueprint beyond 2026, building on the European 1+ Million Genomes initiative. To maximise the opportunities of the EHDS, it will be important to provide clear and timely guidance on the use of AI in the lifecycle of medicines, in particular analysis of 'raw' clinical data transmitted to the European Medicines Agency and data collected for pharmacovigilance purposes. In parallel, regulators should aim to boost the attractiveness of the EU for conducting clinical trials and to expedite access to markets for novel medicines. These goals can be supported, among other things, by reviewing rules for studies combining medicines with medical devices and the application of AI and streamlining guidance across different agencies to industry on unmet medical needs, the design of clinical trials and the use of real-world evidence. Finally, to compensate for the financing gap in pharma, EU funding should be refocused on the development of a limited number of world-class innovation hubs in life sciences for advanced therapy medicinal products. The pharma sector would also benefit from the proposals for financing innovation.

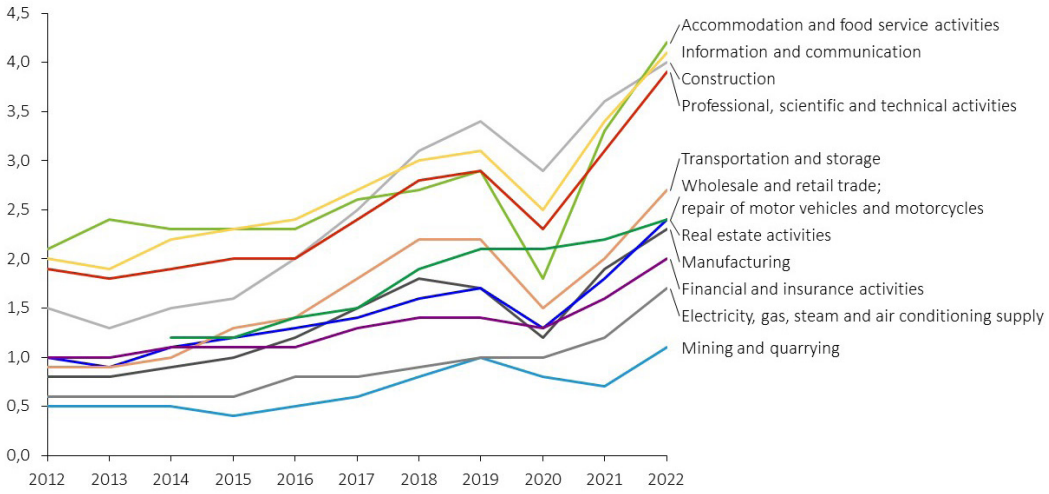
Closing skills gaps

Europe is suffering from skills gaps across the economy, reinforced by a declining labour force [see the chapter on skills]. The European economy displays from persistent skills shortages in several sectors and occupations, for both low- and high-skilled workers [see Figure 10]. Around one-quarter of European companies have faced difficulties in finding employees with the right skills, while another half report some difficulties. 77% of EU companies report that even newly recruited employees do not have the required skills. Skills are also lacking at the managerial level. The uneven adoption of basic management practices – especially those needed to manage human capital – is likely responsible for the sluggish adoption of ICT in the EU in the late 1990s and the 2000s, especially among micro and small companies[08]. While challenges related to skills shortages are widespread across advanced economies, the need to address them is particularly acute in the EU. Demographic headwinds imply a shrinking labour force in Europe, while the US population is projected to expand in the coming decades. In this setting, a European strategy to address skills gaps – focused on all stages of education – is essential. Many of the skills gaps can be traced back to the underuse of existing talent, as witnessed by deep gender gaps in some occupations.

FIGURE 10

Skills shortages in the EU

Job vacancy rate (% of total posts)



Source: Eurostat

Skills shortages are acting as a barrier to innovation and technology adoption and could potentially hinder decarbonisation as well. Europe produces high quality talent in the fields of science, technology, engineering and maths (STEM) but their supply is limited. The EU turns out around 850 STEM graduates per million inhabitants per year compared to more than 1,100 in the US. Moreover, the EU's talent pool is depleted by brain drain overseas owing to more and better employment opportunities elsewhere. Skills are also lacking to diffuse digital technologies faster through the economy and to enable workers to adapt to the changes these technologies will bring. Almost 60% of EU companies report that lack of skills is a major barrier to investment and a similar share report difficulties in recruiting ICT specialists. At the same time, European workers are generally unprepared to take advantage of the widespread digitalisation of work: around 42% of Europeans lack basic digital skills, including 37% of those in the workforce[09]. Decarbonisation will also require new skills sets and job profiles. The rates of job vacancies for clean tech manufacturing in the EU doubled between 2019 and 2023, with 25% of EU companies reporting labour shortages in the third quarter of 2023. Shortages of high-skilled workers are likely to become more acute over time. Projections to 2035 indicate that labour shortages will be most pronounced in high-skilled, non-manual occupations – i.e. those requiring high level of education – driven by replacement needs owing to retirements and the changing demands of the labour market.

08. See, among others, Bloom, Sadun and Van Reenen (2012) and Schivardi and Schmitz (2020) for evidence on cross-country variation in managerial practices, and their impact on aggregate productivity.

09. The EU Digital Decade set out to ensure 80% of working age Europeans have basic digital skills by 2030.

The undersupply of skills in Europe owes to declines in education and training systems that are failing to prepare the workforce for technological change. Educational attainment in the EU – as measured by the OECD's PISA scores – is falling. The leading positions in recent PISA reports are dominated by Asian countries, while Europe has experienced an unprecedented decline. This downward trend concerns both average figures and top performance: in 2022, only 8% of EU students reached a high level of competence in maths and 7% in reading and science as measured by the PISA standardised scores. While the number of STEM graduates is rising, the pace is not sufficient to keep up with the growth in demand in STEM jobs and large gender disparities are evident: there are almost twice as many males as females. Underperformance also extends to adult learning, hindering the possibility for retraining to adapt the labour market to advanced technologies. Participation in adult education and training is relatively low overall and varies significantly across the EU. For example, only 37% of adults participated in training in 2016 and this rate has hardly increased since. To achieve the target of having at least 60% of adults participating in training every year set by the 2020 European Skills Agenda, some 50 million more workers would need to receive training. A similar situation affects vocational training, which ranges widely in its quality and effectiveness within the EU.

While education and training are a national competency, EU investments have yielded relatively poor results. Under the current EU Budget, around EUR 64 billion is spent on investment in skills but results have been limited. This failure is down to several factors. First, the lack of willingness among Member States, who are responsible for skills policies, to go beyond soft forms of coordination. Second, insufficient involvement of industry in developing job-specific skills. Third, EU skills investments suffer from a lack of systematic evaluations, preventing learning about the effectiveness of alternative strategies and refining of interventions. Fourth, collective efforts to improve skills are hampered by an underuse of "skills intelligence", meaning reliable, granular and comparable information on skills needs, existing stocks and desired flows within and across Member States. Such information is essential to assess existing and forecast skills gaps across sectors and regions, and target policies and spending appropriately. While new sources of information and methodologies have become available, the actual use of granular skills data for policy design, remains low and uneven across both EU institutions and individual Member States.

The EU should overhaul its approach to skills, making it more strategic, future-oriented and focused on emerging skill shortages. The report recommends that, first, the EU and Members States enhance their use of skills intelligence by making much more intense use of data to understand and act on existing skills gaps. Second, education and training systems need to become more responsive to the changing skill needs and skill gaps identified by the skills intelligence. Curricula need to be revised accordingly, also involving employers and other stakeholders. Third, to maximise employability, a common system of certification should be introduced to make the skills acquired through training programmes easily understandable by prospective employers throughout the EU. Fourth, the EU programmes dedicated to education and skills should be redesigned, so that the funding allocated can achieve a much greater impact. To improve the efficiency and scalability of skills investments, the disbursement of EU funds should be coupled with stricter accountability and impact evaluation. In parallel, it is proposed to adopt specific interventions to address the most acute skills shortages in technical and STEM skills. A particular focus is needed on adult learning, which will be key to update worker's skills throughout their lives. Linked to this, vocational training also needs a broad reform across the EU. Specific sectors (strategic value chains) or specific skills (both worker and managerial capabilities) will require complementary targeted interventions. For example, it is proposed to launch a new Tech Skills Acquisition Programme to attract tech talent from outside of EU, adopted EU-wide and co-funded by the Commission and Member States. This programme would combine a new EU-level visa programme for students, graduates and researchers in relevant fields to stimulate inflow, a large number of EU academic scholarships, in particular in STEM subjects, and student internships and graduate contracts with participating research centres and public institutions EU-wide, retaining competencies in Europe in the early phase of researchers' careers.

ENDNOTES

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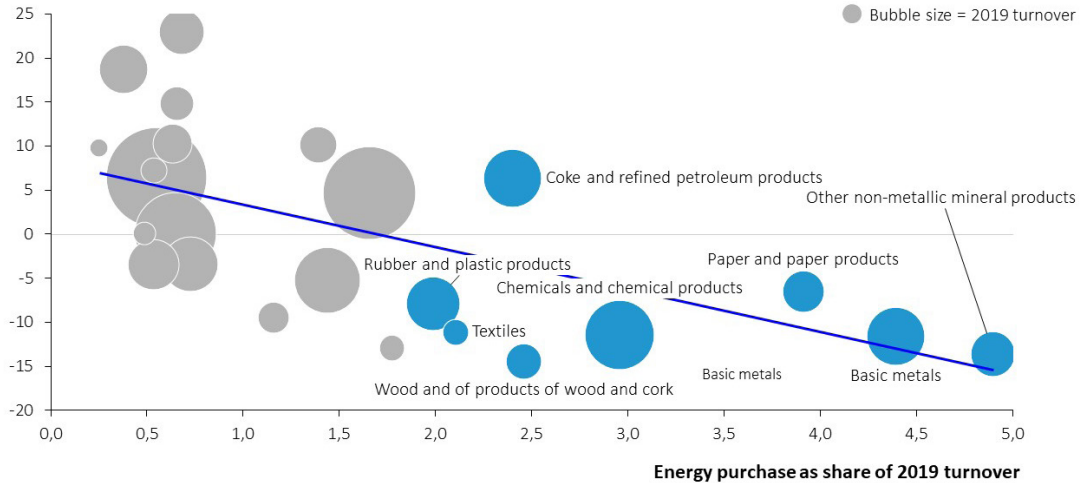
3. A joint decarbonisation and competitiveness plan

High energy costs in Europe are an obstacle to growth, while lack of generation and grid capacity could impede the spread of digital tech and transport electrification. Commission estimates suggest that high energy prices in recent years have taken a toll on potential growth in Europe[i]. Energy prices also continue to affect corporate investment sentiment much more than in other major economies. Around half of European companies see energy costs as a major impediment to investment – 30 percentage points higher than US companies[ii]. Energy-intensive industries (EIIs) have been hit hardest: production has fallen 10-15% since 2021 and the composition of European industry is changing, with increasing imports from countries with lower energy costs. Energy prices have also become more volatile, increasing the price of hedging and adding uncertainty to investment decisions. Without a significant increase in generation and grid capacity, Europe may also face limitations on making production more digital, as training and running AI models and maintaining data centres is highly energy-intensive. Data centres are currently responsible for 2.7% of the EU's electricity demand, but by 2030 their consumption is expected to rise by 28%.

FIGURE 1

Energy-intensive manufacturing challenges

% change in industrial production (Apr. 24 vs Apr. 21)



Source: Eurostat, OECD Trade value added (TiVA database) and ECB staff calculations.

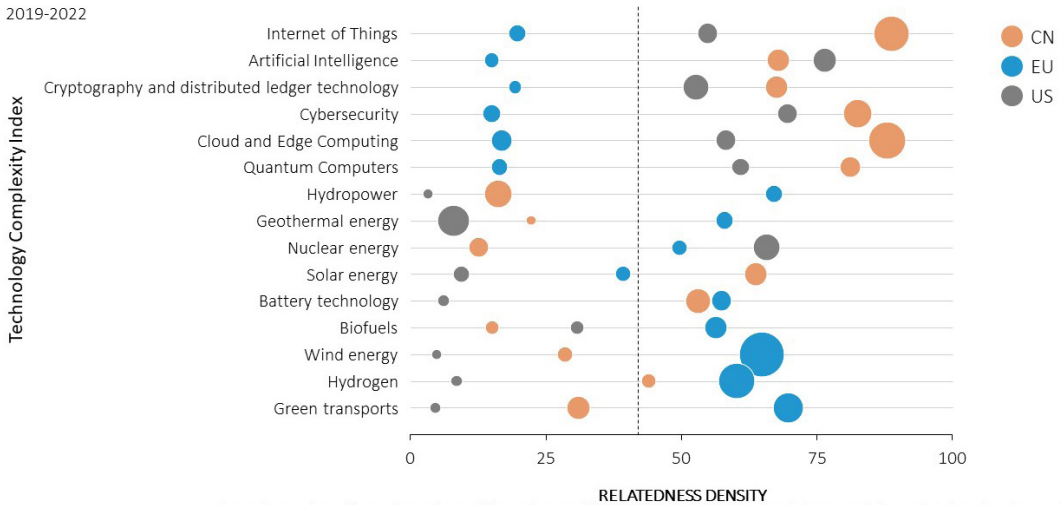
The EU's decarbonisation goals are also more ambitious than its competitors', creating additional short-term costs for European industry. The EU has put in place binding legislation to reduce greenhouse gas emissions by at least 55% by 2030 compared to 1990 levels. The US, by contrast, has set a non-binding target of a 50-52% reduction below (higher) 2005 levels by 2030, while China only aims for its carbon emissions to peak by the end of the decade. These differences create massive near-term investment needs for EU companies that their competitors do not face. For the four largest EIIs (chemicals, basic metals, non-metallic minerals and paper), decarbonisation is projected to cost EUR 500 billion overall over the next 15 years, while for the "hardest-to-abate" parts of the transport sector (maritime and aviation) investment needs stand at around EUR 100 billion each year from 2031 to 2050. The EU is also the only major region worldwide to have introduced a significant CO_2 price. This cost factor is of limited importance so far as heavy industrial production has been largely covered by free allowances under the Emissions Trading Scheme (ETS). However, these allowances will be progressively phased out with the introduction of the Carbon Border Adjustment Mechanism (CBAM).

