ERT

Rebuilding Europe's business case, working against the clock.

COMPETITIVENESS AND INDUSTRY BENCHMARKING REPORT 2024

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Foreword by Martin Brudermüller, Chair of the ERT Competitiveness & Innovation Committee

If Europe was a company...

Time is running out - time for a turnaround.

Over the last two decades, Europe has been significantly losing relevance as an economic powerhouse.

As an EU election year, 2024 is THE moment to take a clear-eyed look at Europe's situation in a fast-changing world.

If Europe was a company, 2024 would be the point when its leadership has to deliver a turnaround. Over the past years challenges have been accumulating externally and internally. Shareholders and investors are concerned and keenly aware that bankruptcy happens "gradually, then suddenly". The additional prospect of enlarging Company Europe towards Eastern Europe makes it even more urgent to return to a position of economic strength. In such a situation, shareholders of any company would be pushing hard for management to restore competitiveness and step up the company's value proposition.

How would 'Company Europe' be seen by stakeholders and analysts?

- A market incumbent that has built a strong position by mastering previous and current generation technology. Yet, globally it finds itself in the middle of the next industrial revolution and Company Europe's leadership in key technologies is neither secured, nor at the centre of corporate strategy.
- Competition (in price and quality) is intense in many former signature sectors, from both established competitors and new entrants. For quite a while Company Europe has been massively losing market share on its export markets, but now it feels pressure also on its home market. Both trends are highly worrisome because Company Europe's business model is largely built on export strength. For Company Europe, trade is even more vital than for its main competitors, who can build on their large home markets.
- Company Europe has been taken unawares by geopolitical developments. It is now struggling with its vulnerability in energy pricing, as well as access to critical raw materials and key components (such as semiconductors). Company Europe is now trying to reposition itself in many dimensions – but silo-thinking still prevails over coordination. Diversification efforts face the reality of existing structures. Re-building of capacities is costly and takes time.
- Company Europe had a rude awakening on its exposure to physical aggression, after neglecting its own military capacity for decades. If it wants to guarantee future security and independence, investment in defence capacity will have to be fast and massive – and funding will be diverted from other projects.
- These changes need to be stemmed on top of very ambitious (net-zero) climate targets that Company Europe has set itself. And these necessitate technology and energy transformation of key business lines. Feasibility also depends on substantial infrastructure investments.
- Company Europe's internal governance and decision-making are complex. Silo-thinking and political risk aversion have led to bureaucracy and hard-to-navigate rules that are not always coherent with company-wide goals. Company culture relies on prescriptiveness rather than incentives.

Company Europe urgently needs a turnaround strategy.

To convince investors to stay committed, Company Europe has to play to its strengths:

- Build on Europe's high technology tradition and create stronger business cases for innovation leadership in revolutionary horizontal technologies (e.g. AI, quantum computing) and disciplines that will re-shape whole sectors (e.g. advanced materials, bioengineering). Gaining and preserving excellence is key to maintaining Europe's human capital. Benefits of technology leadership will spread up and down the value chain and stimulate the wider industrial fabric.

- Increase and optimise the capacity of its most valuable asset, the EU Single Market, by removing remaining barriers. Company Europe needs greater economies of scale on its home market to accelerate growth and underpin global competitiveness.

To make its strategy work, Company Europe also needs to address its weaknesses:

- Company Europe is already overburdened by new regulations and administrative demands – and is still accumulating new legislation on top. It absolutely needs to invest time and resources to digest its own new regulatory reality. It needs to do so with the goal of a 'great simplification' that restores coherence of rules and replaces coercive targets with incentives.
- Deployment and investment in digital and energy infrastructure are too slow to stem its transition. Company Europe now needs to set the basis for a broad uptake of key technology – at scale and across business lines.
- Company Europe has missed several chances to drive digital innovation and is at risk of becoming a follower rather than a leader. It urgently needs a strategy to drive digital innovation where it still has opportunities to create and compete. Otherwise, it will lose out on the next wave of technologies and fall behind, maybe permanently.
- Company Europe's leadership has underestimated the challenges of its energy transformation. To still make transition a success, it has to develop and implement a holistic strategy for all its geographies and link them up into one common market for energy.
- Company Europe's workforce is ageing – and industrial transformation is challenging its skills base. Common efforts and incentives are needed to keep the workforce resilient, engaged and productive.

Company Europe's leadership has its work cut out for them.

These action points are the underpinnings of a much needed 'EU Industrial Deal' which Europe's leadership urgently needs to deliver.

ERT Members have set out their expectations towards Europe's political leaders in the 2023 ERT Vision Paper[1] and the ERT Innovation Flagship Paper[2].

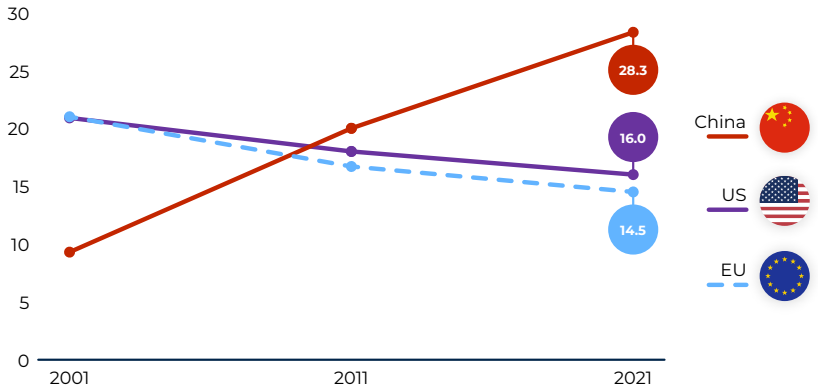
After the 'cold wake-up shower' of our 2022 ERT Benchmarking Report, we now present the 2024 edition as an update – and as an 'ice bath': The early hours of the new EU Commission's term (2024-2029) need to be used well: Europe has to get back on track for growth and to keep up its global relevance.

1. Link to ERT Vision Paper
2. Link to ERT Flagship "Innovation made in Europe"

Rebuilding the business case for Europe

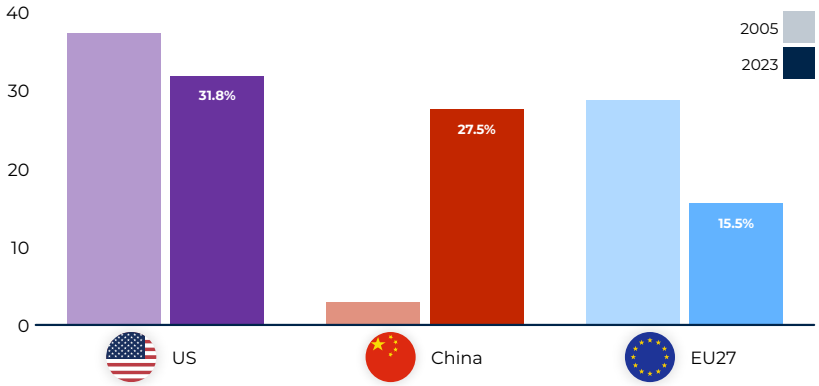
Europe's global competitiveness is sliding. Crunch time for **the TURNAROUND**

EU industry market share on global markets is declining... Page 10



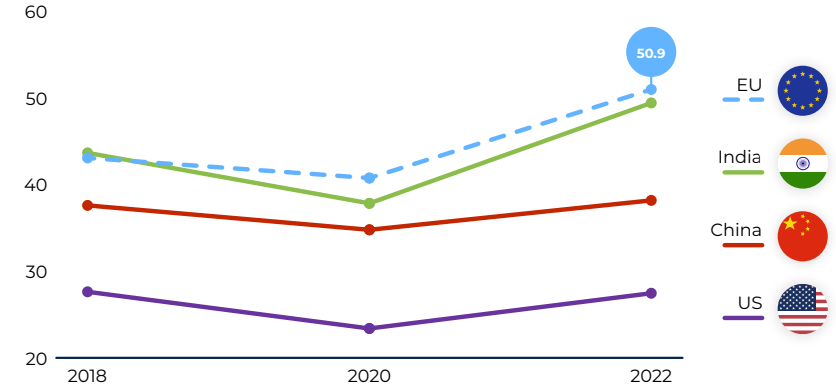
% of global gross value added in mining, manufacturing and utilities

...and EU companies no longer lead in terms of revenues Page 11



Share of companies in Fortune Global 500

... that said, trade is essential for the EU's prosperity. Page 18



Trade in goods and services as a share of GDP, %

EU industry has been continuously losing ground on global markets.

- Market shares have been declining.
- EU companies are becoming less relevant in comparison to global peers.
- Europe's future technological leadership is at risk.

And yet:

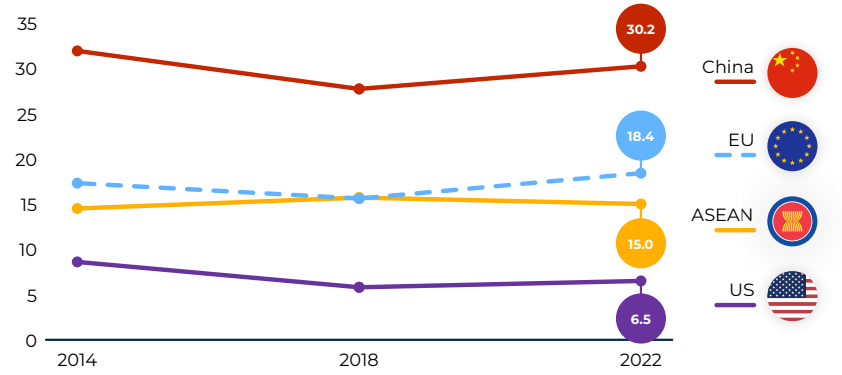
Global markets are key for Europe because:

- Europe's business model is built on external trade.
- The EU Single Market is less integrated than the domestic markets of the US or China.

Three strong pillars for Europe's business case

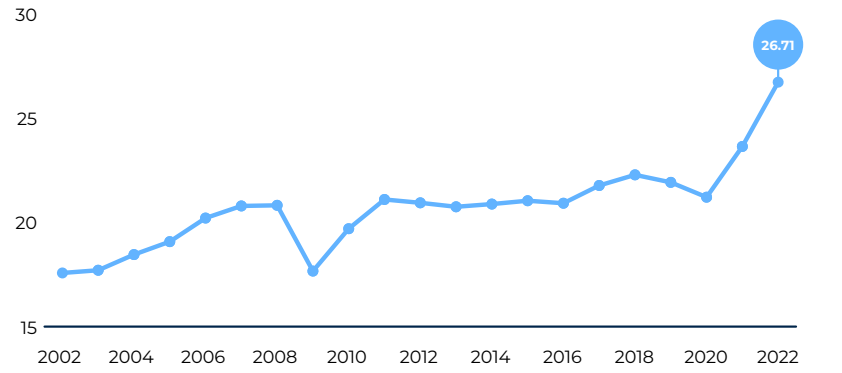
1) high technology leadership, 2) the EU Single Market and 3) the EU as the best place to do business

The EU remains a competitive exporter in high technology goods... Page 26



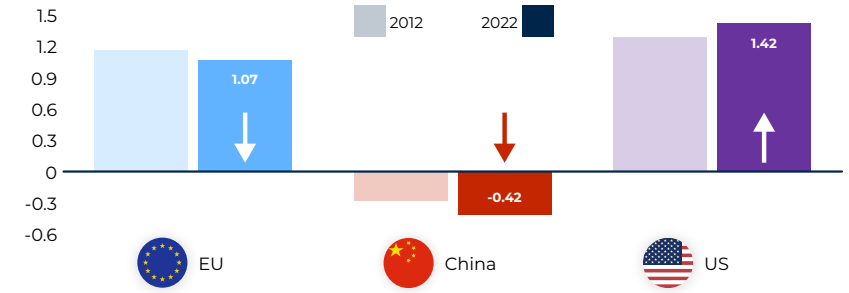
Global market share (excluding intra-EU exports), %

...but the EU Single Market needs more integration... Page 16



% of GDP

...and more pragmatic regulation. Page 21



Regulatory quality index from -2.5 to 2.5 (2.5 being optimum)

Global competition is stiffening – but Europe is still going strong on medium and high technologies.