Decarbonisation offers an opportunity for Europe to lower energy prices and take the lead in clean technologies ("clean tech"), while also becoming more energy secure. The decarbonisation of Europe's energy system

implies the massive deployment of clean energy sources with low marginal generation costs, such as renewables and nuclear. Specific EU regions are endowed with high potential for cost-competitive renewable energy sources: for instance, solar in Southern Europe and wind in the North and Southeast. Renewable energy deployment in Europe is already rising, reaching around 22% of the EU's gross final energy consumption in 2023, compared with 14% in China and 9% in the US. At the same time, Europe has strong innovative potential to meet rising domestic and global demand for clean energy solutions. Although Europe is weak in digital innovation, it is a leader in clean tech innovation [see Figure 2]. This presents opportunities: according to the International Energy Agency (IEA), more than one-third of the required CO_2 emission reductions globally in 2050 rely on technologies currently at the demonstration or prototype phase[iii]. The electrification of the European energy system will also be an enabler of growth for the EU's sustainable transport sector. EU companies are "first-movers" in other sub-sectors of sustainable transport. For example, the EU holds 60% of global high-value patents and tops global rankings of the most innovative companies for low-carbon fuels, which are essential for the decarbonisation of aviation and maritime transport in the medium term and also, potentially, for heavy-duty vehicles.

FIGURE 2

The EU's position in complex (digital and green) technologies

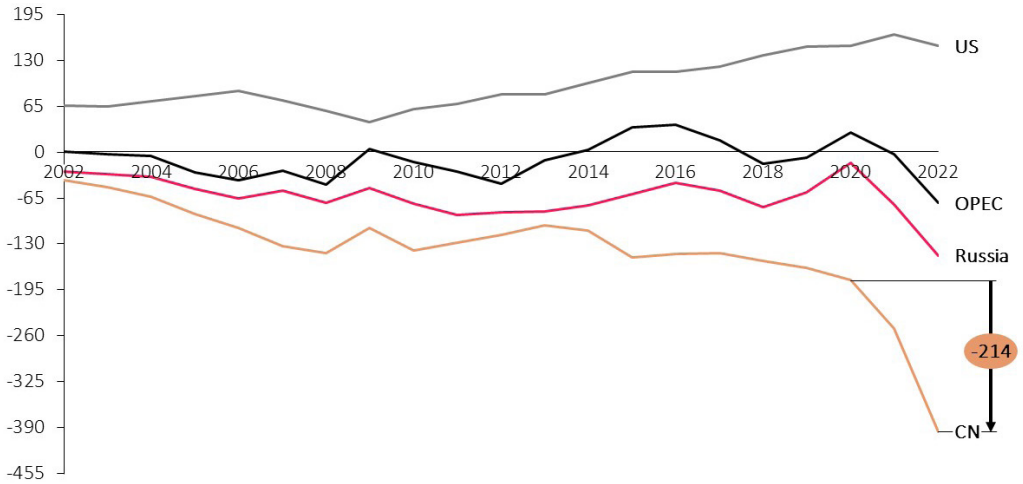


Notes: The results are based on an analysis of patent data to understand the complexity and potential for specialisation in different technology areas. On the y-axis, technologies are ranked according to how advanced or complex they are, with scores ranging between 0 (less complex) and 100 (more complex). The x-axis (showing the relatedness density) represents how easily a country can build comparative advantage in a particular technology, depending on how closely related it is to other technologies the country is already strong in. The size of the bubbles shows how much each country has already specialised in a technology, using a measure of "revealed comparative advantage"(RCA), which reflects their competitive strenght in that field.

Source: European Commission, DG RTD.

However, it is not guaranteed that EU demand for clean tech will be met by EU supply given increasing Chinese capacity and scale. The EU aims to achieve a minimum of 42.5% of its energy consumption from renewable sources by 2030, which will require it to nearly triple its installed capacity for solar PV and more than double its wind power capacity. In addition, the EU has effectively abolished the internal combustion engine from 2035, when all new passenger cars and light duty vehicles registered in Europe must have zero tailpipe emissions. Based on current policies, Chinese technology may represent the lowest-cost route to achieving some of these targets. Owing to a fast pace of innovation, low manufacturing costs and state subsidies four times higher than in other major economies[iv], the country is now dominating global exports of clean technologies. Significant overcapacity is expected: by 2030 at the latest, China's annual manufacturing capacity for solar photovoltaic (PV) is expected to be double the level of global demand, and for battery cells it is expected to at least cover the level of global demand. Production of EVs is expanding at a similar pace. The EU is already seeing a sharp deterioration in its trade balance with China, reflecting in particular imports of EVs, batteries and solar PV products [see Figure 3]. While rising bankruptcies in China suggest that the economy is entering a phase of industrial consolidation, overcapacities are likely to persist, especially given ongoing weaknesses in household consumption and high saving rates. Moreover, in response to perceived unfair competition, an increasing number of countries are raising tariff and non-tariff barriers against China, which will re-direct Chinese overcapacity towards the EU market. In May, the US announced significant hikes in tariffs against a range of products.

FIGURE 3
EU trade balance by partner country
EUR billion



Source: Eurostat, 2024.

Europe must confront some fundamental choices about how to pursue its decarbonisation path while preserving the competitive position of its industry. Black-and-white solutions are unlikely to be successful in the European context. Emulating the US approach of systematically shutting out Chinese technology would likely set back the energy transition and therefore impose higher costs on the EU economy. It would also be more costly for Europe to trigger reciprocal tariffs: more than a third of the EU's manufacturing GDP is absorbed outside the EU, compared with only around a fifth for the US[v]. However, a laissez-faire approach is also unlikely to succeed in Europe given the threat it could pose to employment, productivity and economic security. According to ECB simulations, if the Chinese EV industry were to follow a similar trajectory of subsidies to that applied in the solar PV industry, EU domestic production of EVs would decline by 70% and EU producers' global market share would fall by 30 percentage points[vi]. The automotive industry alone employs, directly and indirectly, almost 14 million Europeans. Given Europe's strong position in clean tech innovation, it could also lose the possibility to benefit from the future productivity gains this sector will bring. Without some foothold in EIIs, Europe's economic security could be undermined, for example via lower food security (lack of fertilisers and pesticides) and less autonomy for the defence sector. Most importantly, the "European Green Deal" was premised on the creation of new green jobs, so its political sustainability could be endangered if decarbonisation leads instead to de-industrialisation in Europe – including of industries that can support the green transition.

Europe will need to deploy a mixed strategy that combines different policy tools and approaches for different industries. Four different broad cases can be distinguished. First, there are some industries where Europe's cost disadvantage is too large to be a serious competitor. Even if the EU has lost ground owing to foreign subsidies, it makes economic sense to import necessary technology and allow foreign taxpayers to bear the costs, while diversifying suppliers to the extent possible to limit dependencies. The second broad case is industries where the EU is concerned about where production takes place – to protect jobs from unfair competition – but is agnostic about where the underlying technology originates from. In this case, an effective policy mix would be to encourage inward FDI while deploying trade measures to offset the cost advantage gained by foreign subsidies. With the combination of recent tariff increases and FDI announcements in some Member States, this approach is currently being de facto applied in the automotive sector. The third case is industries where the EU has a strategic interest in ensuring that European companies retain relevant know-how and manufacturing capacity, allowing production to be ramped up in the event of geopolitical tensions. Here the EU should aim to increase the long-term "bankability" of new investments in Europe, for instance by applying local-content requirements, and to ensure a minimum level of technological sovereignty. The latter can be achieved by requiring foreign companies that want to produce in Europe to enter into joint ventures with local companies. Security considerations may lead to changes over time in the classification of industries of strategic interest. The fourth case is "infant industries" where the EU has an innovative edge and sees high future growth potential. In this case, there is a well-established playbook of applying a full range of trade-distorting measures until the industry reaches sufficient scale and protections can be withdrawn.

Executing this strategy will require a joint decarbonisation and competitiveness plan where all policies are aligned behind the EU's objectives. Priority areas to be addressed include, first, lowering energy costs for end users by transferring the benefits of the decarbonisation and accelerating the decarbonisation of the energy sector in a cost-efficient way, leveraging all available solutions. Second, capturing the industrial opportunities presented by the green transition, ranging from remaining at the forefront of clean tech innovation to manufacturing clean tech at scale to leveraging the opportunities from circularity. Third, levelling the playing field in sectors more exposed to unfair competition from abroad and/or facing more exacting decarbonisation targets than their international competitors – including applying tariffs and other trade measures where warranted.

The root cause of high energy prices

Structural causes are at the heart of the energy price gap and may be exacerbated by both old and new challenges [see the chapter on energy]. The price differential vis-à-vis the US is primarily driven by Europe's lack of natural resources, as well as by Europe's limited collective bargaining power despite being the world's largest buyer of natural gas. However, the gap is also caused by fundamental issues with the EU's energy market. Infrastructure investment is slow and suboptimal, both for renewables and grids. Market rules prevent industries and households from capturing the full benefits of clean energy in their bills. Financial and behavioural aspects of derivative markets have driven higher price volatility. Higher energy taxation than other parts of the world adds a tax wedge to prices. Moreover, while these structural issues have been exacerbated by the energy crisis of the past two years, future crises may bring them to the fore again. Tensions in gas markets are expected to ease thanks to new global supply capacity coming online, but the EU energy system will have to cope with electrification and new security of supply needs.

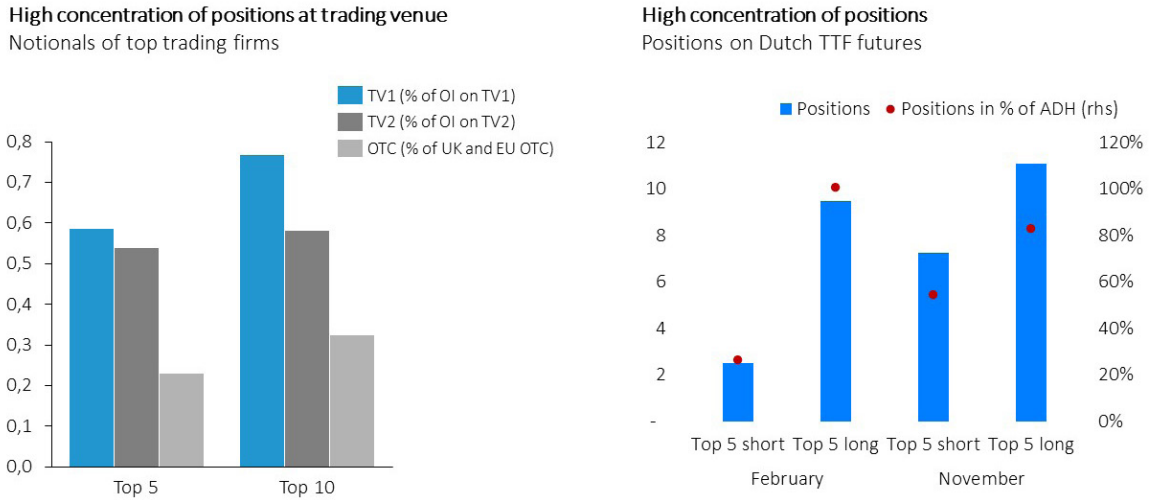
The EU is the largest global gas and LNG importer, yet its potential collective bargaining power is not being sufficiently leveraged and relies excessively on spot prices, threatening Europe with more volatile natural gas prices[01]. This lack of leverage is notable especially in the case of pipeline gas, where the possibility of rerouting gas flows is more limited as shown by the latest unsuccessful efforts by Russia. During the 2022 crisis, for example, intra-EU competition for natural gas between actors willing to pay high prices contributed to an excessive and unnecessary rise in prices. In response, the EU introduced a coordination mechanism to aggregate and match demand with competitive supply offers (AggregateEU), but there is no obligation for joint purchasing on the platform. At the same time, although natural gas prices have fallen considerably from their peaks during the energy crisis, the EU faces an increasingly volatile outlook. With the loss of access to Russian pipeline gas, 42% of EU gas imports arrived as LNG in 2023, up from 20% in 2021. LNG prices are typically higher than pipeline gas on spot markets owing to liquification and transportation costs. Moreover, with the reduction of pipeline supply from Russia, more gas is being bought on LNG spot markets both in the EU and globally leading to stronger competition. Even gas bought in long-term contracts is largely indexed to spot markets, which are increasingly influenced by supply disruptions and demand patterns in Asia.

Financial and behavioural aspects of gas derivative markets can exacerbate this volatility and amplify the impact of shocks. A few non-financial corporates undertake most trading activity in European gas markets. Recent evidence presented by the European Securities Markets Agency (ESMA) suggests that there is significant concentration both at position and trading venue level and that concentration increased in 2022 during largest spike in natural gas prices. The top 5 companies hold around 60% of positions in some trading venues and their short positions increased considerably by almost 200% between February and November 2022 [see Figure 4][vii]. Supervision of these companies' activities could be improved. While regulated financial entities (for example, investment banks, investment funds and clearing market participants) are covered by conduct and prudential rules, many of the companies that trade commodity derivatives can rely on exemptions. In particular, when a commodity company's main activities are not trading, they can be exempted from authorisation as a supervised investment company (so-called "ancillary" exemptions). The US has a stricter approach. Exemptions apply on some types of contracts, but commodity companies are not exempted from supervision, allowing for a more precise level of scrutiny. In addition, energy commodities are subject to position limits, including Henry Hub natural gas contracts.

01. AggregateEU is a first step in demand aggregation allowing the pooling of demand, the coordination of infrastructure use and negotiation with international partners, fostering more centralised EU joint purchasing to further leverage the EU's market power.

FIGURE 4

Market concentration in EU gas derivatives markets



Note: Market share of natural gas by venue in % of reported notionals, excluding central counterparties and clearing members. The figure shows that the top-5 and top-10 EU counterparties (in terms of gross notionals) accounted for more than 50% and 60% respectively of reported notionals by EU entities on each of the two EU gas regulated markets. Data as of November 2022. OI: Open Interest. TV: Trading Venue. OTC: Over-the-counter.

Sources: Trade repositories (TRs), Bank of England, ESMA.

Note: Absolute value of net positions in EUR billion for the top five long and short non-financial corporate counterparties and positions in % of average daily trading volume, in % rhs. The high concentration of positions indicates that if several firms with similar directional positions were to reduce their exposures, they could amplify market moves.

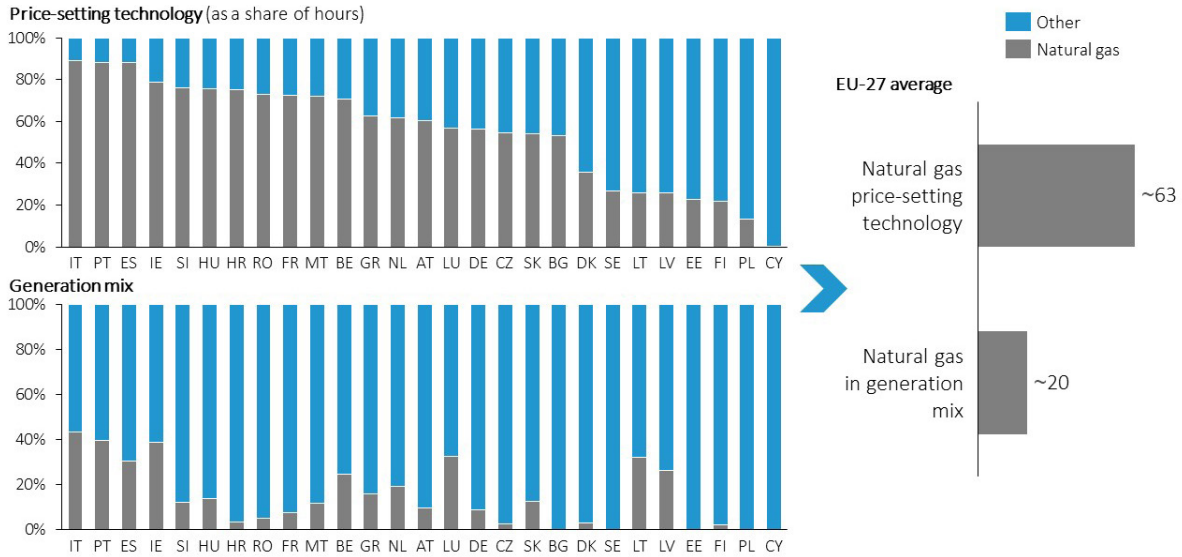
Sources: EMIR, ESMA.

Europe's market rules pass on this volatility to end users and may prevent the full benefits of decarbonising power generation from reaching them. Even as Europe reduces its dependence on natural gas and increases investment in clean energy generation, its market rules in the power sector do not fully decouple the price of renewable and nuclear energy from higher and more volatile fossil fuel prices, preventing end users from capturing the full benefits of clean energy in their bills [see Figure 5]. In 2022 at the peak of the energy crisis, natural gas was the price-setter 63% of the time, despite making up only 20% share of the EU's electricity mix. The use of long-term contract solutions – like Power Purchase Agreement (PPA) markets or Contracts for Difference (CfDs) – can help attenuate the link between the marginal price setter and the cost of energy for end users, but such solutions are underdeveloped in Europe, in turn limiting the benefits from accelerating the roll-out of renewables. In the absence of action, this decoupling problem will remain acute at least for the remainder of this decade. Even if renewable installation targets are met, it is not forecast to significantly reduce the share of hours during which fossil fuels set energy prices by 2030.

FIGURE 5

Price-setting technology per Member State and their generation mix

%, 2022

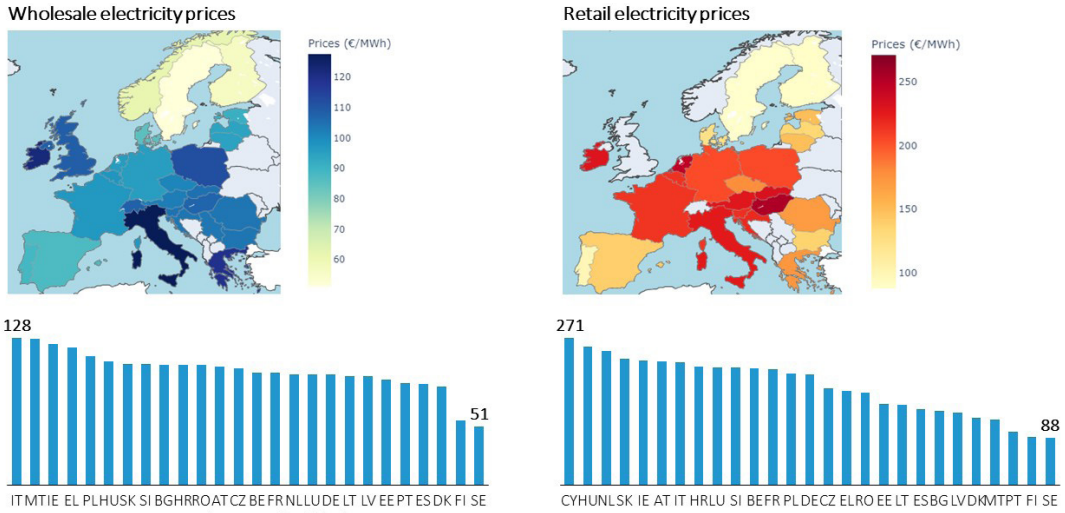


Source: European Commission (JRC), 2023

FIGURE 6

Electricity wholesale and retail prices across Member States for industry

EUR/MWh, 2023



Source: European Commission, 2024. Based on Eurostat, S&P Global, and ENTSO-E, 2024.

A lengthy and uncertain permitting process for new power supply and grids is a major obstacle to faster installation of new capacity. Investments in both power generation and grids require several years between feasibility studies and project completion. However, there is a large variation in permitting times between Member States. The entire permit granting process for onshore wind farms can take up to 9 years in some Member States, compared with under 3 years in the most efficient ones. Ground-mounted solar PV systems can take 3-4 years to approve in some countries but 1 year in others. The time devoted to analyses of environmental impacts represents a significant share of the difference between best and worst performers. The EU has developed initiatives to shorten permitting (such as the Article 122 emergency proposals), but there are still significant hurdles to implementation, in particular lack of administrative capacity and digitalisation. 69% of municipalities report a lack of skills related to environmental and climate assessments.

Finally, over time energy taxation has become an important source of budget revenues, contributing to higher retail prices. While taxation can be a policy tool to encourage decarbonisation, significant variation exists among Member States concerning taxes and price relief schemes. In contrast to the EU, the US does not levy any federal taxes on electricity or natural gas consumption. Moreover, as power generation falls under the scope of the EU's ETS, its carbon intensity is priced in electricity generation costs. This cost is high and volatile in the EU (amounting to EUR 20-25/MWh for gas-fired generation in EU), while in California the same cost stands at around EUR 10-15/MWh. Excluding the CO_2 costs paid by producers (which are estimated to lie in the range of 15-20% the commodity costs in 2022), generation cost is in the range of 45% for households and 65% of industrial retail prices. The residual costs were approximately equally shared between the network and taxes.

The threat to Europe's clean tech sector

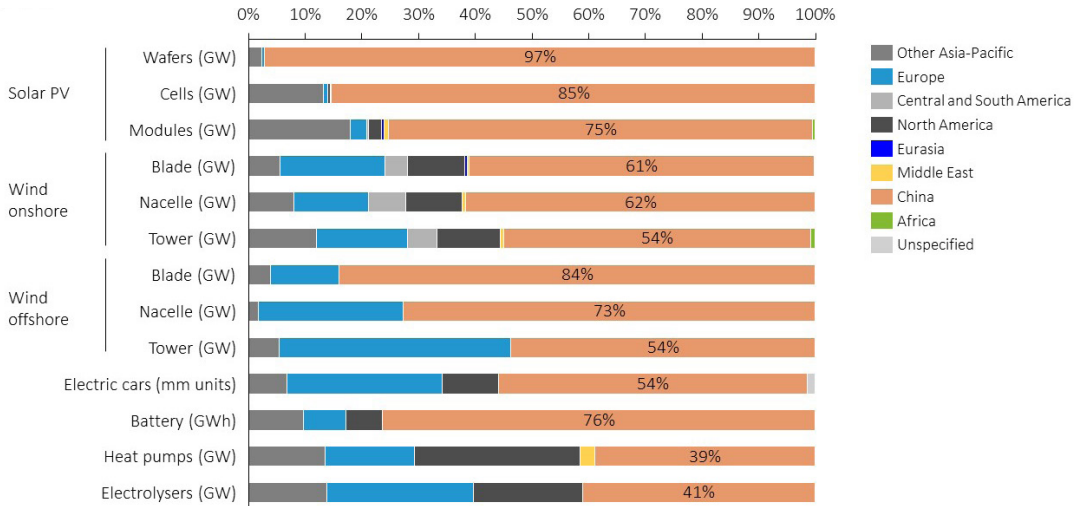
Although Europe is a world leader in clean tech innovation, it is squandering early-stage advantages owing to the weaknesses in its innovation ecosystem [see the chapter on clean technologies]. More than one-fifth of clean and sustainable technologies worldwide are developed in the EU and the pipeline is still strong: around half of EU clean tech innovations at a launch or early revenue stage, 22% at scale-up stage and 10% already mature[viii]. However, since 2020 patenting in low-carbon innovation has slowed down in Europe, while in recent years the sector has seen its early-stage advantages being challenged. For example, from 2015 to 2019 the EU represented 65% of global early-stage VC for hydrogen and fuel cells, but this share declined to 10% from 2020 to 2022. The clean tech sector is suffering from the same barriers to innovation, commercialisation and scaling up in Europe that afflict the digital sector: a total of 43% and 55% of medium and large companies, respectively, cite consistent regulation within the Single Market as the main way to foster commercialisation, while 43% of small companies identify lack of finance as an obstacle to growth[ix]. As in the digital sector, the lower capacity of EU clean tech companies to scale up leads to a gap between the EU and US in later-stage funding.

Europe's innovation potential is not translating into manufacturing superiority for clean tech, despite the size of its domestic market. The EU is the second largest market in terms of demand for solar PV, wind and EVs. In many of these sectors, the EU has enjoyed an industrial "first-mover" advantage and has established leadership, but it has not been able to maintain that lead consistently. In certain sectors, such as solar PV, the EU has already lost its manufacturing capacities, with production now dominated by China [see Figure 7]. In others, such as wind power generation equipment, Europe has a solid position but is facing increasing challenges. For example, although Europe retains primacy in wind turbine assembly – serving 85% of domestic demand and acting as a net exporter – it has lost significant market shares to China in last few years, declining from 58% in 2017 to 30% in 2022. In several sectors the EU retains its technological edge, such as electrolysers and carbon capture and storage. But many EU players still prefer to produce at scale in China owing to higher construction costs in Europe, permitting delays and more restricted access to critical raw materials. For example, electrolyser production requires at least 40 raw materials and the EU currently produces just 1-5% of these domestically. Overall, despite the EU's ambition to maintain and develop clean tech manufacturing capacity, there are multiple signs of an evolution in the opposite direction, with EU companies announcing production cuts, shutdowns and partial or full relocation.

FIGURE 7

Clean technology manufacturing capacity by region

%, 2021



Source: European Commission, 2024. Based on IEA, Bruegel.

The threat to Europe's position in clean tech owes mainly to a lack of an industrial strategy equivalent to other major regions. EU manufacturers are suffering primarily from a lack of stability of demand and from production cost gaps, reinforced by an unlevel playing field with other major economies providing significant subsidies and erecting trade barriers. The European Commission estimates that Chinese subsidies for clean tech manufacturing have long been twice as high as those in the EU as a share of GDP, while the country has protected its home market for solar PV, wind power-generation equipment and EV batteries. The US Inflation Reduction Act (IRA) is estimated to provide USD 40 billion to USD 250 billion in support for manufacturing of clean tech and is projected to help to bridge the US cost gap vis-à-vis producers in China. These policies have left the EU with a significant cost disadvantage: for example, solar PV manufacturing costs in China are around 35%-65% lower than in Europe and costs for manufacturing battery cells are 20%-35% lower[x]. The EU announced a comprehensive response in 2023 with the Net Zero Industry Act (NZIA). However, EU financial support remains fragmented among different programmes, characterised by higher complexity and lead times, and generally excludes operating costs where cost gaps are greatest. Overall, financing for manufacturing at the EU level is five to ten times less generous than under the IRA. Finally, while the NZIA specifies EU manufacturing targets, they are not backed by explicit minimum quotas for local products and components – quotas which other regions regularly apply – meaning EU demand is not predictably channelled towards EU clean tech output.

The EU's improving outlook for its battery industry demonstrates that a focused policy effort can succeed, even if non-EU players may benefit most. Although the EU's market share in lithium-ion batteries globally stands at just 6.5%, battery manufacturing output reached around 65 GWh in 2023 in the EU, growing by around 20% over the previous year. For comparison, the US recorded 80 GWh of production and similar growth, while the figures in China were 670 GWh and 50%, respectively. Public support for battery development has been key to strengthening Europe's position. Public R&I spending on battery technology has risen by 18% per year on average over the past decade, and Europe ranks only behind Japan and South Korea as a location for patent applications for battery storage technologies. With planned investment in the EU more than tripling in 2023, the IEA projects that the EU could meet its domestic demand for batteries by 2030. This capacity growth will increase Europe's strategic resilience and benefit adjacent sectors such as automotives by shortening supply chains. However, many of these projects are at this stage still announcements, and actual development will depend on supporting policies from permitting to financing. In addition, roughly half of the announced investment is from non-EU companies and, in most cases, projects are not taking place in the form of joint ventures. As a result, the EU may be missing an opportunity to combine openness to inward FDI with the development of critical know-how among European manufacturers.

The challenges of asymmetric decarbonisation

"Hard-to-abate" industries are suffering not only from high energy prices, but also from lack of public support to reach decarbonisation targets and investment in sustainable fuels [see the chapters on energy-intensive industries, and transport]. Despite the massive investment needs facing Energy Intensive Industries (EIIs), and the challenging business case for investment in "hard-to-abate" sectors, there is limited public support for the transition in Europe. Only a residual share of current ETS resources is earmarked to EIIs, with priority given to residential efficiency, renewables development or, recently, lowering energy bills. While EIIs in other regions face neither the same decarbonisation targets nor require similar investments, they benefit from more generous state support. China, for example, provides over 90% of the global USD 70 billion subsidies in the aluminium sector, as well as large subsidies for steel. Decarbonisation is also a competitive disadvantage for the "hardest-to-abate" parts of the transport sector (aviation and maritime). Extra-EU flights and sea journeys are partly excluded from the ETS, meaning the prices of these journeys do not yet reflect their climate impact. Consequently, there is a risk of carbon leakage and business diversion from transport hubs in the EU to those in the EU's neighbourhood, unless effective solutions for ensuring a level playing field are found at the international level. At the same time, although low-carbon fuels will be critical for the decarbonisation of these industries, ramping up the marginal production capacity that exists today is challenging. In particular, the EU needs to start building a supply chain for alternative fuels, or the costs of meeting its targets will be significant.