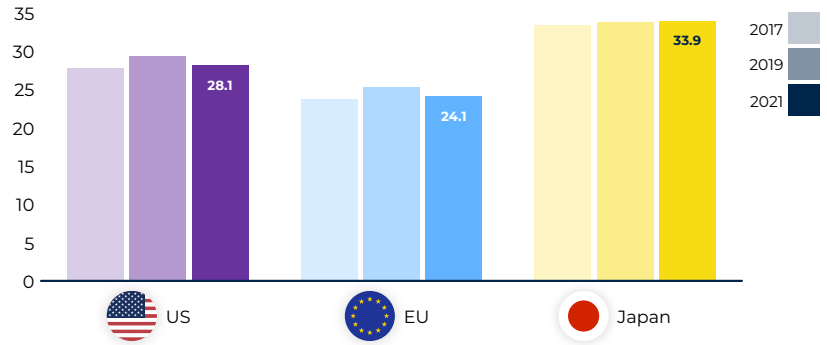
Europe's business case stands on three pillars:

1. **A competitive edge in high technology manufacturing across sectors:**
   - Embracing **new technologies** with industry-wide global impact.
   - Maintaining a dynamic, innovative & diverse **industrial ecosystem**.
   - Strengthening **human capital** and education.
2. **The EU Single Market as a strong home base for sustainable growth:**
   - Boosting intra-EU trade by overcoming remaining **Single Market** barriers.
   - Enabling **economies of scale** for EU companies to compete in a global context.
   - Mobilising **private sector investment** across the EU.
3. **Pragmatic regulation to make the EU the best place to do business:**
   - Creating **incentives for innovation**.
   - Attracting internal and foreign investment **by industry-compatible regulation**.
   - Letting **start-ups thrive**.

Re-building the business case for Europe: Action points

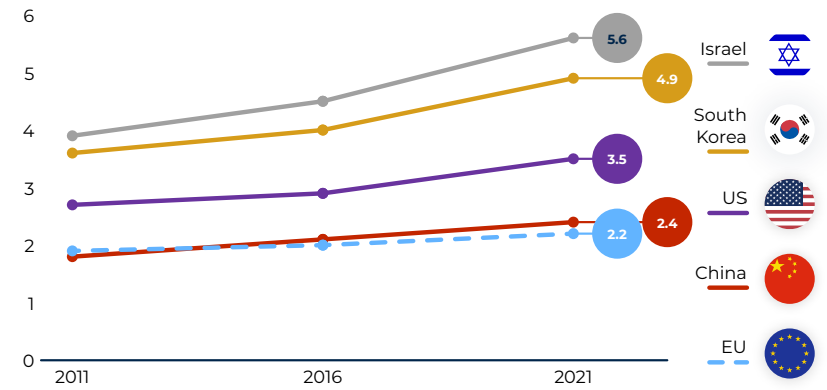
Urgent priorities: Facilitate, enable and promote investment from private and public sector

EU industrial investment needs to grow faster... Page 20



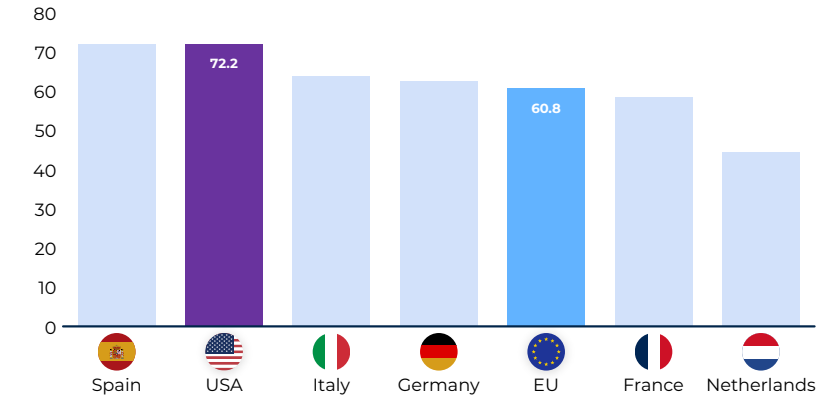
Industrial GFCF as % of industrial gross value added

...and Europe has to spend much more on technological leadership... Page 27



R&D spending as % of GDP

...supported by more pragmatic regulation that enables investment. Page 21



Share of companies reporting regulation as obstacle to investment

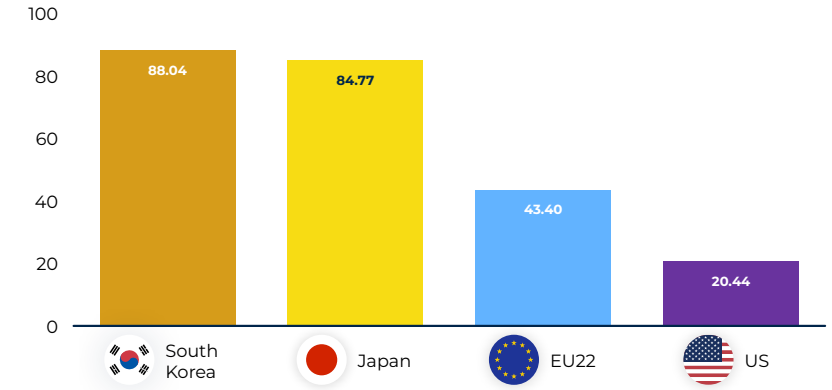
Competitiveness and technological leadership require high levels of investment.

Europe's business leaders expect the EU to:

- Put **simplification and the business case for innovation and investment at the centre** of policymaking.
- **Be accountable and follow-though at all levels** to match this commitment. Regulatory coherence is vital.
- Develop a robust plan for **speeding up financing and infrastructure** that underpin the digital and green transition.
- Demonstrate a strong political will to **strengthen public-private collaboration**. The EU, national governments and industry have to act as partners and create the momentum for Europe to get back to the top.
- Drive forward **EU Single Market integration**.

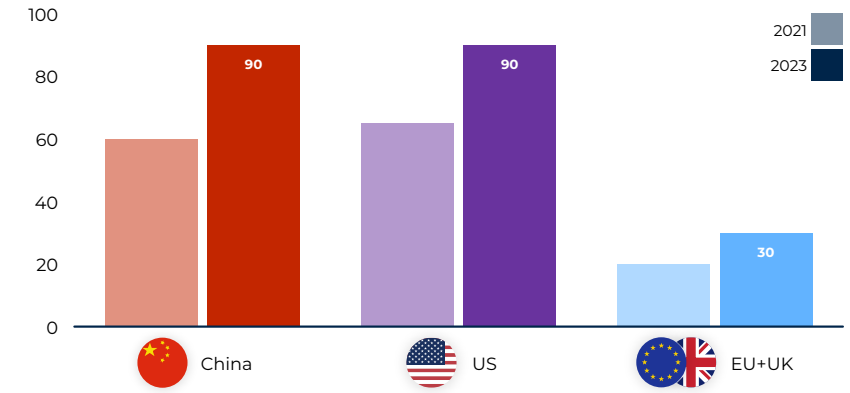
Develop, build and coordinate pan-European and world-leading infrastructures

EU fibre connectivity needs a boost... Page 37



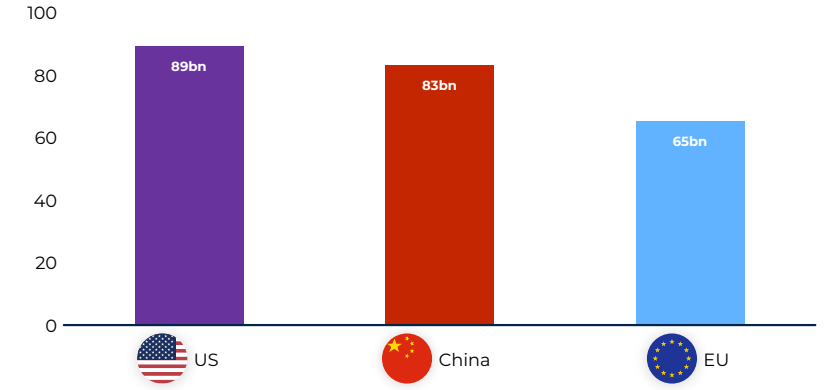
Fibre connections as % in total fixed broadband, 2022

...as does Europe's adoption of 5G technology. Page 36



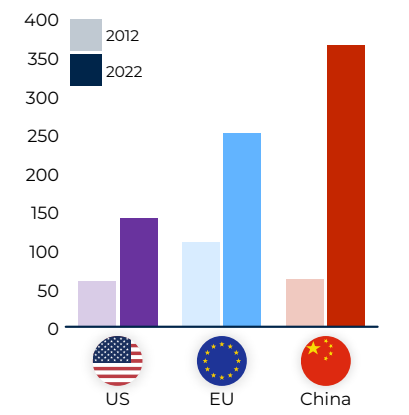
5G mid-band population coverage, %

Europe needs to build more and better electricity grids... Page 45

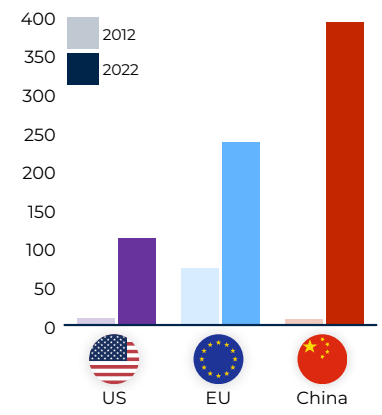


Electricity network investment in USD, 2022

...and faster scale-up of wind and solar energy capacity. Page. 44



Installed wind power capacity, GW



Installed solar power capacity, GW

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The EU is losing global market share and industrial competitiveness

At global level industrial competitiveness is shifting:

- China has replaced the EU and the US as the world's leading base for industrial production, tripling its GVA share since 2000.
- The EU (and Japan) took the biggest proportional hit in market share (losing a third since 2000).

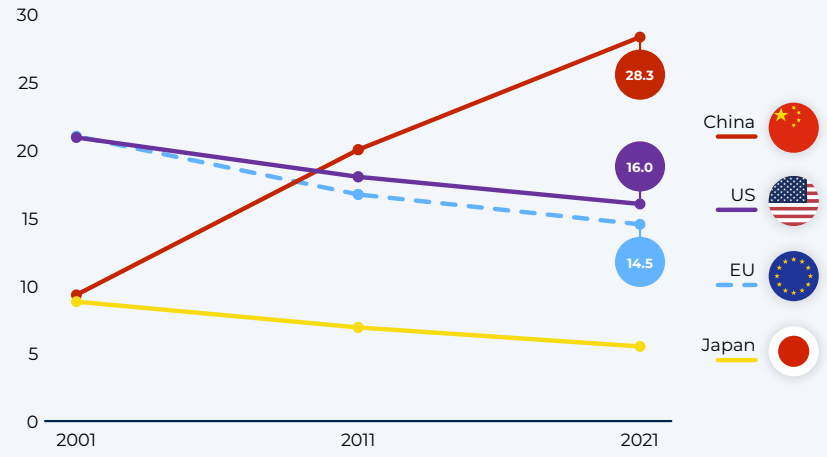
Industry remains key for prosperity in the EU:

- In the EU the share of industry in total Gross Value Added and in employment has somewhat declined over the last 20 years, yet it appears stable overall.
- Industry is even more important for prosperity in China, but considerably less so in the US.
- Industry accounts for nearly a fifth of employment in the EU. Deindustrialisation would have significant consequences for employment and social cohesion.