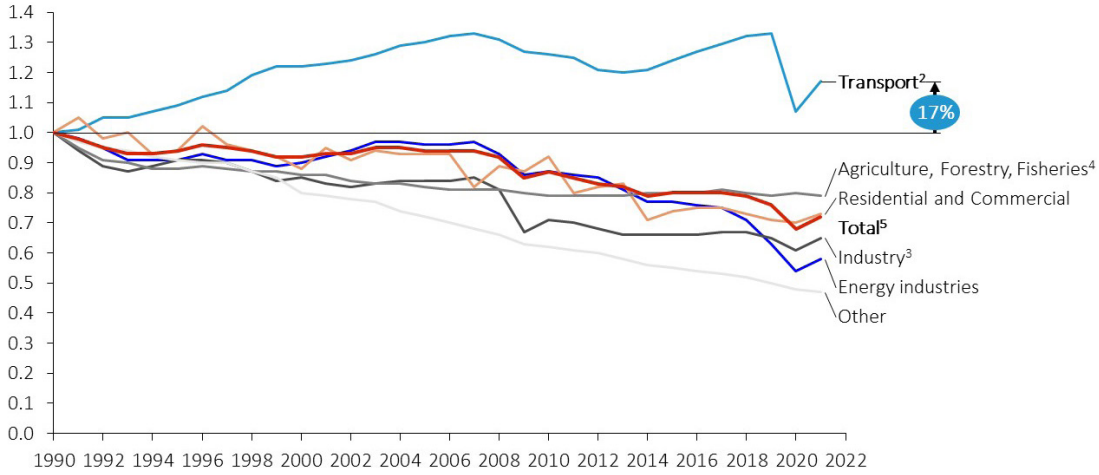
Overall, transport can play a critical role in the decarbonisation of the EU economy, but whether it proves to be an opportunity for Europe depends on planning. Transport accounts for one-quarter of all greenhouse gas emissions and unlike other sectors, CO_2 emissions from transport are still higher than in 1990 [see Figure 8]. However, lack of EU-level planning for transport competitiveness is hindering the ability of Europe to capitalise on the possibilities of multimodal transport to lower carbon emissions. Sustainable mobility requires an integrated approach towards energy networks, charging infrastructures, standardisation of manufacturing equipment, telecoms (including satellite and navigation technologies) and financing. Yet while transport is part of the Commission's 2040 Climate Target Plan, it is excluded from the mandatory National Energy and Climate Plans where Member States outline their strategies to execute decarbonisation. This lack of coordination results, for example, in a precise and binding regulatory framework for carmakers and corporate logistics, increasing the demand for EVs and charging infrastructure, without an analogous obligation for energy providers to supply stable and powerful grid access of sufficient capacity. The transition to sustainable mobility is further hindered by lack of interoperability of infrastructures and of technical requirements for the deployment of fleets and equipment, as well as limited uptake of digitalisation. Only 1% of cross-border maritime operations and 5% of rail transport operations in Europe are fully paperless[02].

02. Differences exist across single modes, with 40% of information exchange taking place electronically in aviation, 5% in rail and less than 1% in road and maritime. European Environment Agency, Transport and environment report 2022, Digitalization in the mobility system: challenges and opportunities, 2022.

FIGURE 8

Evolution of greenhouse gas emissions by sector in the EU

Greenhouse gas emission[1], Index 1990=1



Notes: 1 Excluding LULUCF emissions and international maritime, including international aviation and indirect CO2. 2 Excluding international maritime (international traffic departing from the EU), including international aviation. 3 Emissions from Manufacturing and Construction, Industrial Processes and Product Use. 4 Emissions from Fuel Combustion and other Emissions from Agriculture.

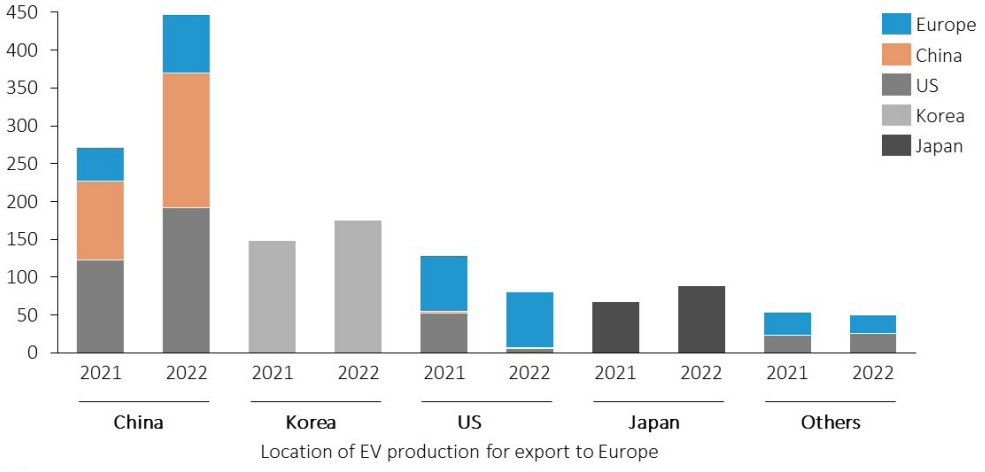
Source: European Commission, 2023

The automotive sector is a key example of lack of EU planning, applying a climate policy without an industrial policy [see the chapter on automotive]. The technology neutrality principle has not always been applied in the automotive sector. The ambitious target of zero tailpipe emissions by 2035 will lead to a de facto phasing out of new registrations of vehicles with internal combustion engines and the rapid market penetration of EVs. Yet, the EU has not followed up these ambitions with a synchronised push to convert the supply chain. For example, the Commission only launched the European Battery Alliance to build a battery value chain in Europe in 2017, while Europe as a whole is far behind on installing charging infrastructure. China, by contrast, has been focusing on the full EV supply chain since 2012 and, as a result, it has moved faster and at a larger scale and is now one generation ahead in EV technology in virtually all domains, while also producing at lower cost. European companies are already losing market share and this trend may accelerate as shipping bottlenecks are overcome [see Figure 9]. Chinese carmakers' market share for EVs in Europe rose from 5% in 2015 to almost 15% in 2023, while the share of European carmakers in the European EV market fell from 80% to 60%.

FIGURE 9

Electric car imports to Europe by country of production and manufacturer headquarters

Thousand vehicles, 2021-2022



Source: IEA, 2023

A joint plan for decarbonisation and competitiveness

The first key goal for the energy sector is to lower the cost of energy for end users by transferring the benefits of the decarbonisation [see the chapter on energy]. Natural gas will remain part of the energy mix in Europe over the medium term – scenarios suggest that EU gas demand will fall by 8%-25% by 2030 – and so this goal requires reducing the volatility of natural gas prices. The report recommends reinforcing joint procurement – at least for LNG – to leverage Europe's market power and establishing long-term partnerships with reliable and diversified trade partners as part of a genuine EU gas strategy. Europe also needs to reduce its exposure to spot market by encouraging a progressive move away from spot-linked sourcing and to reduce volatility in EU gas markets by limiting the possibility of speculative behaviour. Following the US example, regulators should be able to apply financial position limits as well as dynamic caps in circumstances when EU energy spot or derivatives prices diverge markedly from global energy prices. The EU should also put in place a common trading rulebook applying to both spot and derivatives markets and ensure integrated supervision of energy and energy derivatives markets. Finally, the EU should review the "ancillary activities exemption" to ensure that all trading entities are subject to the same supervision and requirements.

At the same time, transferring the benefits of decarbonisation requires policies to better decouple the price of natural gas from clean energy. The EU should decouple the remuneration of renewable energy and nuclear from fossil-fuel generation by building on the tools introduced under the new Electricity Market Design – such as PPAs and two-way CfDs – and progressively extending PPAs and CFDs to all renewable and nuclear assets in a harmonised way. The marginal pricing system should be used to ensure efficient balance in the energy system. To increase the uptake of PPAs into the industrial sector, the report recommends developing market platforms to contract resources and pool demand between generators and offtakers. This initiative can be combined with schemes to provide guarantees to mitigate the financial counterparty risks engendered by using such platforms, thereby enlarging market access to SMEs. For example, the EIB and National Promotional Banks could provide counter guarantees and specific financial products for small consumers or suppliers that lack a proper credit rating. In parallel, a fundamental component of lowering energy costs for end users is reducing energy taxation, which can be achieved by adopting a common maximum level of surcharges across the EU (including taxes, levies and network charges). Legislative reform in this area is subject to unanimity, but cooperation among a subset of Member States or guidance on energy taxation can be considered.

The second key goal is to accelerate decarbonisation in a cost-efficient way, leveraging all available solutions through a technology-neutral approach. This approach should include renewables, nuclear, hydrogen, bioenergy and carbon capture, utilisation and storage, and should be backed by massive mobilisation of both public and private finance (based on the proposals laid out in the chapter on investment. However, increasing the supply of finance for clean energy deployment will not yield the desired results without increasing the pace of permitting for installation. Different options are available to reduce permitting delays for new energy projects. Systematically implementing existing legislation can make a major difference: for example, several Member States have experienced double-digit increases in the volume of permits issued for onshore wind since the entry into force of the Article 122 Emergency Regulation. The report recommends extending acceleration measures and emergency regulation to heat networks, heat generators, and hydrogen and carbon capture and storage infrastructure. Greater focus is also needed on digitalising national permitting processes across the EU and addressing permitting authorities' lack of resources. For instance, administrative fees for procedures could be increased to ensure authorities have adequate capabilities to deliver prompt approvals. Another potential avenue would be for the EU to make renewable acceleration areas and strategic environmental assessments the rule for renewables expansion, replacing individual assessments per project. Targeted updates to relevant EU Environmental legislation could be used to provide limited (in time and perimeter) exemptions in EU environmental directives until climate neutrality is achieved. This revised legislation should appoint last-resort national authorities to ensure the permitting of projects in the event that there is no answer from local authorities after a predetermined time (e.g. 45 days).

A central element in accelerating decarbonisation will be unlocking the potential of clean energy through a collective EU focus on grids. If there is one horizontal area in the energy sector whose importance cannot be

overstated, it is the EU's energy grids. Delivering a step-change in grid deployment will require a new approach to planning at the EU and Member State levels, including the ability to effectively reach decisions and accelerate permitting, to mobilise adequate public and private financing and to innovate grid assets and processes. From a European perspective, rapidly increasing the installation of interconnectors should be the focus. The report recommends, first, to establish a "28th regime" – i.e. a special legal framework outside of the 27 different national legal frameworks – for interconnectors deemed to be Important Projects of Common European Interest (IPCEIs). This regime should shorten the length of national procedures and integrate them into a single process, avoiding the possibility of projects being blocked by individual national interests. Some very large renewable energy projects, such as large offshore wind in the North Sea, could also apply via this procedure, bypassing permitting delays at the local level. Second, the next Multiannual Financial Framework should reinforce the EU instrument dedicated to financing interconnectors (the Connecting Europe Facility). Third, a permanent European coordinator should be created in charge of assisting in obtaining the necessary permits. This coordinator would be responsible for monitoring progress in the permit granting process and facilitating regional cooperation to ensure political backing for cross-border infrastructure from all relevant Member States.

In parallel, the EU should develop the governance needed for a genuine Energy Union so that decisions and market functions of cross-border relevance are taken centrally. A stronger, more robust institutional framework would entail strengthening monitoring, investigation and decision-making powers at the EU level with the possibility of providing full regulatory oversight over all decisions and processes that have direct cross-border impact. A genuine Energy Union should ensure that central market functions of relevance for an integrated market are performed centrally and subject to proper regulatory oversight.

While "hard-to-abate" industries will benefit from lower energy prices, the EU should take a pragmatic approach to decarbonisation to mitigate potential trade-offs [see the chapters on energy-intensive industries, and transport]. For the EU to lead the decarbonisation of EIIs, a stronger focus is needed by both the EU and national governments to provide sufficient financial resources. The report recommends earmaking a larger share of ETS revenues to EIIs, with resources targeted towards innovating assets and processes and enhancing the skills needed for decarbonisation, for example by supporting the uptake of green hydrogen or carbon capture and storage solutions. ETS revenues should also be used to support the decarbonisation of the transport sector, helping reach the EU's milestones for shifting more activity to sustainable modes of transport. Decarbonisation funding across the EU should be based on common, competitive and simple instruments, such as Carbon CfDs or competitive auctions by the European Hydrogen Bank. A basket of options should be in place to financially support transport decarbonisation. These could include CfDs to de-risk investment in low carbon fuels, blending EU grants with support by EIB and National Promotional Banks, and Regulatory Asset Based models for investment in (high speed) railway infrastructure. At the same time, a global level playing field for EIIs and transport operators should be ensured during the transition. While CBAM is an important instrument for European companies to stay competitive against their international peers that face lower or no carbon prices, its success is still uncertain. The EU should closely monitor and improve the CBAM design during the transition phase and consider postponing the phase out of free ETS free allowances for EIIs if implementation is ineffective.

To capitalise on the decarbonisation push, Europe should refocus its support for clean tech manufacturing, focusing on technologies where it either has a lead or where there is a strategic case for developing domestic capacity [see the chapter on clean technologies]. The next Multiannual Financial Framework (MFF) should streamline the number of funds devoted to the manufacturing of clean tech, concentrating on technologies where the EU has an advantage and strong potential for growth – such as the opportunity presented by batteries. Support under the EU budget should offer companies a single point of entry with a uniform application procedure and awarding conditions, and should feature support for both capital expenditure and operational expenditure. To attract more private sector funding to clean tech, and especially towards innovative companies, dedicated financing schemes should be developed employing the same financing strategies discussed in chapter 2. At the national level, to ensure predictable demand for the EU clean tech industry and to offset trade distorting policies abroad, the report recommends introducing an explicit minimum quota for the local production of selected products and components in public procurement and in CfD auctions and other forms of local production offtake. This quota should be combined with criteria established at EU level for orienting local production to the most innovative and sustainable solutions. The approach could be supported by the creation of joint ventures or cooperation agreements

for knowledge transfer and sharing between EU and non-EU companies. For "infant industries", it is recommended that Member States plan upcoming auctions and public procurement procedures to act as a "launch customer" for new technologies.