Note (1): Industry includes mining, manufacturing and utilities, but excludes construction. Data is in constant prices.
Source (1): UN Statistics Division
Source (2): OECD, Eurostat, ADP, Macrobond

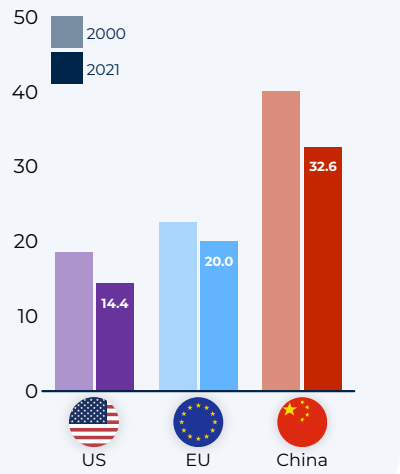
Global industry market share

% of global gross value added (GVA) in mining, manufacturing and utilities



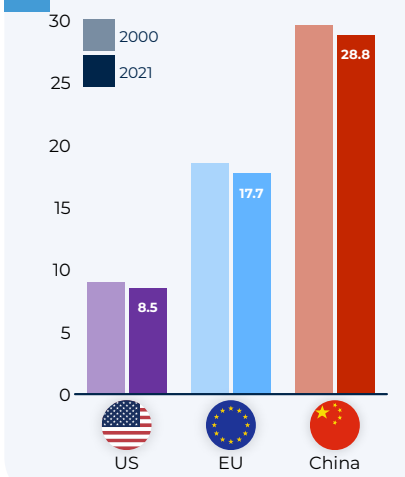
Share of industry in total GVA

%

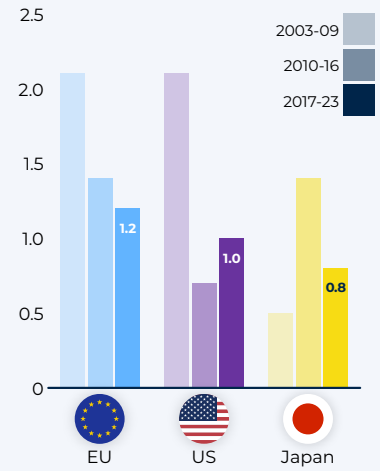


Share of industry in total employment

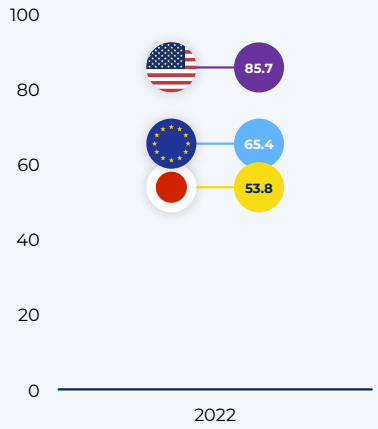
%



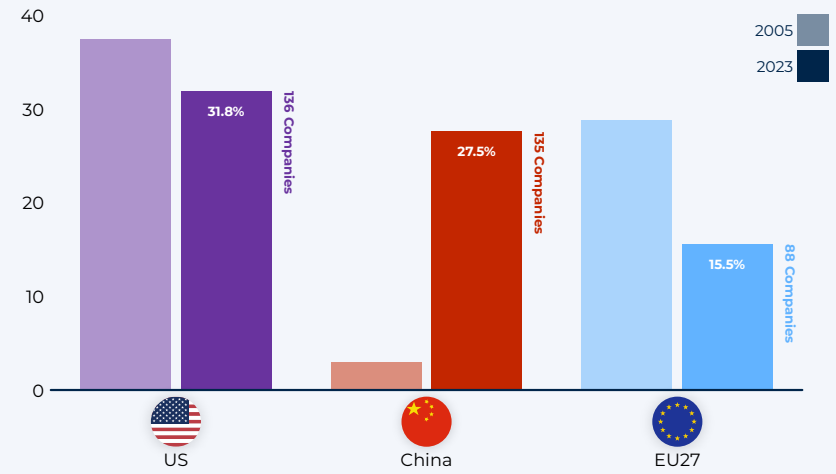
Growth in labour productivity
% change



Labour productivity as average annual output per hour worked
In 2022 USD



Share of companies in Fortune Global 500 by revenue
%



EU productivity growth is losing steam and EU corporates are being overtaken by global peers and competitors

Labour productivity – running at different speeds:

- Over the last decade labour productivity has grown only slowly in the three most advanced economies EU, US and Japan. Only the US has managed a (small but) positive U-turn.
- In terms of labour productivity levels, the US maintains a clear advantage over the EU. For the EU to catch up, productivity growth would have to accelerate significantly.
- Success in the next industrial revolution will decide whether Europe's labour productivity will stagnate, or even worse, decline.

Where's home for the highest-revenue companies?

- More than half of the Fortune Global 500 companies are based either in the US or in China.
- China's economic rise has pushed many incumbent companies out of the Fortune Global 500: Chinese companies have surpassed mainly European (and Japanese) companies.
- On average most revenue – and therefore means to drive technological progress – is still generated by US-based companies.
- Why did EU companies lose most ground in the Fortune Global 500? Likely causes:
  - a lack of competitiveness in their business models;
  - the EU is no longer an environment that fosters strong companies;
  - missed opportunities in new high revenue sectors.

Note (1): Labour productivity defined as output per hour worked in 2022 USD PPP Constant Prices. To GC: does latest period really capture 2023?
Source (1): The Conference Board
Source (2): Fortune Global 500 List (2023)

Europe is leading in terms of sustainability – in numbers, but not in scale

Sustainability in numbers vs market cap:

- Europe is rich in companies that embrace high sustainability requirements: at a global level the EU has by far the largest number of 'sustainable' companies as identified by the Dow Jones Sustainability Index. The US comes second, but is far behind.
- In terms of market capitalisation, the reverse is striking. Sustainable EU companies are much smaller than their US peers in terms of total market capitalisation: total market cap for a sustainable EU companies is not even half that of the much less numerous US peers.

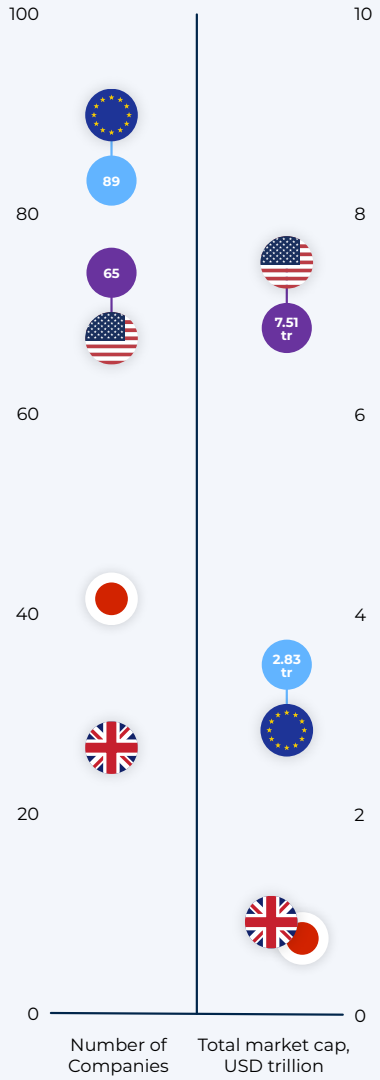
Industry remains key for prosperity in the EU:

- The Dow Jones Sustainability Index is dominated by five sectors: Information Technology, Health Care, Industrials and Financials and Communications services. Especially the IT sector is dominated by US companies with very high market cap. US financial institutions and communications services are also much larger than their European peers.
- EU companies are therefore in a worse position than their US peers:
  - Raising capital is easier in the US where capital markets are much deeper in the EU. EU markets remain fragmented and less developed.
  - US companies can build scale on a large home market, whereas the EU Single Market is not fully integrated.

Note: The Dow Jones Sustainability World Index comprises global sustainability leaders as identified by S&P Global through the Corporate Sustainability Assessment (CSA). It represents the top 10% of the largest 2,500 companies in the S&P Global BMI based on long-term economic, environmental and social criteria. / Source: Dow Jones Sustainability Index (mid-October 2023)

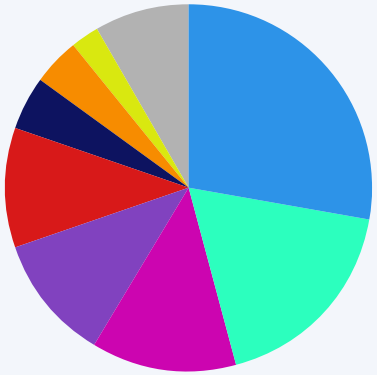
Firms in Dow Jones Sustainability Index

Number (left) and total market cap $ trillion (right)



Dow Jones Sustainability Index, 2023

Section breakdown in terms of numbers of companies



Information Technology	28.0%
Health Care	18.0%
Industrials	12.8%
Financials	11.1%
Communication Services	10.5%
Consumer Staples	4.6%
Materials	4.3%
Energy	2.6%
Other	8.1%

WHAT INDUSTRY EXPECTS FROM THE EU AND MEMBER STATES

Horizontal action needed to restore the EU's industrial competitiveness

EU Single Market integration has stagnated **(KPI 1)**. The next European Commission should address the remaining barriers to internal trade as a priority.

EU exporters' market shares have been decreasing for more than 20 years **(KPI 2)** – it is high time to halt the decline...

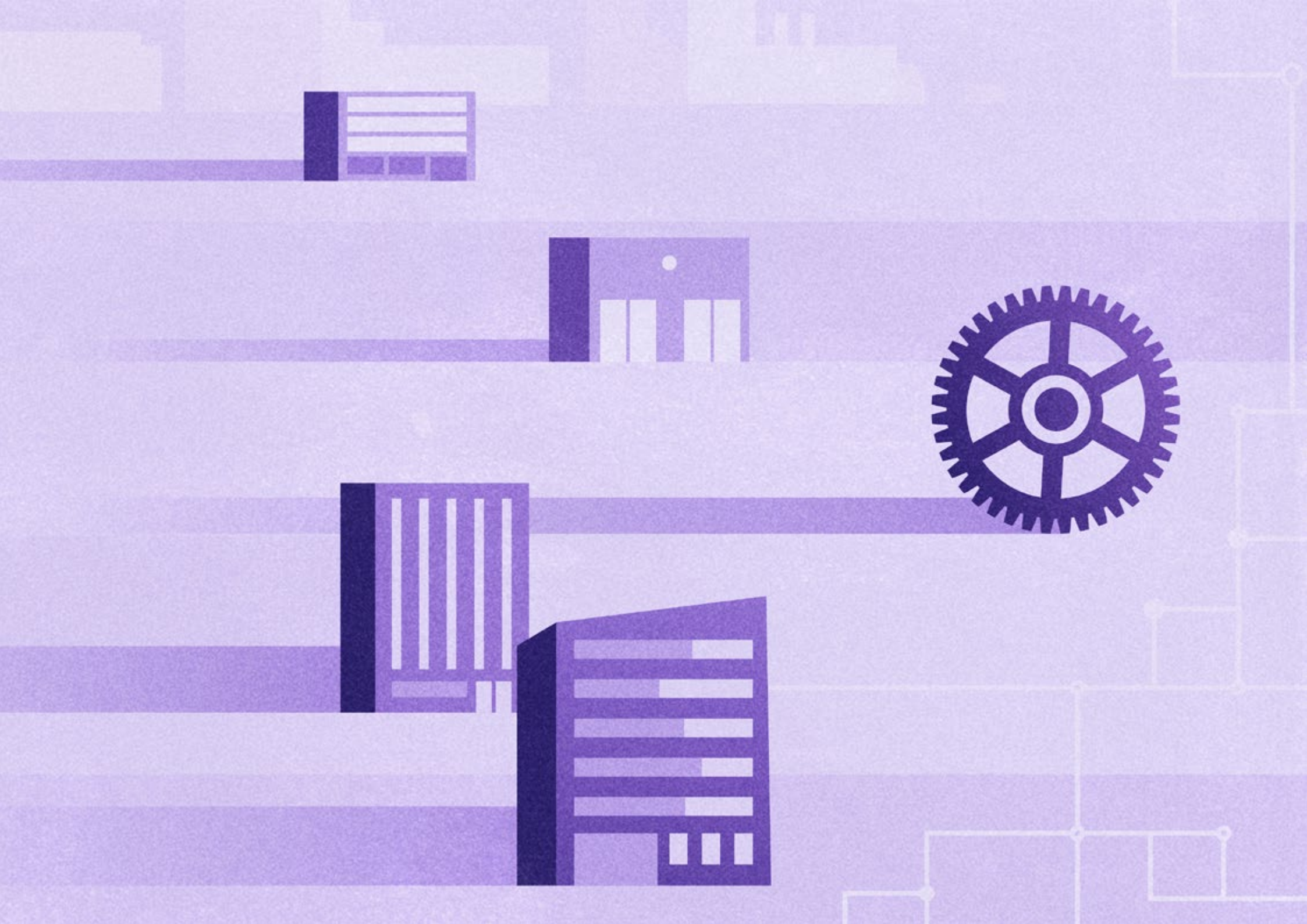
...because the EU – with its open economy – continues to lose ground in all world regions **(KPI 3)**. It has to make 'promoting and partnering' a success again because trade is part of its business model.

Attracting foreign capital **(KPI 4 & 5)** is also key to future growth...

... as is incentivising European corporates and other private investors **(KPI 6 & 7)** to put their money into EU industries' future productivity and innovation drivers.

To regain competitiveness, the EU and Member States need a mind-shift. Simpler and more coherent policy making and a greater use of incentives are key – otherwise the EU's way to regulate will become a competitive disadvantage **(KPI 8)**.

Skills shortages in Europe's workforce are becoming a major concern and need more proactive responses **(KPI 9)**: public and private sector have to find better, more joint-up ways to step up to the challenge.



The European Commission must prioritise EU Single Market integration

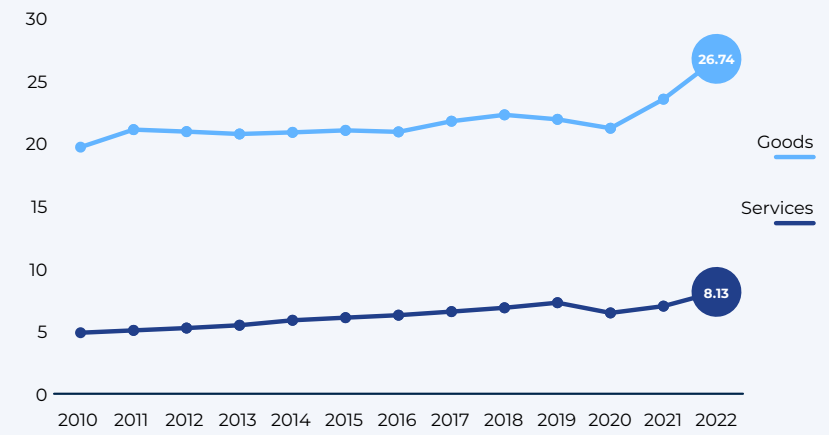
OBSERVATIONS

- Europe's main competitors, the US and China, both have enormous internal markets, that are also less fragmented or difficult to navigate than the EU
- The integration of Europe's Single Market for goods and services has been stagnating for years, due to persistent barriers to internal trade and market fragmentation – e.g. due to diverging product and/or labelling rules *(Caution: the marked increase of intra-EU trade in goods in 2022 does NOT show an integration success. It is a) due to a rebound from the Covid-19 dip and b) reflects 2022 price effects (high inflation and Ukraine-war related energy price hikes that translated into higher prices for energy intensive products)).*
- Business leaders are much less optimistic on the state of Single Market integration than the European Commission (ERT Confidence Survey November 2023).
- Businesses make much less use of the EU SOLVIT platform than citizens – their problems result often from legislation itself, not just from implementation practices.

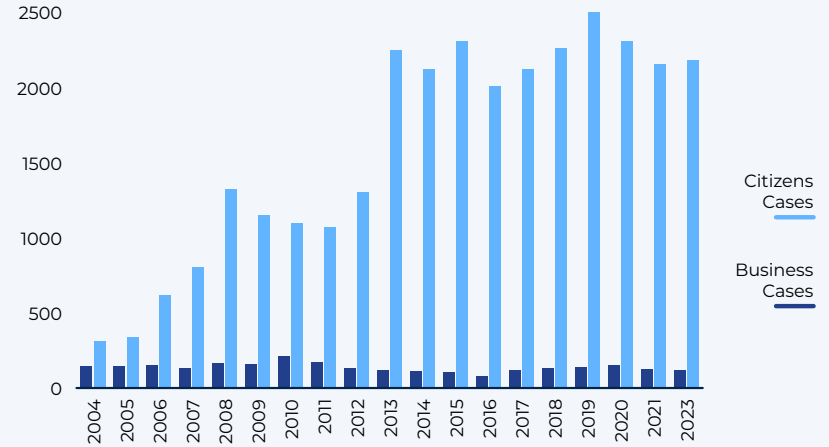
RECOMMENDATIONS

- A fully integrated Single Market must be a top priority for the next EU Commission and Parliament. Its huge potential for economic growth and Europe's future prosperity is too important to be wasted.
- The next European Commission's opening commitment should be to identify and remove the most important remaining Single Market barriers, including those resulting from EU legislation.
- In a defence context: further cooperation amongst Member States and common procurement are needed to address Single Market fragmentation that still holds back the production of large quantities of equipment.

KPI 1 - Intra-EU trade in goods and services
% of GDP

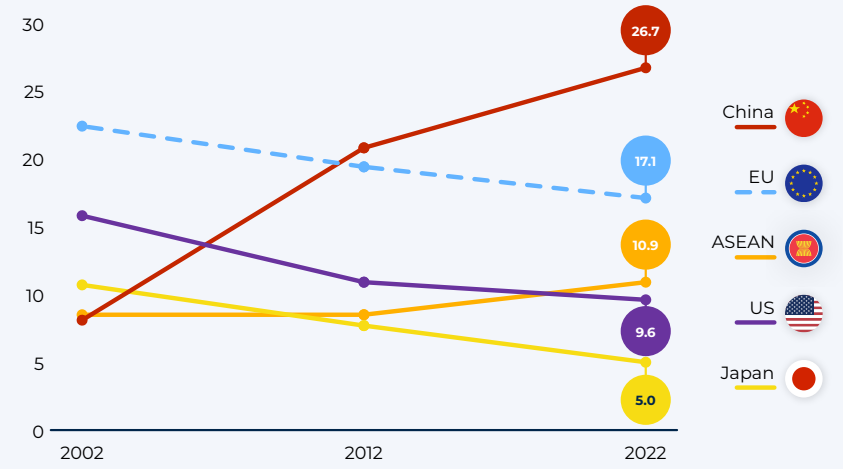


SOLVIT cases brought forward by citizens and businesses w.r.t cross-board difficulties in the Single Market

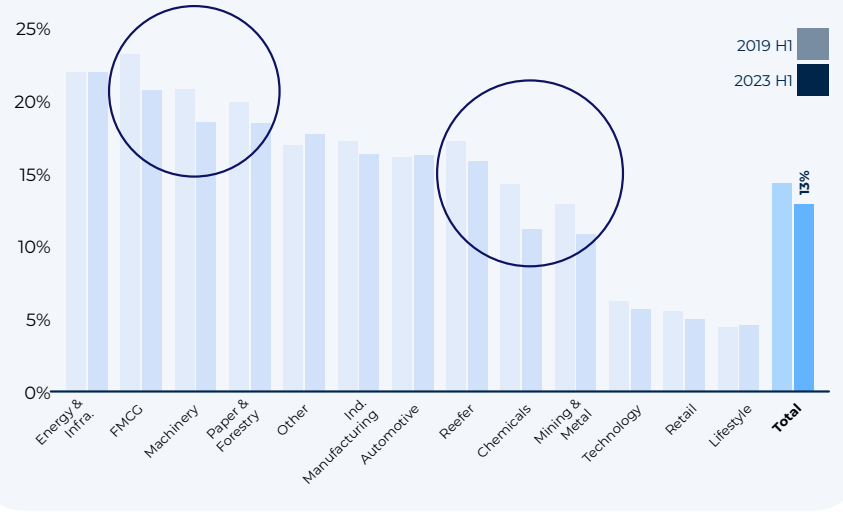


Note (2): SOLVIT is a problem-solving network for issues incurred by persons or enterprises when their cross-border rights in single market are breached. It is provided by national administrations.
Source (1): Eurostat, Global Counsel calculations
Source (2): European Commission

KPI 2 - Exports of manufacturers
Global market share, %



EU export share in different product classes
% of global container trade



EU producers need better framework conditions to remain competitive

OBSERVATIONS

- The EU's market share as an exporter of manufactured goods has declined over the years, while China has become world leader because:
  - EU and US companies have invested into production capacity in China, both as a growth market and for exports;
  - Chinese companies have grown strong in China's domestic markets and are now pushing into global markets.
- The EU market share in exports has declined proportionately less than Japan's or the US': Europe's manufacturing sector maintains its competitive potential *(Caution: neither the impact of Europe's increasing energy costs as of H2 2022 nor of the US Inflation Reduction Act are fully captured in 2022 data).*
- Container trade date show that over the last two years, Europe's export share has been declining in most sectors.

RECOMMENDATIONS

- Europe's policymakers at all levels have to create conditions for Europe's businesses to play to their strengths as producers and exporters. Factors to be addressed:
  - Europe's high energy costs compared to other regions;
  - accelerating technological change;
  - increased global competition for raw materials;
  - a weakening of WTO and trade principles.
- The EU has to expand its global commercial relationships and increase market access for its exporters in a pragmatic way.

Source (1): WTO, Source
Source (2) : Maersk – Strategic Insights

To keep benefiting from global trade, the EU must make 'promoting and partnering' a success

OBSERVATIONS

- With international trade in goods and services as a share of GDP at constantly high levels, the EU remains one of the world's most open economies.
- Openness exposes EU companies to competition from peers in more protected home markets: A global level playing field is even more vital for the EU than for its global peers and competitors.
- Container trade data show that Europe's export share has been decreasing across all geographies.

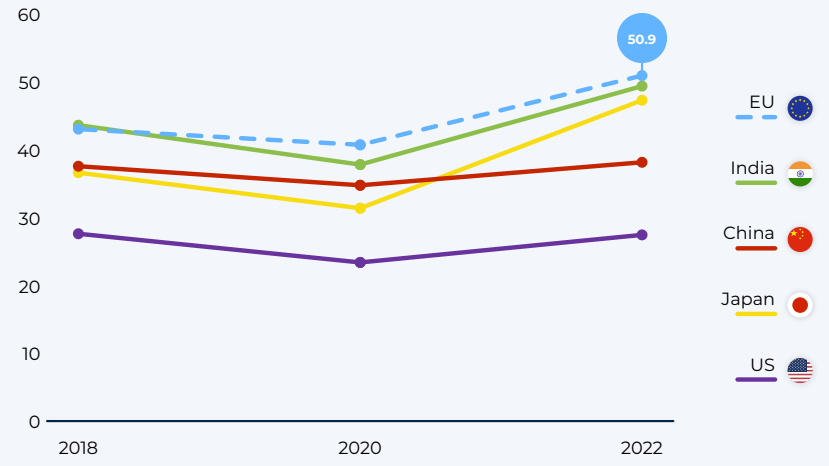
RECOMMENDATIONS

- The EU should emphasise those aspects of its Economic Security Strategy that promote competitiveness and build/reinforce partnerships to open markets abroad:
  - forging strong alliances with like-minded partners, e.g. the US and countries in Asia Pacific as well as Latin America. There is no time to lose in accelerating FTAs and strategic partnerships;
  - driving transatlantic market integration, especially joint global standard-setting and regulatory cooperation: The EU-US Trade & Technology Council must continue to serve as a stable, long-term framework of cooperation. The ultimate goal remains a holistic transatlantic free trade agreement;
  - continuing EU efforts to safeguard the multilateral rules-based trading system and revitalise the WTO.
- Dialogues with China should be intensified to create economic opportunities and address unfair practices.
- Trade defence measures should be deployed where appropriate and only where clearly justified to level the playing field.

Note (1): Excludes intra-EU trade.
Source (1): Eurostat World Bank
Source (2): Maersk – Strategic Insights.

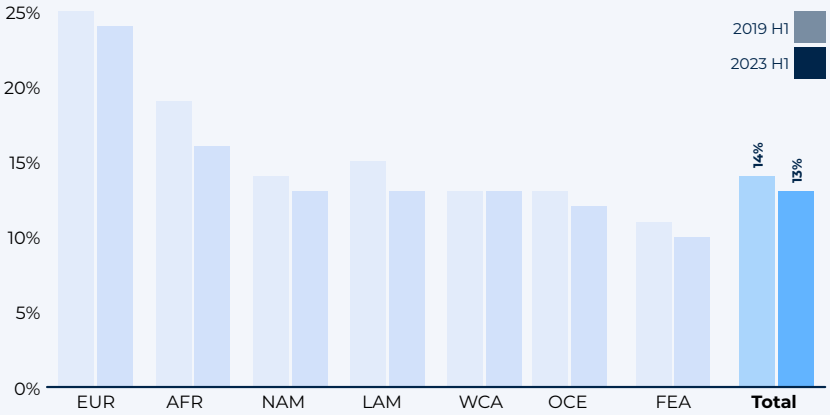
Economic openness

Trade in goods and services as a share of GDP, %



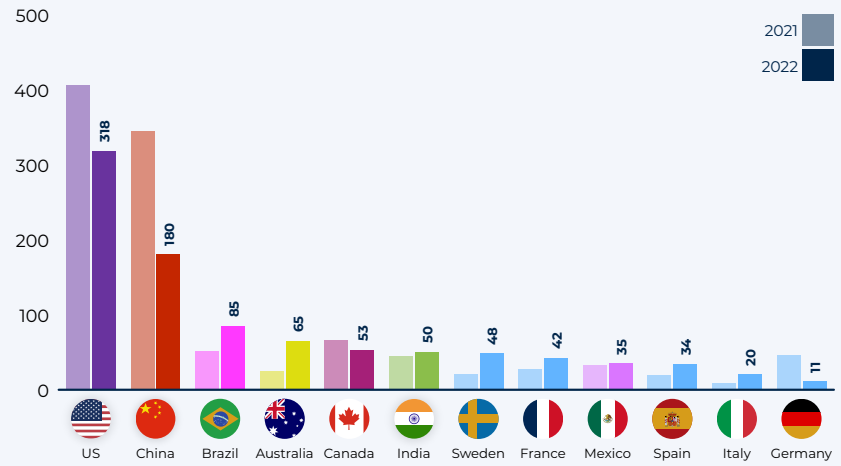
KPI 3 - EU export share to different markets