Trade policy will be fundamental to combine decarbonisation with competitiveness, securing supply chains, growing new markets and offsetting state-sponsored competition. As supply chains for some clean technologies are highly concentrated, the EU has win-win opportunities to strategically partner with other regions in targeted steps of clean technology supply chains. Like-minded neighbouring regions with access to low-cost renewable energy sources and raw materials could help Europe accomplish its energy and climate goals in an affordable manner while widening the diversification of supplies. At the same time, the EU should leverage its strong position in clean tech and pursue opportunities to invest in other countries to widen the deployment market for technologies the region is developing, such as near zero-emissions processes for materials production. To enable these goals, the report recommends for the EU to establish industrial partnerships with third countries in the form of offtake agreements across the supply chain or co-investment in manufacturing projects. The EU's Global Gateway could be leveraged for the necessary investment. However, in situations where otherwise productive EU companies are being threatened by state-sponsored competition, the EU should be prepared to apply trade measures in line with principles described above [see the Box in chapter 1 – the starting point].

As part of its decarbonisation strategy, the EU should develop an industrial action plan for the automotive sector [see the chapter on automotive]. In the short term, the main objective for the sector should be to avoid a radical delocalisation of production away from the EU or the rapid takeover of EU plants and companies by state-subsidised foreign producers, while continuing decarbonisation. The countervailing tariffs recently adopted by the Commission against Chinese automotive companies making battery EVs will help level the playing field in this regard while accommodating genuine productivity gains in China. Looking forward, the report recommends for the EU to develop an industrial roadmap that accounts for the horizontal convergence (i.e. electrification, digitalisation and circularity) and the vertical convergence (i.e. critical raw materials, batteries, transport and charging infrastructure) of value chains in the automotive ecosystem. As part of this action plan, the EU should evaluate support for IPCEIs in the automotive sector. Scale, standardisation and collaboration will be crucial for EU manufacturers to become competitive in areas such as small and affordable European EVs, software-defined vehicle and autonomous driving solutions, and the circularity value chain. A coherent digital policy, encompassing the data ecosystem, should support these developments. In building such a roadmap, the EU should follow a technology-neutral approach in defining the path to CO_2 and pollutant reductions and should take stock of market and technological developments.

The wider EU strategy towards cross-border and modal integration and sustainable transport needs to plan for competitiveness and not only for cohesion [see the chapter on transport]. Transport should be based on a new unified approach to planning at the EU and national levels, focused on harmonisation and interoperability as well as cohesion. This approach should be matched by deeper coordination with adjacent network industries (energy and telecoms) and new incentives in the EU budget for Member States to remove barriers to EU integration and ensure interoperability and competition in all transport segments, when these goals goes beyond the application of EU law. The EU should also continue to reinforce its leading position in innovative transport by launching industrial innovation projects for decarbonisation challenges, such as an industrial demonstrator (as part of a new Competitiveness Joint Undertaking, replacing current public-private partnerships) or an IPCEI for the zero-emission flight of the future.

ENDNOTES

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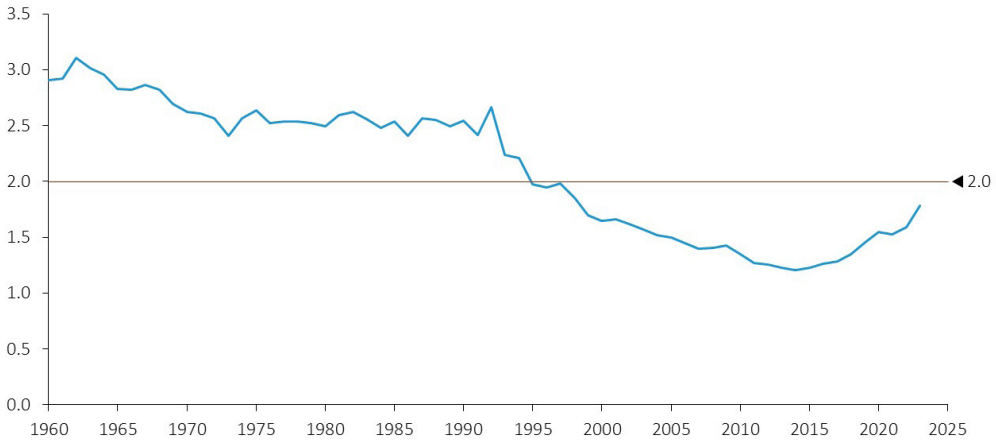
x IEA, Advancing Clean Technology Manufacturing, 2024.

4. Increasing security and reducing dependencies

While dependencies are a two-way street, Europe is vulnerable to both coercion and, in extreme cases, geo-economic fragmentation. Europe has extensive external dependencies, ranging from critical raw materials (CRMs) to advanced technologies. Many of these dependencies could become vulnerabilities in a situation where trade fragments along geopolitical lines. Around 40% of Europe's imports are sourced from a small number of suppliers and difficult to substitute, and around half of these imports originate from countries with which it is not strategically aligned[i]. As a result, Europe's notional exposure to any "sudden stops" in trade caused by geopolitical conflagration is high. However, absent an extreme unforeseen scenario, a profound and rapid decoupling of global trade seems unlikely in the medium term. Evidence of de-globalisation is currently limited, with companies preferring to diversify suppliers rather than re-shore or near-shore production on a significant scale[ii]. Neither China nor the EU has an incentive to accelerate this process: as the previous chapter demonstrated, China is reliant on the EU to absorb its excess capacity in clean technologies. The more immediate risk for Europe is that dependencies could be used to create an opportunity for coercion, making it harder for the EU to maintain a united stance and undermining its common policy objectives. A growing use of dependencies as a "geopolitical weapon" is in turn likely to increase uncertainty and have a detrimental effect on business investment[iii].

Deteriorating geopolitical relations also create new needs for spending on defence and defence industrial capacity. Europe now faces conventional warfare on its Eastern border and hybrid warfare everywhere, including attacks on energy infrastructure and telecoms, interference in democratic processes and the weaponisation of migration[iv]. At the same time, US strategic doctrine is shifting away from Europe and towards the Pacific Rim – for example in the format of AUKUS – driven by the perceived threat of China. As a result, a growing demand for defence capability is being met by a shrinking supply – a gap which Europe itself must fill. However, thanks to a prolonged period of peace in Europe and the US security umbrella, only ten Member States now spend more than or equal to 2% of GDP in line with NATO commitments, although defence expenditures are rising [see Figure 1]. The defence industry requires massive investments to catch up. As a point of reference, if all EU Member States who are NATO Members and who have not yet reached the 2% target were to do so in 2024, defence spending would rise by EUR 60 billion. Additional investments are also needed to restore lost capabilities owing to decades of underinvestment and to replenish depleted stocks, including those donated to support the defence of Ukraine against Russian aggression. In June 2024, the Commission estimated that additional defence investments of around EUR 500 billion are needed over the next decade.

FIGURE 1
EU Member States' defence expenditure
% of GDP



Source: SIPRI. Accessed 2024.

Becoming more independent creates an "insurance cost" for Europe, but these costs can be mitigated by cooperation. Reducing dependencies across the key areas where Europe is exposed will require significant investments and entail significant costs. Increasing CRM security requires investments in mining – both at home and in resource-rich countries – processing, stockpiling and recycling. Strengthening the supply chain for semiconductors will require hundreds of billions of new spending. In both cases, these investments will lead to Europe no longer buying from the most efficient supplier and may therefore increase cost pressures for the economy in the short term. However, the "option value" of such investments increases exponentially in extreme scenarios, as the cut-off of Russian gas has shown. By becoming less vulnerable to external leverage, the EU will also benefit from increased decision-making autonomy. But to avoid a potential trade-off between independence and costs, European cooperation will be essential. CRMs are a quintessential example of where it is most cost efficient for Member States to collectively insure – including with non-EU allies – rather than to self-insure. Building up domestic capacity for advanced technologies will be most effective if priorities and demand requirements are coordinated in advance. Likewise for defence and space: all Member States will become more secure if the European defence industry can meet new demands and develop new technologies, and if the EU retains autonomous access to space.

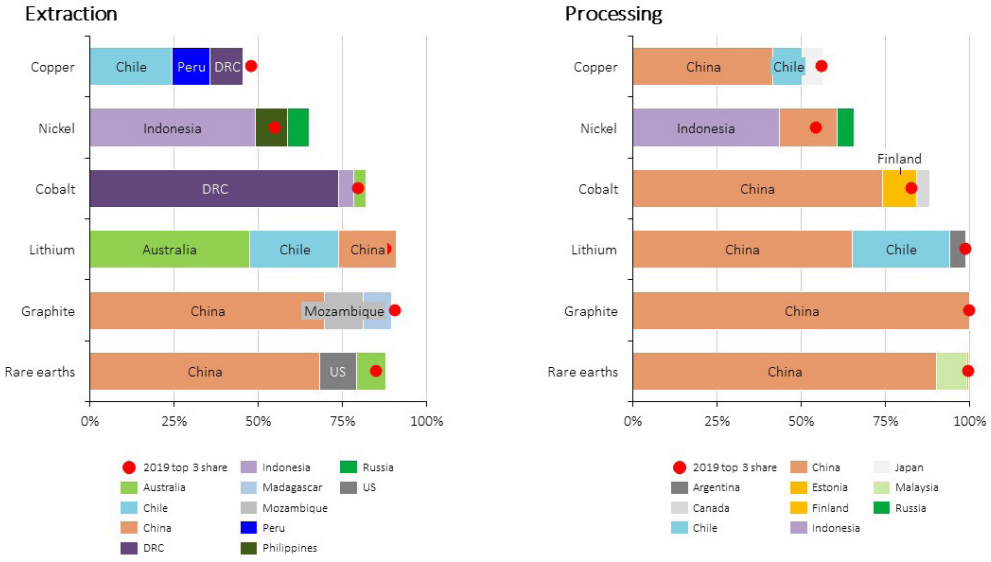
Reducing external vulnerabilities

As outlined in the previous chapter, access to CRMs is critical for the clean tech and automotive industry, yet supply is highly concentrated [see the chapter on critical raw materials]. The global market for critical minerals for the energy transition has doubled during the past five years, reaching EUR 300 billion in 2022[v]. Accelerating deployment of clean energy technologies is driving unprecedented growth in demand. From 2017 to 2022, global demand for lithium tripled, while demand for cobalt rose by 70% and 40% for nickel. According to IEA projections, mineral demand for clean energy technologies is expected to grow by a factor of 4 to 6 by 2040. However, the supply of CRMs is highly concentrated in a handful of providers, especially for processing and refining, which creates two main risks for Europe. The first is price volatility, which hampers investment decisions. For example, although an extreme case, the price of lithium increased twelvefold over two years before tumbling again more than 80%, preventing the opening of competitive mines in the EU. While oil stocks and gas storage play an important role in cushioning shocks in the energy market, there is no equivalent for critical minerals in the event of large market swings. The second risk is that CRMs can be used as geopolitical weapon, as a large part of extraction and processing is concentrated in countries with which the EU is not strategically aligned. For example, China is the single largest processer of nickel, copper, lithium and cobalt, accounting for between 35-70% of processing activity, and has shown willingness to use its market power [see Figure 2]. Export restrictions from the country grew by a factor of nine between 2009 and 2020. Little progress is being made so far with diversification. Compared with three years ago, the share of the top three producers for key CRMs either remains unchanged or has increased further.

FIGURE 2

Concentration of the extraction and processing of critical resources

Share of top-three producing countries in total production of selected resources and minerals, 2022



Source: IEA. Based on S&P Global, USGS, Mineral Commodity Summaries and Wood Mackenzie, 2024.

Faced with these constraints, CRMs are subject to a global race to secure supply chains, and Europe is currently falling behind. Other major economies are moving to secure independent supply chains and reduce their vulnerability. Alongside its dominant position in processing and refining, China is actively investing in mining assets in Africa and Latin America and overseas refining via its Belt and Road initiative. Its overseas investment in metals and mining through the Belt and Road Initiative reached a record high of USD 10 billion in the first half of 2023 alone, and it plans to double the ownership of overseas mines containing critical minerals by Chinese companies. The US has deployed the IRA, the Bipartisan Infrastructure Act and defence funding to develop at scale domestic processing, refining and recycling capacity, as well as using its geopolitical power to secure the global supply chain. Japan is highly dependent on other regions for CRMs, and since the 2000s it has developed a strategic approach to increase access to overseas mining projects. The Japan Organization for Metals and Energy Security invests equity in mining and refining assets around the world, manages strategic stockpiling and, since the introduction of the recent

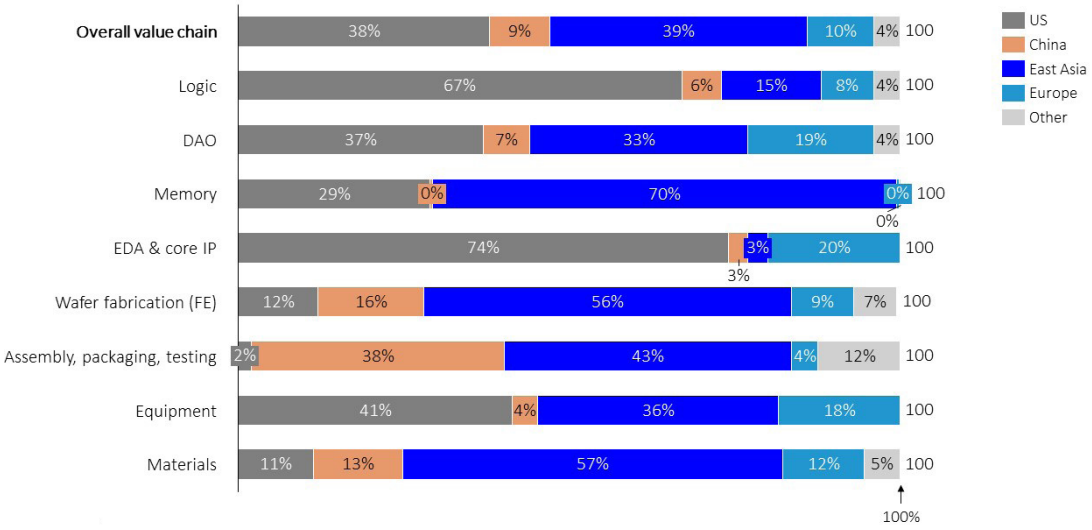
economic security law, has powers to develop processing and refining facilities within Japan. Europe, by contrast, has a comparable level of dependencies, being highly dependent on one or two countries for most of its critical mineral imports. However, it is not following a similarly coordinated approach. The EU is lacking a comprehensive strategy covering all stages of the supply chain (from exploration to recycling) and, unlike its competitors, the mining and trading of commodities is largely left to private actors and the market.