% of global container trade

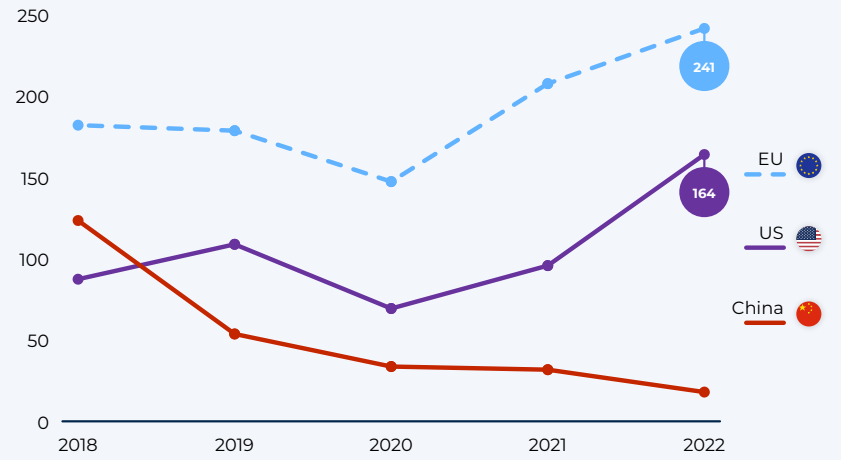


EUR: North Europe, Mediterranean (including North Africa) – **AFR:** West Africa, South Africa, Mozambique, East Africa, Indian Ocean Islands – **NAM:** US, Canada – **LAM:** Central American & Caribbean (including Mexico), West Coast South America, East Coast South America – **WCA:** Middle East (excluding North Africa), Indian Subcontinent **OCE:** Oceania – **FEA:** China, Mongolia, Hong Kong, North East Asia (including Taiwan), South East Asia

KPI 4 - Major FDI recipients in 2022
USD bn



KPI 5 - Greenfield FDI inflows
Value of announced greenfield FDI, USB bn



The EU must become (even) more attractive for foreign capital

OBSERVATIONS

- 2022 saw a fall in FDI globally, including for the US and China as the largest recipients. EU countries' record is mixed, but at much lower levels.
- For the last decade, the EU has been the lead destination of greenfield investment (including from within the EU), with a clear post-Covid rebound in 2022. The US IRA (adopted in 2022) may well change this ranking.

RECOMMENDATIONS

- FDI is essential for EU growth and global competition for capital is tough. Keeping the EU attractive for investors must become a priority for policymakers.
- National FDI screening tools and the EU's cooperation mechanism help mitigate risks from foreign investment in critical technologies and infrastructure. Such tools should be used fairly and proportionately, they must not become a back door for protectionism.
- The US IRA will become a powerful pull factor for FDI and greenfield investment. The EU cannot match the US fiscal tools to support investment: it needs to become a better place to do business more generally and far beyond the provision of financial incentives.

Note (1): For Australia and Mexico data exclude resident SPEs. For China and India data are on a asset/liability basis.
Note (2): Greenfield investment is defined by the UN as when a parent company starts a new venture in a foreign country by constructing new operational facilities from the ground up. EU data includes intra-EU investment.
Source (1): OECD
Source (2): UNCTAD

EU corporates and EU 'private money' need better incentives to invest in economic growth

OBSERVATIONS

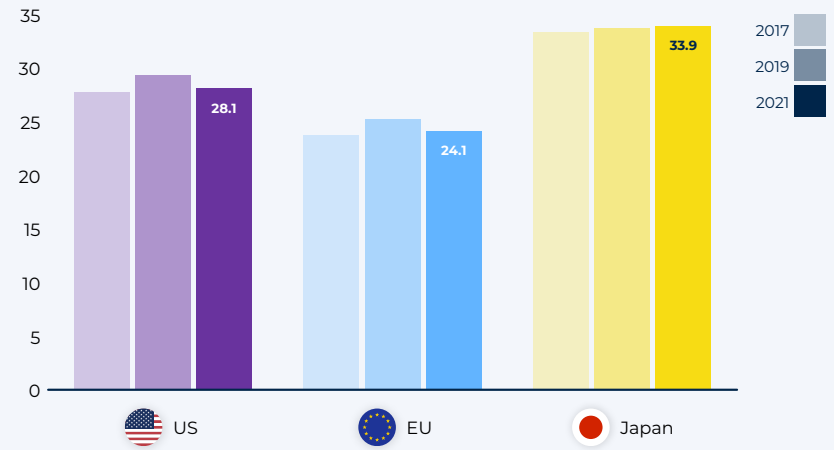
- EU industry consistently invests a lower share of Industrial Gross Value Added (GVA) than industry in Japan and the US.
- In 2021 industrial investment rates declined both in EU and US, likely reflecting economic conditions during the pandemic.
- In the US the Inflation Reduction Act (IRA) will likely lead to an increase in industrial investment as of 2023.
- Venture capital investments have been increasing globally, and Europe's share is growing steadily – although still less than half of what is invested in the US.
- To stem the digital and green transition, Europe's real economy needs massive investment, both for corporates and for start-ups and scale-ups. Much of this investment will come from Europe's large companies.

RECOMMENDATIONS

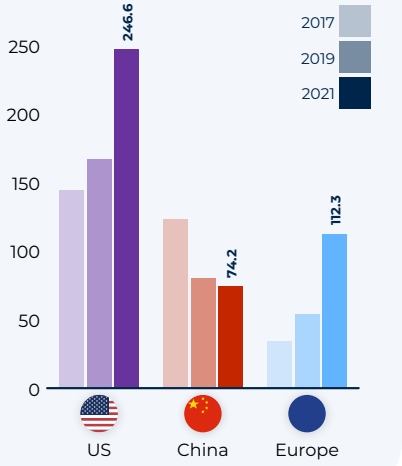
- It is high time to assess how the EU and Member States can create a more investment-friendly environment and set better incentives for corporate investment.
- Another urgent task: channelling more EU private sector investment into innovative start-ups and scale-ups. Europe is finally becoming more attractive for venture capital investment and policies that have enabled this should be strengthened further.
- The EU needs to build a stronger European venture capital sector and incentivise the participation of 'patient capital' (e.g. EU pension funds, family offices or foundations).

Note (1): GCFC: Gross Fixed Capital Formation
Note (2): Europe = European continent
Source (1): OECD, Eurostat / Source (2, 3): Pitchbook

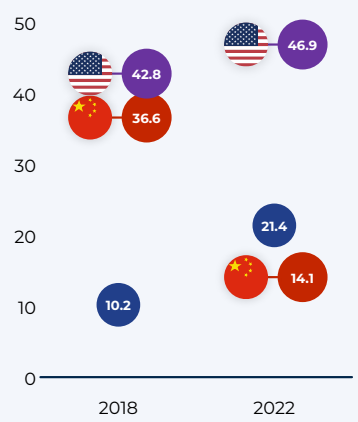
KPI 6 - Industrial investment rate
Industrial GFCF as a share of Industrial Gross Value Added (GVA), %



KPI 7 - Invested capital via venture capital details
Absolute value USD bn

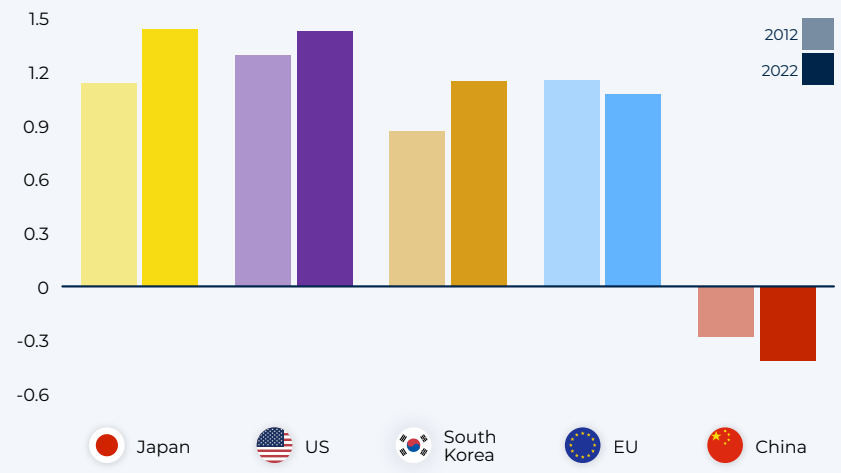


Share of total value of venture capital deals
Across the world 2022, %



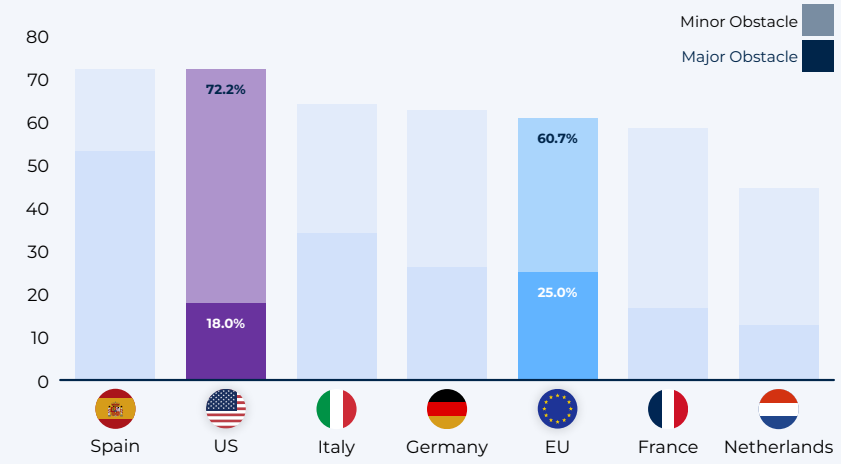
KPI 8 - Private sector friendliness index, 2022

Regulatory quality index from -2.5 to 2.5, with 2.5 being optimum



Share of companies indicating that business regulations are an obstacle to long-term investment decisions

2022, %



The next European Commission has to deliver a 'great simplification' of EU regulation

OBSERVATIONS

- Unlike in Japan, the US or South Korea, the EU's private sector friendliness and regulatory quality have declined.
- New EU rules with heavy reporting burden (taxonomy, corporate sustainability, etc.) will weigh on private sector friendliness in the future.
- When asked by the EIB only a minority of companies responded that business regulation is NOT an obstacle to long term investment decisions. Responses differ across Member States, but for the largest four EU economies, only one company out of three did not flag obstacles.
- In the US the share of companies flagging obstacles is even higher than in the EU – but in the EU 'major' obstacles are called out more frequently.
- The ERT CEO Conference Survey highlights strong concerns that Europe's regulatory environment undermines competitiveness looking forward.

RECOMMENDATIONS

- The EU needs a 'great simplification' of its regulation.
- EU institutions and national governments need a mind shift to make business friendly regulation a part of the EU's regulatory DNA. 'Business friendly' means:
  - coherent political goals, followed through with coherent rules centred around the business case for innovation and investment;
  - reporting requirements that focus on the essential;
  - fast permitting and digitalised administrative processes;
  - a Single Market environment with greater harmonisation that enables economies of scale.

Note (1): Index measures perceptions of the government's ability to develop and implement sound policies that are conducive to private sector development.

Source (1): World Bank

Source (2): EIB Investment Survey 2023

Public and private sector have to join efforts to up- and re-skill Europe's workforce

OBSERVATIONS

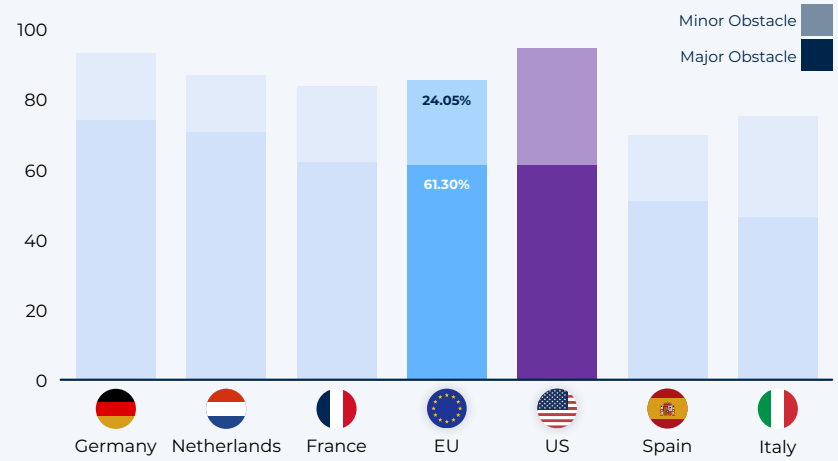
- Skills shortages – together with ageing societies – will become a major challenge in western economies.
- Across the EU, 85% of companies see a lack of skilled workers as an obstacle to long-term investment decisions. This also is the case in the five Member States with the highest GDP.
- According to the DESI index only 54% of working age Europeans have sufficient digital skills.
- Companies seek to address skills shortages by re-skilling or up-skilling employees, but the intensity of this effort differs strongly across Member States. A global comparison shows that Europe can do much better.
- Job-related training programmes are costly: large companies appear better positioned than SMEs to upskill or reskill their employees than SMEs.

RECOMMENDATIONS

- Re-skilling and up-skilling have to become the 'new normal', if Europe's workforce is to keep pace with the evolution of technology. The EU and Member States should do more to incentivise and enable the re-skilling and up-skilling of companies' own workforces.
- The EU Industry 5.0 'human-centricity' approach (driven forward by DG RTD) should be tailored to help solve skills and demographic challenges.
- More public-private cooperation to reskill unemployed workers is urgently needed. Key factors: scalability and better access to public funding (e.g. via the European Social Fund or Erasmus+). ERT's Reskilling4Employment (R4E.EU) offers insights.

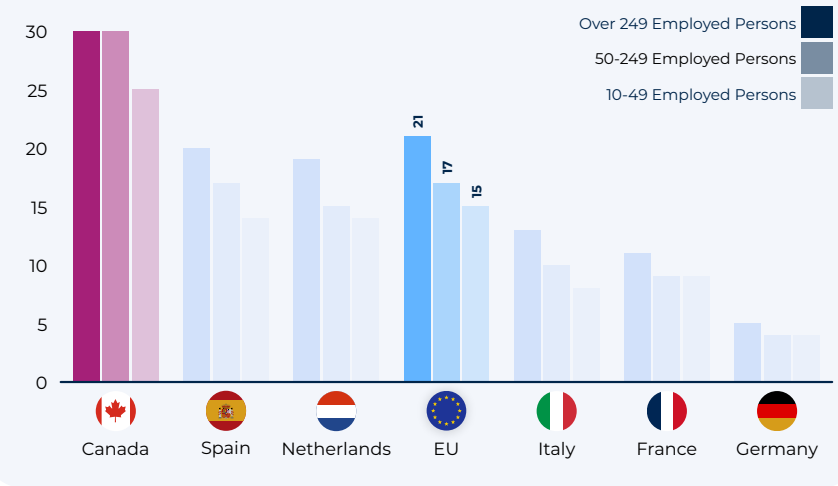
Share of firms saying that lack of skilled workers is an obstacle to long-term investment decisions

2022, %



KPI 9 - Participation of employed (25-64 year-olds) in non-formal job-related education and training by size of enterprise

In 2022, %



Note (2): EU 23 = EU Member States that are also OECD member
Source (1): EIB
Source (2): OECD

WHAT INDUSTRY EXPECTS FROM THE EU AND MEMBER STATES

Adding missing pieces for innovation leadership

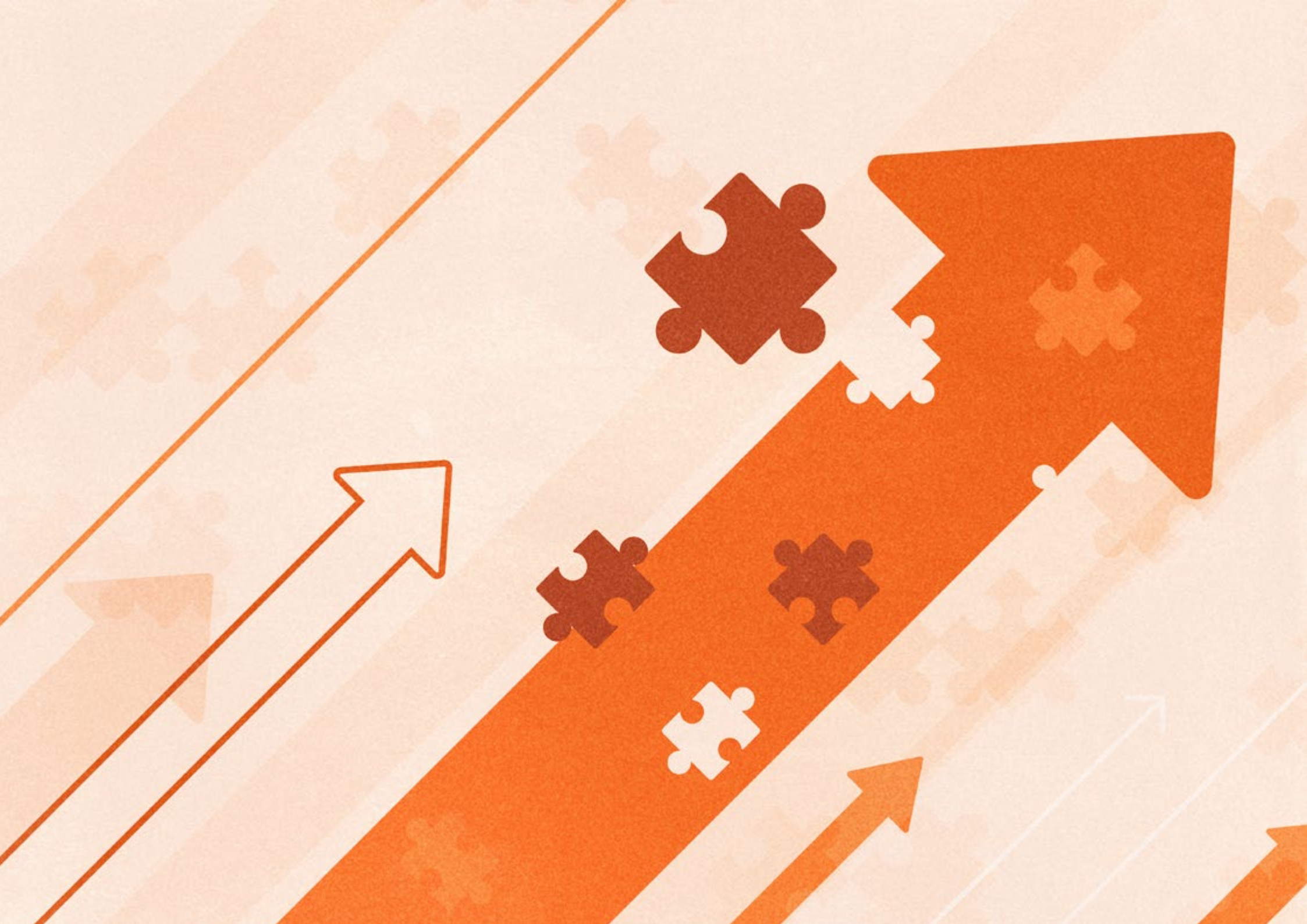
The future of Europe's industrial business case lies in driving forward high technologies as innovators and producers **(KPI 10 & 11)**. For 'Innovation made in Europe' to keep succeeding, policymakers at all levels and industry have to embrace technological leadership as a shared goal....

... that also means that Europe has to get much better at empowering and enabling innovation, because low investment in R&D **(KPI 12 & 13)** will undermine future global competitiveness.

Looking forward European inventors need a much better platform for experimental R&D **(KPI 14)** and deep tech innovation...

... and Europe has to foster and attract more scientific talent **(KPI 16)** to keep pushing technological frontiers **(KPI 17)** in academia and industry.

Europe – including national governments and investors – need to value more the benefits and positive externalities of defence R&D and dual-use innovation **(KPI 18)**. Even more so as Europe's security paradigm is changing and the frontier of military technology is shifting **(KPI 19)**.



The EU and Member States must embrace Europe's leadership in high technology as a shared goal

OBSERVATIONS

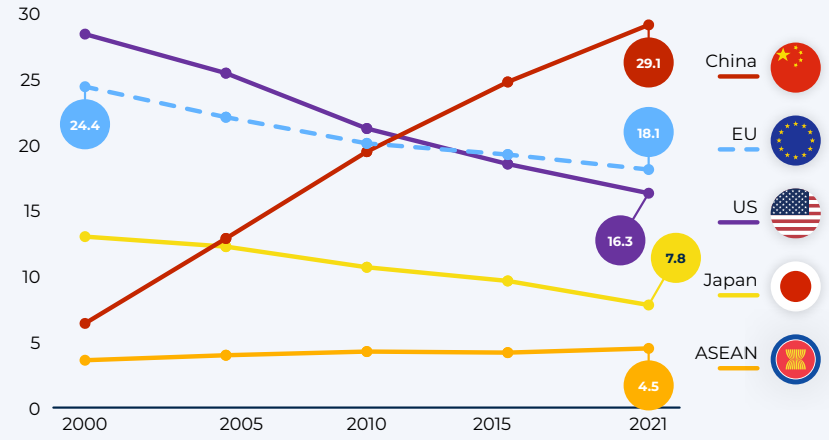
- China and its industries have evolved from the "world's work bench" to an innovator and competitor in their own right with domestic champions and a strong export agenda.
- The ASEAN countries are evolving as well and have also become important assembly locations for western companies.
- EU industry has remained competitive as a producer and exporter for medium and especially high technology. Competitiveness in high technology goods stimulates the full value chain and maintains Europe's industrial fabric as such – and therefore economic resilience and prosperity.
- The world is experiencing a step change: A new technological era is starting in terms of possibilities for final products as well as in the ways we produce. This affects cost efficiency, speed and quality – and competitiveness.

RECOMMENDATIONS

- Europe's leadership needs to understand that past successes do not guarantee future competitiveness. The EU and Member States have to put technological leadership at the centre of policy making:
  - Future success is based on enabling technology-open innovation across sectors and technologies.
  - This principle has to be ingrained in and across all legislation, far beyond isolated initiatives such as the Net Zero Industry Act or Horizon Europe.

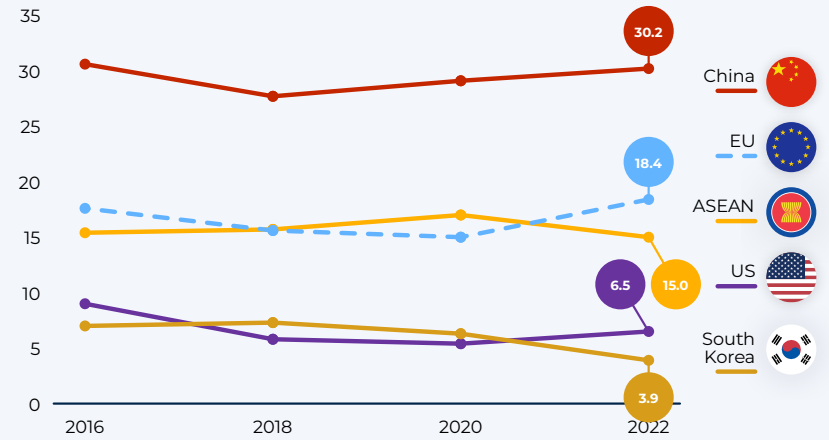
KPI 10 - Medium and high technology manufacturing gross value added

Global market share, %



KPI 11 - Exports of high technology manufactured goods

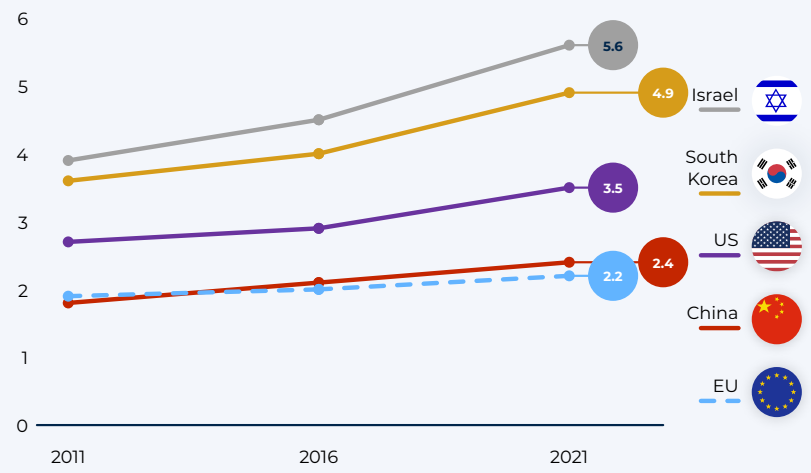
Global market share (excluding intra-EU exports), %



Note (1 & 2): ASEAN: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam.
Note 2: Word exports for 2022 incomplete. Using 2021 numbers for countries where 2022 data are not available
Source (1): UNIDO Statistics Data Portal
Source (2): World Bank, Eurostat, Global Counsel calculations

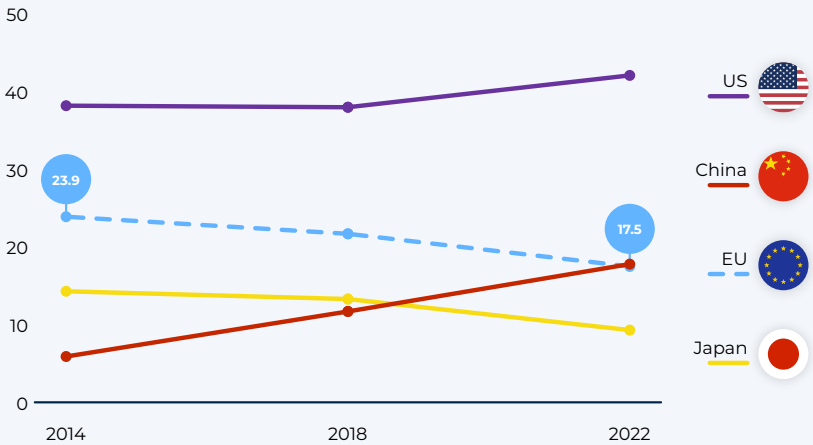
KPI 12 - Total R&D spending as a share of GDP

%



KPI 13 - Industrial R&D investment among the world's 2,500 largest companies

Global market share, %



The EU's regulatory environment needs an upgrade to empower and reward innovators

OBSERVATIONS

- Financial investment in R&D is a strong driver of innovation and technological leadership.
- The EU is lagging all its peers in terms of R&D intensity. It is also still far behind its own goal to reach 3% R&D intensity by 2010.
- R&D investment differs strongly across the EU with the risk of entire regions being left behind.
- EU industry's share in R&D investment is steadily declining as compared to China and the US. This is mainly because ICT sector innovation is driven by US companies in fierce competition with Chinese peers, rather than by EU companies.