Strategic dependencies also extend to critical technologies for the digitalisation of Europe's economy [see the chapter on digitalisation and advanced technologies]. The EU relies on foreign countries for over 80% of digital products, services, infrastructure and intellectual property[vi]. Dependencies are particularly acute, however, for semiconductors owing to the structure of the industry, which is dominated by a small number of large players. The US has specialised in chips design, Korea, Taiwan and China in chips manufacturing, and Japan and some EU Member States in key materials and equipment – optics, chemistry and machinery [see Figure 3]. Europe has little domestic capacity in many parts of the supply chain. For example, the EU currently has no foundry producing below 22 nm process nodes and relies on Asia for 75% to 90% of wafer fabrication capacity (as does the US). Europe has become dependent on non-EU countries for chips design, packaging and assembly as well. Dependencies are also acute for other advanced tech. The EU's AI industry relies on hardware produced largely by one US-based company for the most advanced processors. Similarly, Europe's dependence on cloud services developed and run by US companies is massive. For quantum computing platforms, the EU suffers from six critical dependencies across 17 key technologies, components and materials. China and the US hold technological leadership in most of these critical elements. In the telecoms sector, Europe is less dependent on foreign technology: top EU vendors are well positioned in the global supply of telecoms equipment. However, it will be important that dependencies do not increase, especially on high-risk suppliers that could compromise the security of EU networks and citizens' data. Currently, 14 Member States have no restrictions on high-risk suppliers in place.

FIGURE 3

Share in semiconductor value chain by country

% of worldwide total, 2019



Source: SIA, 2021.

To reduce its vulnerabilities, the EU needs to develop a genuine "foreign economic policy" based on securing critical resources [see the chapter on critical raw materials]. In the short term, the EU needs to implement the Critical Raw Materials Act (CRMA) rapidly and fully. The report recommends complementing this Act with a comprehensive strategy covering all stages of the critical mineral supply chain, from extraction to processing to recycling. To strengthen Europe's position at the procurement stage, it is proposed to create a dedicated EU Critical Raw Material Platform. The platform would leverage Europe's market power by aggregating demand for the joint purchasing of critical materials (following the model used in South Korea and Japan) and coordinating the negotiation of joint purchases with producer countries. It would also help lower "insurance costs" for Member States by managing future strategic stockpiles at the EU level, going beyond the soft request for national stockpiles

included in the CRMA. In parallel, it is recommended that the EU further develops its "resource diplomacy" for CRMs. Proposals include upgrading the Global Gateway – which promotes investment in third countries – to focus on the EU's strategic needs and developing joint strategies with other buyers from strategically aligned countries, for example through a G7+ Critical Raw Materials Club (including Japan, South Korea and Australia). The EU should also carefully explore the potential of environmentally-sustainable deep sea mining: estimates suggest that the sea bed holds large multiples of the known land-based reserves for example for copper, titanium, manganese, cobalt, nickel and rare earth elements[vii].

The EU must also harness the potential of domestic resources through mining, recycling and innovation in alternative materials. Unlike fossil fuels, the EU has deposits of some critical raw materials, such as lithium in Portugal. Accelerating the opening of domestic mines could enable the EU to meet its entire demand for some critical minerals. The CRMA already calls on Member States to implement shorter permitting timeframes for "Strategic Projects": 27 months for extraction permits and 15 months for processing, compared with processes that take three to five times as long today. However, the report recommends additional actions to accelerate the pace of permitting, for example increasing administrative capacity by mandating pre-defined staff resources to be allocated to Strategic Projects. At the same time, materials found in retired EVs, windmills and other goods represent a further supply that could be tapped through recycling. The EU could potentially meet more than half to three quarters of its metal requirements for clean technologies in 2050 through local recycling[viii]. It is therefore recommended to establish a true Single Market for waste and circularity. Achieving this goal will require strengthening the secondary market for critical raw materials waste, effectively enforcing existing legislation on waste collection and shipment to allow the build-up of scale, and coordinating EU export controls on waste. Finally, boosting R&I for alternative materials or processes will be crucial to substitute critical raw materials. For example, US tech companies have recently combined federal research labs to use AI to develop a new material that could reduce the lithium content in batteries by 70%[ix].

For strategic industries, the EU should pursue a coordinated EU strategy to bolster domestic production capacity and to protect key network infrastructures [see the chapter on digital and advanced technologies]. While EU ownership of large foundries may be unrealistic at this stage owing to the required investment levels, Europe should maximise its joint efforts to strengthen innovation in semiconductors and its presence in the most advanced chips segments. The report recommends launching a common strategy based around four elements. First, funding for innovation and the establishment of testing labs near existing centres of excellence. Second, providing grants or R&D tax incentives for "fabless" companies active in chips design and foundries in selected strategic segments. Third, supporting the innovation potential of mainstream chips. Fourth, coordinating EU efforts in back-end 3D advanced packaging, advanced materials and finishing processes. Total investments in industrial deployment of around EUR 100 billion have been announced in the EU since the proposal for a European Chips Act, mostly supported by Member States under State aid control. However, there is a risk that a fragmented approach leads to weak coordination of priorities and demand requirements, lack of scale for domestic producers, and in turn less ability to invest in more innovative semiconductor segments. It is therefore proposed to create a centralised EU budgetary allocation dedicated to semiconductors supported by a new "fast-track" IPCEI. Use of this tool would entail co-financing from the EU budget and shorter approval times for semiconductor projects. For telecoms, it is recommended to strengthen security considerations in technology sourcing by favouring the use of EU trusted vendors for spectrum assignment in all future tenders, and by promoting EU-based telecoms equipment providers as strategic in trade negotiations.

Strengthening industrial capacity for defence and space

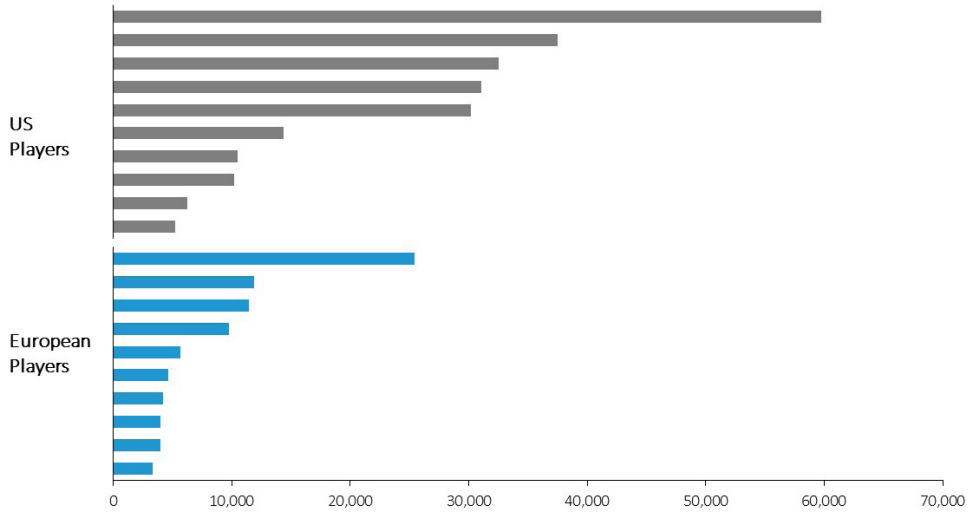
The European defence industry not only suffers from lower defence spending but also a lack of focus on technological development [see the chapter on defence]. The European defence sector is highly competitive globally, registering an annual turnover of EUR 135 billion in 2022 and strong export volumes. Some EU products and technologies are superior or at least equivalent in quality to those produced by the US, such as main battle tanks, conventional submarines, naval shipyard technology and transport aircraft. However, the EU defence industry is suffering from a capacity gap on two fronts. First, overall demand is lower: aggregate defence spending in the EU is about one-third as high as in the US. Second, EU spending is less focused on innovation. Defence is a highly technological industry characterised by disruptive innovation, meaning that massive R&D investments are required to maintain strategic parity. The US has prioritised R&D spending over all other military spending categories since 2014. In the 2023, it allocated EUR 130 billion (USD 140 billion) for Research, Development, Test and Evaluation, amounting to around 16% of total defence spending. This category also saw the largest relative percentage increase in the defence budget. In Europe, total funding for defence R&D was EUR 10.7 billion in 2022, amounting to just 4.5% of total spending. Complex next-generation defence systems in all strategic domains will require massive R&D investment that exceeds the capacity of single EU Member States.

The European defence industry is also fragmented, limiting its scale and hindering operational effectiveness in the field. The EU defence industrial landscape is populated mainly by national players operating in relatively small domestic markets [see Figure 4]. Fragmentation creates two major challenges. First, it means that the industry lacks scale, which is essential in a capital-intensive sector with long investment cycles. As a result, if EU Member States were to ramp up defence spending significantly, a supply crisis could occur with Member States competing between each other on the constrained European defence equipment market. Second, fragmentation leads to serious issues related to a lack of standardisation and the interoperability of equipment, which have come to light during the EU's support for Ukraine. For 155 mm artillery alone, EU Member States have provided ten different types of howitzers to Ukraine from their stocks, and some have even been delivered in different variants, creating serious logistical difficulties for Ukraine's armed forces. In terms of other products, for example, EU Member States operate twelve types of battle tanks, whereas the US produces only one[x].

FIGURE 4

Comparison of major European and US players

Defence revenues, EUR million, 2023



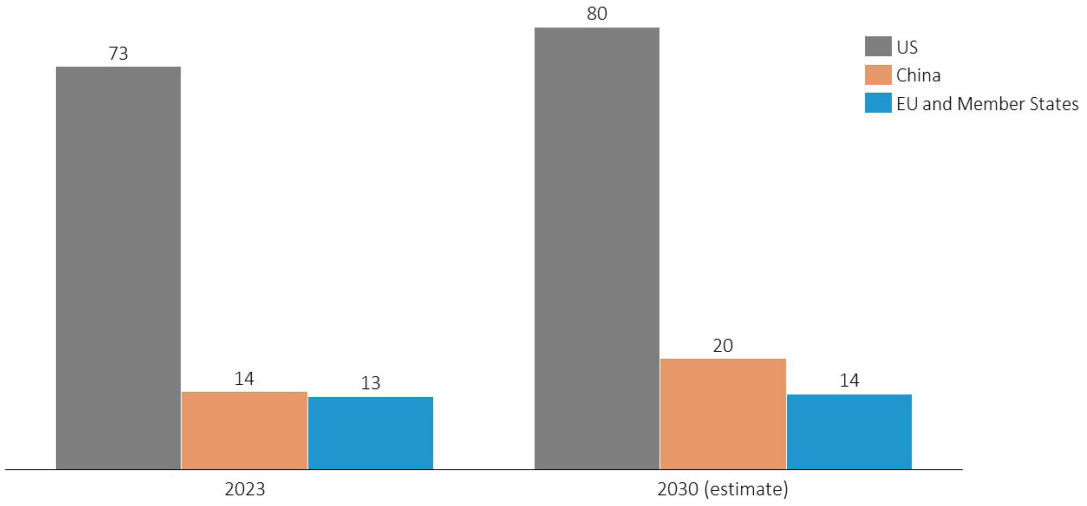
Source: Elaboration on Defence News Top 100. European players include European non-EU companies

The EU has developed a world-class space sector, despite much lower levels of funding, but is now starting to lose ground [see the chapter on space]. The EU funds, owns and manages critical space infrastructure. It has developed world-class strategic assets and capabilities, with technical competences on par with other space powers in most areas. For example, in satellite navigation, Galileo provides the most accurate and secure positioning and timing information, also for military applications. In Earth Observation, Copernicus offers the most comprehensive data worldwide, including for environmental and climate change monitoring, disaster management and security. However, the EU has lost its leading market position in commercial launchers (Ariane 4-5) and geostationary satellites. It had to rely temporarily on the Space X rockets to launch the satellites for its strategic programme Galileo. The EU also lags the US in rocket propulsion, mega-constellations for telecoms and satellite receivers and applications, which is a much larger market than the other space segments. Like the defence industry, the space sector is suffering from a marked investment gap with its major competitors. For the past forty years, investment has ranged between 15% and 20% of US levels. In 2023, public expenditure in Europe on space stood at USD 15 billion, compared with USD 73 billion in the US. China is expected to overtake Europe in the next few years, reaching an expenditure of USD 20 billion by 2030 [see Figure 5].

FIGURE 5

Government expenditure on space programmes

USD billion



Source: Euroconsult, 2023.

For both defence and space industries, insufficient aggregation and coordination of public spending in Europe compounds industrial fragmentation. European collaborative procurement accounted for only 18% of expenditure on defence equipment procurement in 2021, well below the benchmark of 35% agreed upon in the European Defence Agency frameworks. This lack of coordination creates a vicious circle for the EU defence industry. Without demand aggregation among Member States, it is more difficult for the industry to predict longer-term needs and increase supply, in turn decreasing its overall capacity to meet demand and depriving the industry of orders and opportunities. As a result, defence procurement is diverted outside of the EU. Between June 2022 and June 2023, 78% of procurement spending went to non-EU suppliers, out of which 63% went to the US. At the same time, when EU Member States organise and cooperate, the results are positive. One such example is the A330 Multi-Role Tanker Transport, which was developed through a collaborative project allowing participating countries to pool resources and share operation and maintenance costs. The European space sector is likewise hindered by insufficient demand aggregation and investment coordination among Member States. Furthermore, the European Space Agency (ESA) operates based on the principle of “geographical return”, meaning that it invests in each of its member countries through industrial contracts for space programmes an amount which is similar to the country’s financial contribution to the agency. This principle leads to an inevitable fragmentation of supply chains, the unnecessary duplication of capacities in relatively small markets and a mismatch between the most competitive industrial actors and the actual allocation of resources.