RECOMMENDATIONS

- Europe needs to make more of what we have at EU level: improve the impact and efficiency of funding instruments, e.g. Horizon Europe via increased funding, easier access, faster processes and better alignment with industry priorities.
- Building a stronger business case for innovation: companies invest in R&D if they have good prospects to bring to market and commercialise new ideas. Starting points are:
  - reducing EU and national regulatory silo-thinking;
  - putting the business case for innovation at the heart of policy making: greater coherence of sector rules with political goals with strong and wide incentives for innovation, rather than prescriptive narrow targets;
  - increasing scale-up potential for innovation: completing the EU Single Market coupled with policies promoting technology deployment (at higher Technology Readiness Levels);
- To stem large investments in R&D and implementation, stronger public private collaboration is key.

Note (2): R&D spending globally made by the 2,500 largest enterprises.
Source (1): OECD
Source (2): 2023 EU Industrial R&D Investment Scoreboard, European Commission

EU and Member States have to improve the basis for experimental and priority deep tech R&D

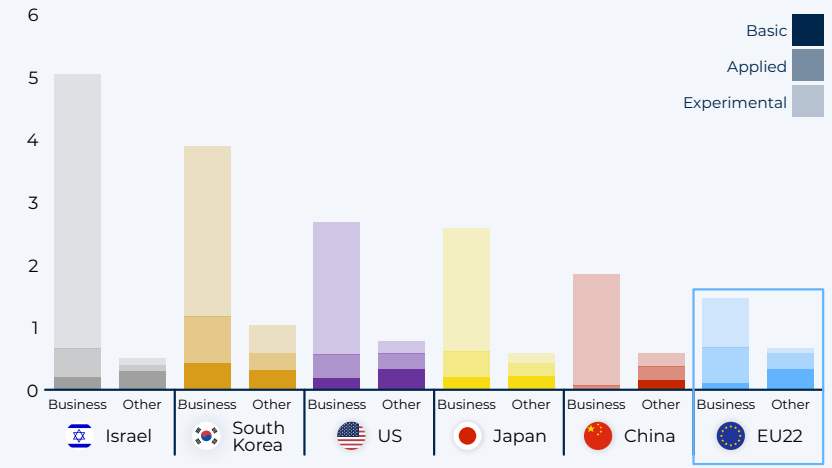
OBSERVATIONS

- Across the globe, business is by far the largest R&D spender, far exceeding governments and academia.
- In the EU; R&D spending is not only proportionately lower than for its peers and competitors – it also focused on different kinds of R&D: EU industry spends much less on experimental R&D than its global peers.
- Looking at deep tech innovation, VC funding is essential, especially for start-ups and scale-ups. US deep techs have by far the best access to VC funding. In Europe VC funding is sizeable only for AI, climate tech and blockchain.

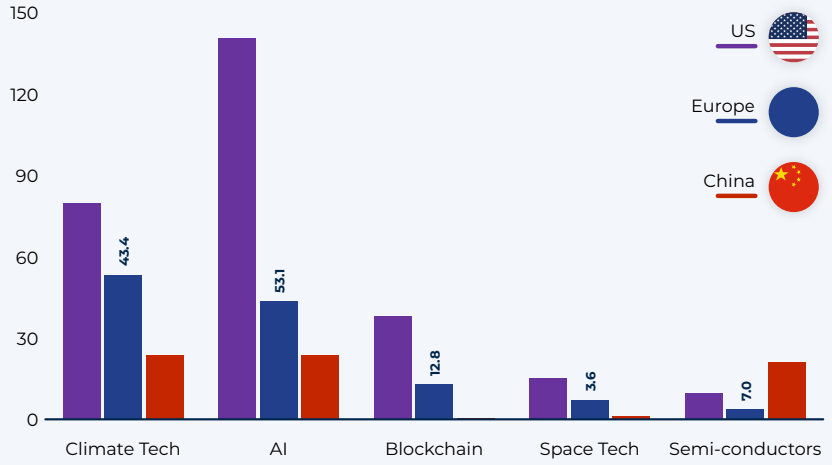
RECOMMENDATIONS

- Use public R&D investment to incentivise and multiply private sector R&D investment, targeting industry priorities.
- Improve conditions for experimental R&D in Europe:
  - learn from others on how to stimulate it: public-private cooperation, regulatory sandboxes and agility;
  - build a strong environment for testing and experimentation and for cooperation with technology infrastructures.
- Make Europe a better place for VC investment to catch up on AI, but also boost strategic but neglected areas: semiconductors, defence and quantum computing.
- Strengthen the European Innovation Council and find other levers to incentivise private capital to invest in start-up-driven innovation.

KPI 14 - R&D spending by type and source in 2021
% of GDP

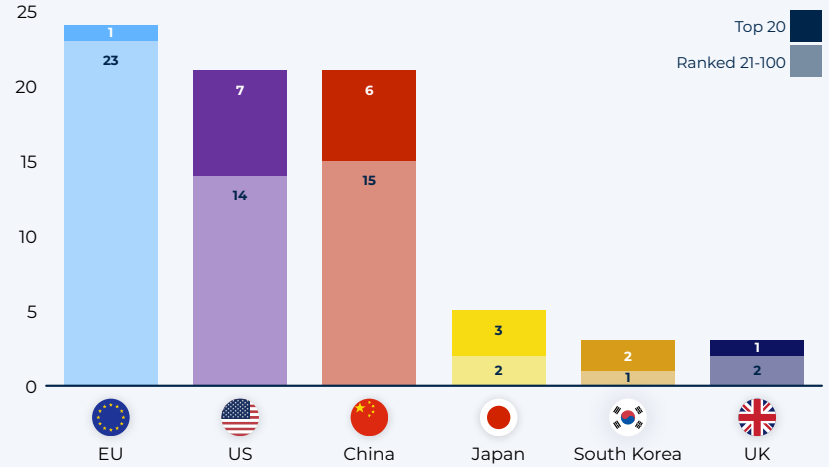


KPI 15 - VC funding in key deep tech areas
2021-2023, USD bn

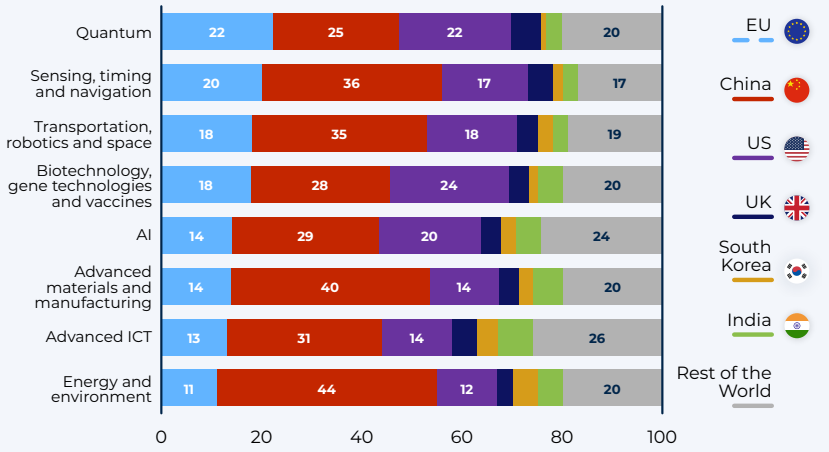


Note (1): Other = government, education, private non-profit. China: 2020 data used for applied and experimental. For Israel applied R&D data available only for business and academia. OECD definition: basic research: no particular application/use in view. Applied research: directed towards a specific practical aim or objective. Experimental development: draws on existing knowledge to produce new materials, products or devices, install new processes, improve the existing.
Note (2): Deep tech technologies are based on tangible engineering innovation or scientific advances/discoveries applied for the first time as a product. /
Source (1): OECD
Source (2): Dealroom

KPI 16 - Number of cities in WIPO 2022 Top 100 Science & Tech cluster list



KPI 17 - Share of high impact research output in critical technologies 2023, %



Both EU and Member States should cultivate scientific talent as an asset and smoothen cooperation with industry

OBSERVATIONS

- The EU has a large number of researchers and innovation hubs. But in terms of perceived excellence, EU hubs are increasingly becoming overshadowed by hubs in the US and in China.
- Competition for top science talent is fiercer as many industry sectors undergo science-driven revolutions. Cooperation with leading researchers is a key ingredient for innovation and triggers more funding and talent attraction: 'nothing succeeds like success'.
- Both Europe and the US seem to be falling behind in terms of high impact research for future technologies. China is following an especially clear strategy in this area.

RECOMMENDATIONS

- The EU and Member States should ensure the best possible conditions for its researchers and research infrastructures – financially and in terms of forming networks and cooperations in a non-bureaucratic way.
- The EU and Member States should step-up support for targeted cooperations between industry, academia and research centres across disciplines and borders.
- R&D funding programmes should be better aligned with industry priorities and regulatory frameworks.
- Promoting scale-up and uptake of solutions would benefit critical technologies where Europe is already strong, e.g. biotech and biomanufacturing.
- Leading and early-career scientists from third countries need stronger incentives to choose careers in the EU.

Note (1): The WIPO S&T cluster list measures the density of inventors and scientific authors, and includes data on the number of PCT patent filings and scientific publications.
Note (2): High impact research: research that has been heavily cited, including in research cited in patent filings. Patents that reference high quality research are more likely to become commercially viable.
Source (1): World Intellectual Property Organisation (WIPO)
Source (2): ASPI Critical Technology Tracker

EU institutions and Member States have to raise the profile of defence and dual-use R&D

OBSERVATIONS

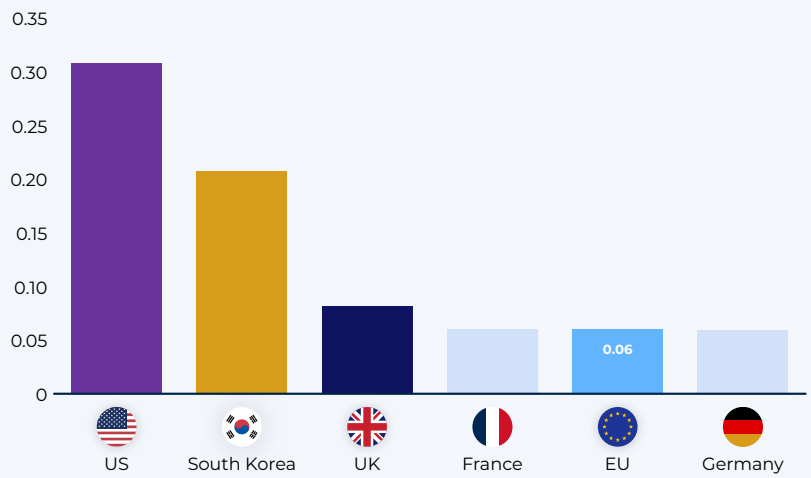
- Geopolitics are shifting: Russia's war in Ukraine has shaken Europe's security architecture and puts a spotlight on weaknesses in European military capabilities. The outcome of the next US election could impact NATO – and increase Europe's vulnerability to military aggression.
- Military technology is evolving fast, reflecting broader technological innovation and concrete battlefield lessons. To compete domestically and globally, Europe's defence industry has to remain at the technological forefront. If not, there will be severe repercussions for Europe's security.
- And yet even the highest spending EU Member States which invest much less public money into defence R&D than other major economies for the defence industry is a strong export sector. European investment in collaborative defence Research&Technology (R&T) remains far below its target of 20% of total defence R&T.
- China has a strong agenda to drive scientific innovation in military technology, shadowing even the US in terms of scientific output. And research-made-in-Europe is far behind in most areas.