In the absence of common European spending, policy actions for the defence sector need to focus on aggregating demand and integrating industrial defence assets [see the chapter on defence]. In the short term, the swift implementation of the European Defence Industrial Strategy and the related European Defence Industry Programme is needed. In particular, it is essential to increase substantially the aggregation of demand between groups of Member States, at least among those who opt to do so, and to raise the share of joint defence procurement. The report recommends further steps to develop a medium-term EU Defence Industrial Policy which can support the structural cross-border integration of defence assets and the selective integration and consolidation of EU industrial capacity, with the explicit aim of increasing scale, standardisation and interoperability. EU competition policy should enable such consolidation when increased scale would deliver efficiencies or allow the realisation of globally competitive investments. In addition, as EU defence spending rises, defence industrial consolidation, integration and technological innovation should be supported by reinforced European preference principles in procurement, ensuring that a minimum share of this rising demand is concentrated on European companies rather than flowing overseas.

Together with the urgent need to increase overall defence investment, there is a strong case to reinforce cooperation and pooling of resources for defence R&D at the EU level. The defence sector is facing massive investment needs [see the chapter on investment]. While the defence sector overall will benefit from measures to deepen EU capital markets, innovative defence SMEs will need additional support. Relevant measures could include modifying the EIB Group's lending policies on excluding defence investment and clarifying the EU's Environmental, Social and Governance frameworks on the financing of defence products. Defence R&D, however, is a special category of spending that warrants a unique approach. Currently, the EU invests around EUR 1 billion in defence R&D per year, while the bulk of investment takes place at the Member State level. But several new or technically complex segments – such as drones, hypersonic missiles, directed-energy weapons, defence artificial intelligence and seabed and space warfare – call for pan-European coordination. No Member State can effectively finance, develop, produce and sustain all the necessary capabilities and infrastructure that are required to maintain leadership in these technologies. At the same time, the spillovers from defence R&D to other sectors of the economy and privately funded R&D are large[xi]. The report therefore recommends that European funding for R&D is both increased and concentrated on common initiatives. This approach could be developed through new dual-use programmes and a proposed European Defence Projects of Common Interest to organise the necessary industrial cooperation.

The European space sector would benefit from updated governance and investment rules, and greater coordination of public spending in a true Single Market for space. The report recommends progressively removing the ESA's geographical return principle. The ESA's procurement rules should reflect the outcome of industrial competition and the choice of the best providers, and resources should be concentrated on projects that demonstrate the potential for significant scientific or technological advancement, regardless of the location of the participating entities. This process should be accompanied by the establishment of a functioning Single Market for space, with common standards and the harmonisation of licensing requirements (in line with the planned EU Space Law). It is also proposed to establish a multi-purpose Space Industrial Fund that would allow the European Commission to act as an "anchor customer" to jointly purchase space services and products and fund critical technologies, helping the EU industrial base to increase its capacity. Similarly, joint strategic priorities for space research and innovation should be supported by increased coordination, funding and the pooling of resources for the development of new large EU joint programmes. Finally, as for the defence sector, the growth of innovative EU space SMEs, start-ups and scale-ups should be enabled by improved access to finance and the introduction of targeted European preference rules.

ENDNOTES

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5. Financing investments

The financing needs required for the EU to meet its objectives are massive, but productive investment is weak despite ample private savings [see the chapter on investment]. To meet the objectives laid out in this report, a minimum annual additional investment of EUR 750 to 800 billion is needed, based on the latest Commission estimates, corresponding to 4.4-4.7% of EU GDP in 2023. For comparison, investment under the Marshall Plan between 1948-51 was equivalent to 1-2% of EU GDP. Delivering this increase would require the EU's investment share to jump from around 22% of GDP today to around 27%, reversing a multi-decade decline across most large EU economies. However, productive investment in the EU is not rising to this challenge. Since the Great Financial Crisis (GFC), a sizeable and persistent gap has opened between private productive investment[01] in the EU and the US. At the same time, the private investment gap across the two economies has not been offset by higher government investment, which also dropped after the GFC and has been persistently lower in the EU compared to the US as a share of GDP. EU households provide ample savings to finance higher investment, but at present these savings are not being channelled efficiently into productive investments. In 2022, EU household savings were EUR 1,390 billion compared with EUR 840 billion in the US. But, despite their higher savings, EU households have considerably lower wealth than their US counterparts, largely because of the lower returns they receive from financial markets on their asset holdings.

The EU can meet these investment needs without overstretching the resources of the European economy, but the private sector will need public support to finance the plan. The European Commission and the IMF's Research Department have simulated scenarios of a sustained EU investment push of around 5% of GDP, using their multi-country models. The results suggest that investment of this magnitude would increase output by around 6% within 15 years. Since supply adjusts more gradually than demand – as the build-up of additional capital takes time – the transition phase implies some inflationary pressures, but these pressures dissipate over time. Unlocking the investment will be challenging. Historically in Europe, around four-fifths of productive investment has been undertaken by the private sector, and the remaining one-fifth by the public sector. Delivering private investment of around 4% of GDP through market financing alone would require a reduction in the private cost of capital – by approximately 250 basis points in the European Commission model. Although improved capital market efficiency (e.g. through the completion of the Capital Markets Union) is expected to reduce private financing costs, the reduction will likely be substantially smaller. Fiscal incentives to unlock private investment therefore appear necessary to finance the investment plan, in addition to direct government investment.

The required stimulus to private investment will have some impact on public finances, but productivity gains can reduce the fiscal costs. If the investment-related government spending is not compensated by budgetary savings elsewhere, primary fiscal balances may temporarily deteriorate before the investment plan fully exerts its positive impact on output. However, if the strategy and reforms outlined in this report are implemented in parallel, the investment push should be accompanied by a significant increase in EU total factor productivity (TFP). A sizable increase in TFP will improve the government budget surplus, significantly reducing the transitional costs of implementing the plan, provided that the additional revenue is not fully spent on other purposes. For example, a 2% increase in the level of TFP within ten years could already be sufficient to cover up to one third of the fiscal spending (investment subsidies and government investment) required to implement the plan. The 2% TFP increase can be considered modest given the current 20% gap TFP levels between the EU and the US.

THE ROOT CAUSES OF LOW INVESTMENT FINANCING IN EUROPE

A key reason for less efficient financial intermediation in Europe is that capital markets remain fragmented and flows of savings into capital markets are lower. While the Commission has introduced several measures to build a Capital Markets Union (CMU), three main fault lines remain. First, the EU lacks a single securities market regulator and a single rulebook for all aspects of trading and there is still high variation in supervisory practices and interpretations of regulations. Second, the post-trade environment for clearing and settlement in Europe is far less

01. Productive investment is defined as gross fixed capital formation minus residential investment.

unified than in the US. Third, despite the recent progress made on withholding tax, tax and insolvency regimes across Member States remain substantially unaligned. EU capital markets are also undersupplied with long-term capital relative to other major economies, owing largely to the underdevelopment of pension funds. In 2022, the level of pension assets in the EU was only 32% of GDP while in the US total assets amounted to 142% of GDP and in the UK to 100%. This difference reflects the fact that most European households' pension wealth takes the form of claims on public pay-as-you-go social security systems. EU pension assets are highly concentrated in a handful of Member States with more developed private pension systems. The combined share of the Netherlands, Denmark and Sweden in EU pension assets amounts to 62% of the EU total.

The mirror image is that the EU relies excessively on bank financing, which is less well-suited to fund innovative projects and faces several constraints. Although the GFC and the ensuing bank deleveraging led to a greater role for capital markets and non-bank finance in Europe, bank loans are still the most important source of external finance for companies. However, banks are typically ill-equipped to finance innovative companies: they lack the expertise to screen and monitor them and have difficulties valuing their (largely intangible) collateral, especially compared to angel financiers, venture capitalists and private equity providers. Banks in Europe also suffer from lower profitability than their US counterparts – in large part because US banks gain higher net fee and commission income from operating in their deeper capital markets – and lack scale relative to their US counterparts owing to the incomplete Banking Union. EU banks also face some specific regulatory hurdles which constrain their capacity to lend. In particular, EU banks cannot rely on securitisation to same extent as their US counterparts. Annual issuance of securitisations in the EU stood at just 0.3% of GDP in 2022, while for the US the figure was 4%. Securitisation makes banks' balance sheets more flexible by allowing them to transfer some risk to investors, release capital and unlock additional lending. In the EU context, it could also act as a substitute for lack of capital market integration by allowing banks to package loans originating in different Member States into standardised and tradeable assets that can be purchased also by non-bank investors.

At the same time, EU support for both public and private investment is constrained by the size of the EU budget, its lack of focus and a too conservative attitude to risk. The EU's annual budget is small, amounting to just over 1% of EU GDP, while Member States' budgets are collectively close to 50%. It is also not allocated towards the EU's strategic priorities: despite attempts at reform, the shares of the 2021-2027 Multiannual Financial Framework (MFF) allocated to cohesion and the common agricultural policy are still 30.5% and 30.9%, respectively. Moreover, the EU budget is fragmented across close to 50 spending programmes, preventing EU financing from reaching sufficient scale for larger pan-European projects. Access to EU funding is complex and bureaucratic for private actors, and there is limited room to accommodate new policy priorities or respond to unforeseen developments. The capacity of the EU budget to mobilise private investment through risk-sharing instruments is also hampered by too little appetite for risk. The largest risk-sharing instrument currently in place is the InvestEU programme, but the implementing partners, such as the EIB Group, remain mostly focused on the lower-risk scope of investment. Finally, repayment of EU borrowing under the NextGenerationEU (NGEU) programme will start in 2028 and account for EUR 30 billion per year. Without a decision on new own resources, effective spending power at the EU level would be mechanically reduced by interest and principal repayments.

It is unquestionable that the issuance of a common safe asset would make the CMU much easier to achieve and more complete. First, it would facilitate the uniform pricing of corporate bonds and derivatives by providing a key benchmark, in turn helping to standardise financial products across the EU and making markets more transparent and comparable. Second, it would provide a type of safe collateral that can be used in every Member State and in all market segments, in the activities of central counterparties and in interbank liquidity exchanges, including on a cross-border basis. Third, a common safe asset would provide a large, liquid market that attracts investors globally, leading to lower costs of capital and more efficient financial markets across the EU. This asset would also form the basis of international euro reserves held by other central banks, enhancing the role of the euro as a reserve currency. Fourth, it would provide all European households with a safe and liquid retail asset accessible at a common price, reducing information asymmetries and 'home bias' in the allocation of retail funds.

Some joint funding of investment at the EU level is necessary to maximise productivity growth, as well as to finance other European public goods. The more that governments implement the strategy laid out in this report, the greater the increase in productivity will be, and the easier it will be for governments to bear the fiscal costs of supporting private investment and of investing themselves. Joint funding for specific projects will be key to maximise

the productivity gains of the strategy, such as investing in breakthrough research and infrastructures to embed AI into the economy. At the same time, there are other public goods identified in this report – such as investing in grids and interconnectors, and financing the joint procurement of defence equipment and defence R&I – that will be undersupplied without common action and funding. Finally, for Member States to converge more closely in their policies – be it the Single Market or more generally in the policies described in this report such as climate, innovation, defence, space and education – both regulation and incentives will be required. Incentives will also require common funding. However, if the strategy is not fully implemented and productivity growth does not pick up, a broader issuance of public debt may be needed to make the funding of the transitions a more realistic proposition.

The issuance of common safe assets to fund joint investment projects could follow existing templates – however, it would have to be accompanied by all the safeguards that such a fundamental step would entail. The use of a common safe asset has a well-established precedent in the funding of the NGEU. The present circumstances are equally serious, even if less dramatic. But issuing such assets on a more systematic basis would require a stronger set of fiscal rules which ensure that an increase in common debt is matched by a more sustainable path of national debt. In this way, all EU Member States could contribute to such an asset without prejudging the sustainability of their public debt. Issuance would also have to remain mission and project-specific.

MOBILISING PRIVATE AND PUBLIC FINANCE AT SCALE

To unlock private capital, the EU must build a genuine Capital Markets Union (CMU) supported by a stronger pension. As a key pillar of the CMU, the European Securities and Markets Authority (ESMA) should transition from a body that coordinates national regulators into the single common regulator for all EU securities markets, similar to the US Securities and Exchange Commission. An essential step to transform ESMA into such an agency is modify its governance and decision-making processes along similar lines as those of the ECB Governing Council, detaching them as much as possible from the national interests of EU Member States. Harmonising insolvency frameworks will also be critical to remove fragmentation created by differing creditor hierarchies, while the EU should continue to eliminate taxation obstacles to cross-border investing. These measures would in turn make it easier to foster centralisation in clearing and settlement. Ultimately, the EU should aim to create a single central counterparty platform (CCP) and a single central securities depository (CSD) for all securities trades. As for smaller clearing houses the benefits of consolidation may not be large, a practical pathway towards consolidation could start with consolidating the largest CCPs and CSDs, and then counting on their gravitational pull to attract smaller ones. The EU must also better channel households' savings to productive investments. The easiest and most efficient way to do so is via long-term saving products (pensions). To increase the flow of funds into capital markets, the EU should encourage retail investors through the offer of second pillar pension schemes, replicating the successful examples of some EU Member States.

To increase the financing capacity of the banking sector, the EU should aim to revive securitisation and complete the Banking Union. This report recommends that the Commission makes a proposal to adjust prudential requirements for securitised assets. Capital charges must be reduced for certain simple, transparent and standardised categories for which charges do not reflect actual risks. In parallel, the EU should review transparency and due diligence rules for securitised assets, which are relatively high compared to other asset classes and reduce their attractiveness. Setting up a dedicated securitisation platform, as other economies have done, would help to deepen the securitisation market, especially if backed by targeted public support (for example, well-designed public guarantees for the first-loss tranche). The EU should also assess whether current prudential regulation, also in light of the possible upcoming implementation of Basel III, is adequate to have a strong and international competitive banking system in the EU. A minimal step towards completing the Banking Union would be to create a separate jurisdiction for European banks with substantial cross-border operations that would be "country blind" from the regulatory, supervisory and crisis management viewpoints.

The EU budget should be reformed to increase its focus and efficiency, as well as being better leveraged to support private investment. The EU's financial resources should be refocused on jointly agreed strategic projects and objectives, where the EU brings the most added value. Under the next EU budget, the report recommends establishing a "Competitiveness Pillar" to direct EU funding towards priority projects identified under the Competitiveness Coordination Framework [see the chapter on governance]. As part of this process, the EU should streamline

its budget structure to achieve sufficient scale to support strategic projects and to simplify access to beneficiaries. It is proposed to regroup and substantially decrease the number of all funding programmes. Dedicated funding schemes should be put in place to address the investment gap for scale-up technology companies in the EU [see the chapter on innovation], as well as manufacturing capacities in certain cases, such as clean tech. The flexibility of the EU budget should be enhanced to enable the reallocation of resources across and within programmes and potential beneficiaries. The EU budget should also be better leveraged to support private investment through different types of financial instruments and more risk appetite by implementing partners. In particular, it is recommended to increase the size of the EU guarantee for the InvestEU Programme. The InvestEU programme should in turn focus on financing higher risk and more scale-up investment. This objective will require the EIB Group to take on more and larger high-risk projects, making greater use of the EIB Group's own financial firepower.

Finally, the EU should move towards regular issuance of common safe assets to enable joint investment projects among Member States and to help integrate capital markets. If the political and institutional conditions are in place as outlined above, the EU should continue – building on the model of NGEU – to issue common debt instruments, which would be used to finance joint investment projects that will increase the EU's competitiveness and security. As several of these projects are longer-term in nature, such as financing R&I and defence procurement, common issuance should over time produce a deeper and more liquid market in EU bonds, allowing this market to progressively support the integration of Europe's capital markets. At the same time, together with the above reforms, to finance a variety of programmes focused on innovation and on raising productivity, Member States could consider increasing the resources available to the Commission by deferring the repayment of NGEU.

6. Strengthening governance

A new industrial strategy for Europe will not succeed without parallel changes to the institutional setup and functioning of the EU. As demonstrated throughout this report, successful industrial policies today require strategies that span investment, taxation, education, access to finance, regulation, trade and foreign policy, united behind an agreed strategic goal. Europe's major competitors, as single countries, can apply these strategies. The EU's decision-making rules are based on a valid internal logic – to achieve consensus or at least reach a broad majority – but they appear slow and cumbersome in comparison with developments taking place externally. Crucially, Europe's decision-making rules have not substantially evolved as the EU has enlarged and as the global environment facing Europe has become more hostile and complex. Decisions are typically made issue-by-issue in different sub-committees, with little coordination across policy areas. Multiple veto players can delay or dilute action. The upshot is a legislative process with an average time of 19 months to agree new laws[01] – from the Commission's proposal to the signing of the adopted act – and which even then does not deliver results at the level and pace EU citizens expect. Strengthening the EU requires Treaty changes, but it is not a precondition for Europe to move forward: much can be done with targeted adjustments. Until the consensus for Treaty changes is in place, a renewed European partnership should be built on three overarching goals: refocusing the work of the EU, accelerating EU action and integration, and simplifying rules.

REFOCUSING THE WORK OF THE EU

The report recommends establishing a new "Competitiveness Coordination Framework" to foster EU-wide coordination in priority areas, replacing other overlapping coordination instruments. The EU has a variety of tools to coordinate policies, such as the European Semester for economic policies and National Energy and Climate Plans for energy policies. In most cases, however, the established processes have so far proven to be largely bureaucratic and ineffective at fostering genuine EU-wide policy coordination. The new framework would address only EU-level strategic priorities – "EU Competitiveness Priorities" – which would be formulated and adopted by the European Council. These priorities would be defined at the beginning of each European political cycle in a European Council debate and adopted in European Council conclusions[02]. Thereafter, the coordination of all economic policies relevant to the EU's agreed strategic priorities would be merged into the new coordination framework, excluding fiscal policy surveillance which would continue to be governed by the European Semester exercise. Not only would this rationalisation help to organise and focus the EU's activities, it would also represent a major simplification exercise for both EU and national administrations.

The Competitiveness Coordination Framework would be divided into Competitiveness Action Plans for each strategic priority, with well-defined objectives, governance, and financing. For the first cycle, the objectives could correspond to the goals set out in this report. Governance of the Action Plans should aim to minimise bureaucracy and involve a wide range of stakeholders: Member States, technical experts, the private sector, and EU institutions and agencies. The Commission should have a mandate for horizontal actions and exclusive competencies of the EU, such as revamping competition policy and reducing administrative and regulatory burdens. For shared competencies like closing the skills gap and accelerating innovation, the Commission should provide guidelines and share the institutional setup for implementation with relevant national bodies and industry experts, as discussed in the relevant chapters of this report. In specific sectors of the economy, a new setup could be envisaged bringing together the Commission, industry and Member States, as well as relevant sectoral agencies.

01. During the first half of the 2019-2024 parliamentary term.

02. Article 121 TFEU provides a legal basis for establishing a Competitiveness Coordination Framework. The procedure involves the Council and the European Council.

The consolidation of the EU's various coordination mechanisms should be matched by a consolidation of its budgetary resources. EU resources should focus on funding public goods that are critical to the EU's strategic priorities and which would otherwise be undersupplied by Member States or the private sector [see the chapter on investment]. Already under the current Multiannual Financial Framework (MFF), programmes such as InvestEU could be made more effective by adjusting the mandates of the implementing partners to enable more risk-taking. Under the next MFF, the report recommends defining a "Competitiveness Pillar" with funding hypothecated to delivering the Action Plans. The EU also needs to leverage better the large spending power of the Member States – which is collectively equivalent to other major economies – by improving cooperation and focus. It is recommended to create nationally pre-allocated envelopes in the MFF to incentivise and co-finance multi-country industrial projects, which can be activated by a sub-group of interested Member States if necessary. It is also proposed to deploy two revamped tools: a new Competitiveness IPCEI allowing State aid for cross-border projects, including industrial infrastructure, and a new Competitiveness Joint Undertaking to quickly set up public-private partnerships between the Commission, interested Member States and industries.

At the same time, refocusing implies that the EU should be more rigorous in applying the subsidiarity principle and exercise more "self-restraint". The Commission's legislative activity has been growing excessively, also due to passive scrutiny of the subsidiarity principle by national parliaments, which sets the boundaries of the Commission's right of initiative. While national parliaments have the power to scrutinise whether EU legislation complies with the subsidiarity principle through reasoned opinions – and potentially trigger the so-called "yellow card procedure" – many do not actively exercise this right. For example, of the 39 national parliaments or chambers in the EU, only nine (from seven Member States) issued reasoned opinions in the context of scrutinising subsidiarity in 2023. An EU-wide inquiry should be launched to analyse the reasons behind national parliaments' passive exercise of their scrutiny of the subsidiarity principle. Building on its conclusions, initiatives should be taken to reinforce the administrative capacity and role of national parliaments and Member States in their control over EU legislative activity. Moreover, EU institutions should apply a "self-restraint" principle in policymaking, both by better filtering future initiatives and by streamlining the existing acquis, building on the measures described in "Simplifying rules" below.

ACCELERATING THE WORK OF THE EU

Council votes subject to qualified majority voting (QMV) should be extended to more areas, and if action at the EU level is blocked, a differentiated approach to integration should be pursued. So far, many efforts to deepen European integration between Member States have been hindered by unanimity voting in the Council of the European Union. All possibilities offered by the EU Treaties should therefore be exploited to extend QMV. The so-called "passerelle" clause should be leveraged to generalise voting by qualified majority in all policy areas in the Council. This step would require an upfront agreement, subject to unanimity at the level of the European Council, and would have a positive impact on the pace at which key legislative initiatives are adopted by the EU. If action at the EU level is hindered by existing institutional procedures, the next-best option is for like-minded groups of Member States to resort to enhanced cooperation as foreseen by Articles 20 TEU and 329 TFEU. Enhanced cooperation offers two important safeguards: the consent of the European Parliament (EP) and judicial oversight of the Court of Justice of the EU (CJEU). It is also based on a Commission proposal. As an illustration, if the EU is unable to establish a special regime for innovative companies under normal procedures, a voluntary 28th company rulebook harmonising legislation concerning corporate law and insolvency, as well as a few key aspects of labour law and taxation, to be made progressively more ambitious, could be explored under enhanced cooperation by willing Member States. As a last resort, intergovernmental cooperation should be considered. However, acting outside of the Treaties creates parallel legal frameworks and implies the absence of judicial oversight by CJEU, democratic legitimacy via the EP, and the Commission's involvement in preparing texts.

SIMPLIFYING RULES

The regulatory burden on European companies is high and continues to grow, but the EU lacks a common methodology to assess it. The Commission has been working for years to reduce the "stock" and "flow" of regulation under the Better Regulation agenda. However, this effort has had limited impact so far. The stock of regulation

remains large and new regulation in the EU is growing faster than in other comparable economies. While direct comparisons are obscured by different political and legal systems, around 3,500 pieces of legislation were enacted and around 2,000 resolutions were passed in the US at the federal level over the past three Congress mandates (2019-2024). During the same period, around 13,000 acts were passed by the EU. Despite this increasing flow of regulation, the EU lacks a quantitative framework to analyse the costs and benefits of new laws. Among the EU institutions, only the Commission has developed a methodology (the Standard Cost Model) to calculate regulatory burdens, but its concrete application varies across pieces of legislation. The co-legislators – the European Parliament and Council – have no methodology in place to measure the impact of amendments they propose to draft EU legislation. Moreover, there is no single methodology in place to assess the impact of EU legislation once transposed at national level, with only a few Member States systematically measuring the impact of transposed EU law – in turn making it harder for national parliaments to exercise scrutiny.

Companies in Europe face three main hindrances from the rising weight of regulation. First, they need to comply with the accumulation of or frequent changes to EU legislation over time, translating into overlap and inconsistencies. For example, a Business Europe gap analysis of 13 pieces of EU law flagged duplication across 169 requirements, including differences (29%) and outright inconsistencies (11%). Second, EU companies face an extra burden due to national transposition, for instance as Member States "gold plate" of EU legislation or implement laws with divergent requirements and standards from one country to another. As touched on in chapter 2, GDPR in particular has been implemented with a large degree of fragmentation which undermines the EU's digital goals. Third, EU regulation imposes a proportionally higher burden on SMEs and small mid-caps than on larger companies, yet the EU lacks a framework to assess these costs. About 80% of Commission Work Programme items are relevant to SMEs but only around half of impact assessments substantially focused on these companies. The EU also lacks a commonly agreed definition of small mid-caps and readily available statistical data.

To start lowering the "stock" of regulation, the report recommends appointing a new Commission Vice President for Simplification to streamline the acquis, while adopting a single, clear methodology to quantify the cost of the new regulatory "flow". At the start of each Commission mandate, before adopting new EU legislation, a fixed period of at least six months should be devoted to systematically assessing and stress-testing all existing regulation by sector of economic activity. On this basis, a second phase should focus on pursuing the codification and consolidation of EU legislation by policy area. This process should include simplifying and removing overlap and inconsistencies across the whole "legislative chain", with priority given to those economic sectors where Europe is particularly exposed to international competition. This exercise should be run by all members of the College of Commissioners within their respective competencies and coordinated by a Vice-President for Simplification. To ensure that new legislation is consistent with this simplification drive, a single methodology should be developed and consistently applied within the Commission across its impact assessments. This methodology should be applied to all new legislation and be adopted by co-legislators when amending legislation. It is also recommended to add a new standard requirement in the article on the transposition of directives requiring Member States to systematically assess new legislation using the same methodology as the EU institutions. At the same time, the Single Market Enforcement Taskforce (SMET) should be strengthened and focused on evaluating and addressing instances of incorrect transposition and transposition which exceeds the requirements of EU directives. Finally, implementation and enforcement authorities in the Member States should be streamlined and merged.

The EU should fully implement the announced cut by 25% of reporting obligations and commit to achieving a further reduction for SMEs up to 50%, upholding proportionality for SMEs in EU law and extending it to small mid-caps. The report recommends that all new proposals up for adoption should be subject to a revamped competitiveness test, with a clear, strong methodology to measure the cumulative impact, including both compliance costs and administrative burden. These checks should be performed by involving committees of industrial operators supporting the Commission in assessing the impact of all draft autonomous acts. On this basis, the Commission should choose to postpone initiatives which are particularly problematic from an innovation standpoint or with a disproportionate impact on SMEs. In addition, the Commission should extend mitigation measures to small mid-caps. The EU should also enable the use of AI-powered software and machine-processed data to lower compliance and administrative costs for SMEs. Measures should include requiring harmonised reporting templates, de minimis reporting thresholds, and centralised reporting requirements using one multilingual interface.

TABLE OF ABBREVIATIONS

AI	Artificial intelligence
API	Application Protocol Interface
ATMP	Advanced Therapy Medicinal Product
CBAM	Carbon Border Adjustment Mechanism
CCP	Central counterparty platform
CfD	Contract for Difference
CJEU	Court of Justice of the European Union
CMU	Capital Markets Union
CRM	Critical raw material
CRMA	Critical Raw Materials Act
CSD	Central securities depository
DARPA	Defence Advanced Research Projects Agency
EEZ	Exclusive Economic Zone
EHDS	European Health Data Space
EIB	European Investment Bank
EIC	European Innovation Council
EIF	European Investment Fund
EII	Energy-intensive industry
EP	European Parliament
ERC	European Research Council
ESA	European Space Agency
ESMA	European Securities and Markets Authority
ETS	Emissions Trading System
FDI	Foreign direct investment
ICT	Information and Communications Technology
IEA	International Energy Agency
IPCEI	Important Project of Common European Interest
IPR	Intellectual Property Rights
IRA	Inflation Reduction Act
LNG	Liquefied natural gas
MFF	Multiannual Financial Framework
NGEU	NextGenerationEU
NZIA	Net-Zero Industry Act
PPA	Power Purchase Agreement
PPP	Purchasing Power Parity
PV	Photovoltaic
QMV	Qualified majority voting
R&I	Research and innovation
SMET	Single Market Enforcement Taskforce
STEM	Science, technology, engineering, and mathematics
TFP	Total factor productivity
VC	Venture capitalist