RECOMMENDATIONS

- The EU and Member States urgently need to re-think their approach to dual-use innovation and increase budgets for defence-relevant R&D.
- The EIB must overcome its current reservations and adjust its investment rules to send a clear signal that the EU defence industry is not a 'destination non-grata' for financial investors – but also for top scientists.

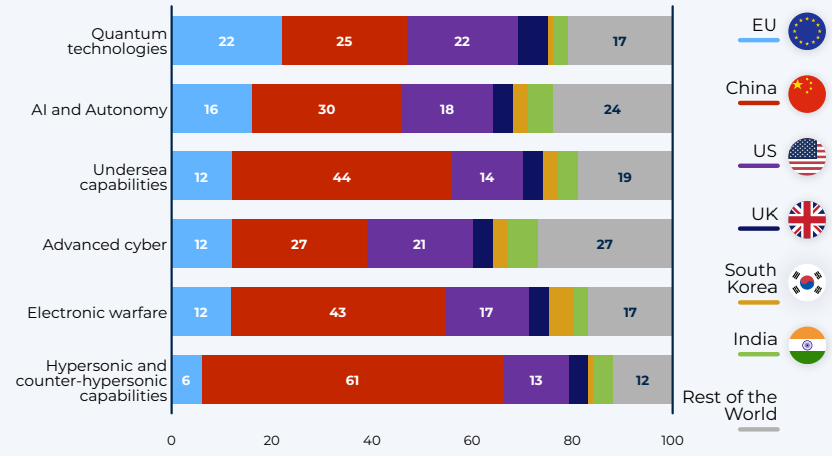
KPI 18 - Government budget allocation for defence R&D

2022, % of GDP



KPI 19 - Share of high impact research output across advanced military capability categories

2023, %



Note (1): 2021 data used for UK.
Note (2): High impact research - see definition as per KPI 16
Source (1): OECD, EDA Defence data
Source (2): ASPI Critical Technology Tracker

WHAT INDUSTRY EXPECTS FROM THE EU AND MEMBER STATES

Creating the conditions for Europe to 'own' its digital transformation

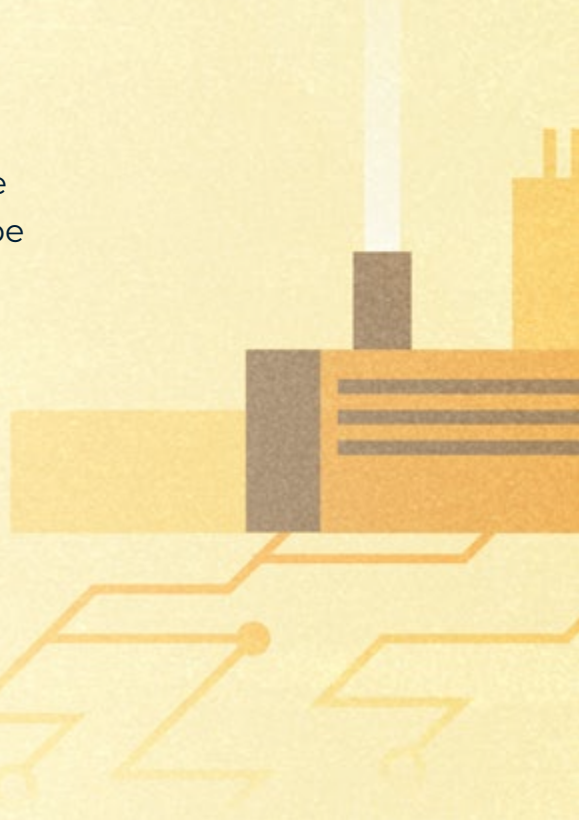
European industry is well on the way towards Industry 4.0 and deploying advanced technologies – but our global competitors are faster at bringing change to the factory floor at scale **(KPI 20)**.

Behind the curve: Europe has so far missed out on 'owning' Artificial Intelligence **(KPI 21)** and is too slow in developing an AI talent-base **(KPI 22)**...

... and although digital transformation depends heavily on the quality of connectivity, Europe has fallen dramatically behind in the deployment of both 5G **(KPI 23)** and fibre networks **(KPI 24)**.

Reliable access to semiconductors has become a sine-qua-non for industrial activity and Europe urgently needs a long-term strategy to build its own competitive ecosystem – whilst peers and competitors are already building theirs **(KPI 25 & 26)**...

... and at the same time, Europe has to speed up in the race on Quantum Computing **(KPI 27 & 28)** – the next Commission should prioritise a QC strategy for the full value chain.



The EU should set incentives and enablers for digital innovation and the deployment of Industry 4.0

OBSERVATIONS

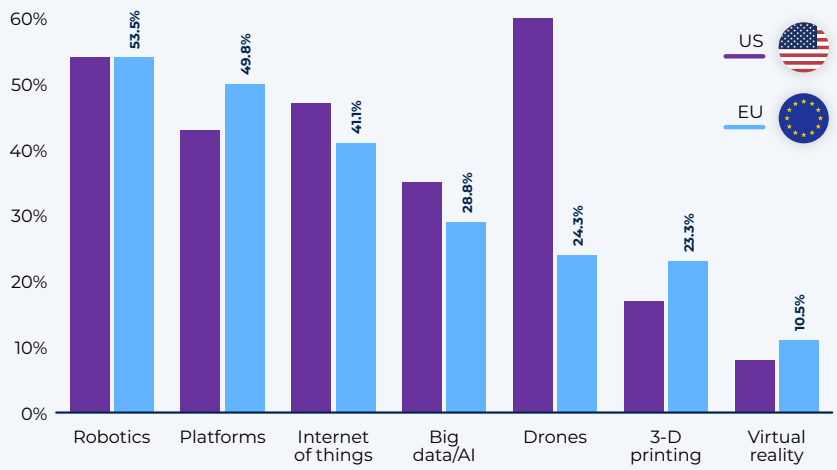
- European companies are embracing Industry 4.0 advanced technologies (robotics, platforms and Internet of Things, etc.), at the same level as their US peers. Uptake of other disruptive technologies is also taking place.
- Asian economies are far ahead in the adoption of industrial robots. Especially Chinese companies are investing heavily. Within the EU there are huge differences across Member States, but on average Europe is a laggard.
- Secure, reliable, and high-performing connectivity is a precondition for the digital transformation of European industry. A lot of this investment is private.
- The cyber threat landscape is complex and evolves rapidly. To manage cybersecurity risk, all stakeholders across the digital ecosystem need to contribute to building the required capabilities.

RECOMMENDATIONS

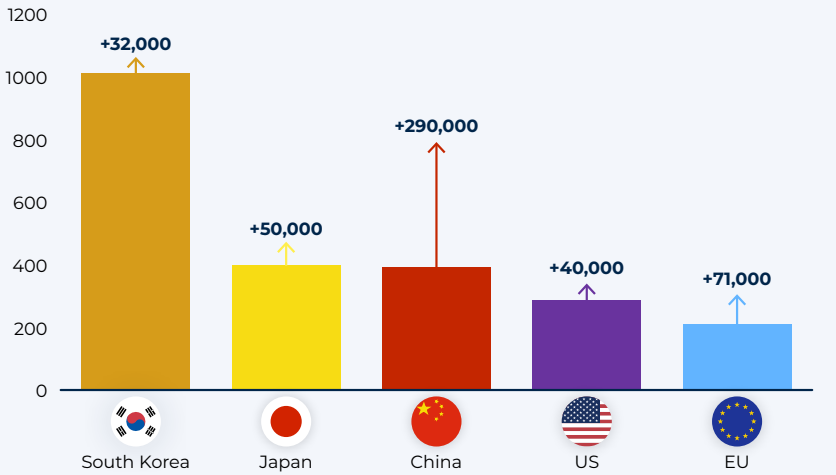
- The EU must support tech uptake and innovation by:
  - legislation that provides legal certainty for the use of new technologies and the deployment of Industry 4.0;
  - enabling Europe's technological capacity and industrial base to lead the global development of innovative technologies. This is not the time for unnecessary, burdensome obligations.
- The EU and Member States need to make an ambitious effort to create true digital Single Market opportunities that incentivise investment and healthy pan-European competition.
- Europe needs to factor in better that digitalisation creates higher, complex and always evolving cyber risks. The EU should foster increased cybersecurity cooperation between governments, international institutions, industry and other stakeholders.

Source (1): European Investment Bank
Source (2): International Federation of Robotics

Use of advanced technologies by EU and US firms in 2023

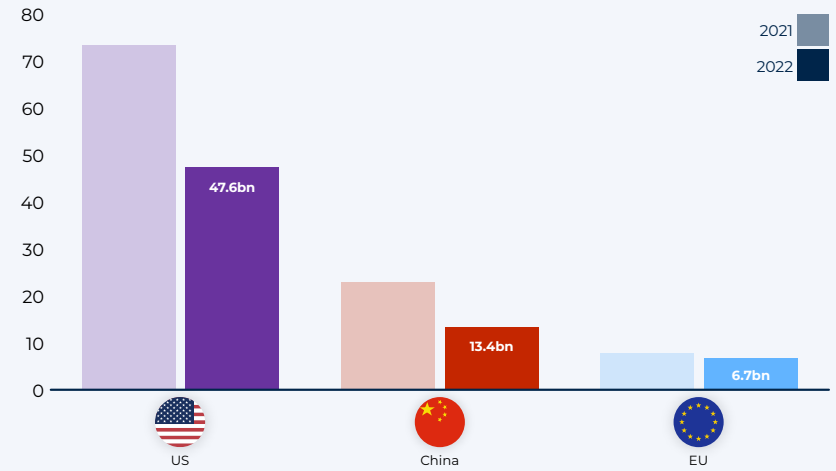


KPI 20 - Installed robots per 10,000 works, and total number of new installation (arrows), 2022

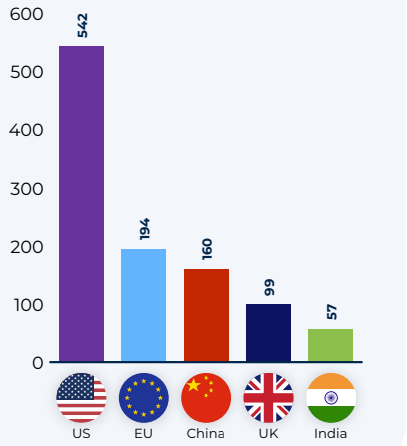


KPI 21 - Private investment in AI by region

Total Investment (USD billions)

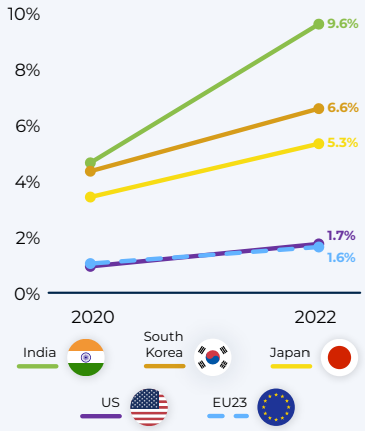


Number of newly funded AI companies by geographic area, 2022



KPI 22 - AI talent concentration by country

%



Both the EU and Member States must contribute to a stronger basis for investment in AI leadership

OBSERVATIONS

- The US private sector is the most dynamic in driving AI forward both via investment in AI and by founding new AI companies.
- Private investments in the EU are dwarfed in comparison, but new initiatives were launched in 2023.
- EU (and US) companies are already facing skills shortages in AI, especially compared to Asian countries where professionals and students are embracing AI in large numbers.

RECOMMENDATIONS

- The European Commission needs to prioritise its goal to attract over EUR 21.5 billion of total AI investment per year between 2021–2030.
- Europe does not only have to be a proficient user of AI, it also needs to own and develop the technology. EU and Member States urgently need to create an environment conducive to AI innovation: sufficient access to capital and infrastructure, as well as a clear strategy to boost AI-competence and skills at all levels.
- Following the adoption of the EU AI Act it is vital to:
  - ensure consistent interpretation, implementation and enforcement across the EU;
  - develop / implement technical standards in close cooperation with businesses to ensure they are well adapted to AI applications and do not stifle innovation;
  - guarantee coherence with other existing and future EU legislation, international initiatives and global standards;
  - foster an open AI-ecosystem via open and competitive markets, where anti-competitive dynamics are tackled early on.

Source (1) & (2): Stanford AI Index 2023, NetBase Quid

Source (3): OECD, LinkedIn

The EU has to incentivise investment in 5G (and 6G) and urgently improve conditions for 5G roll-out

OBSERVATIONS

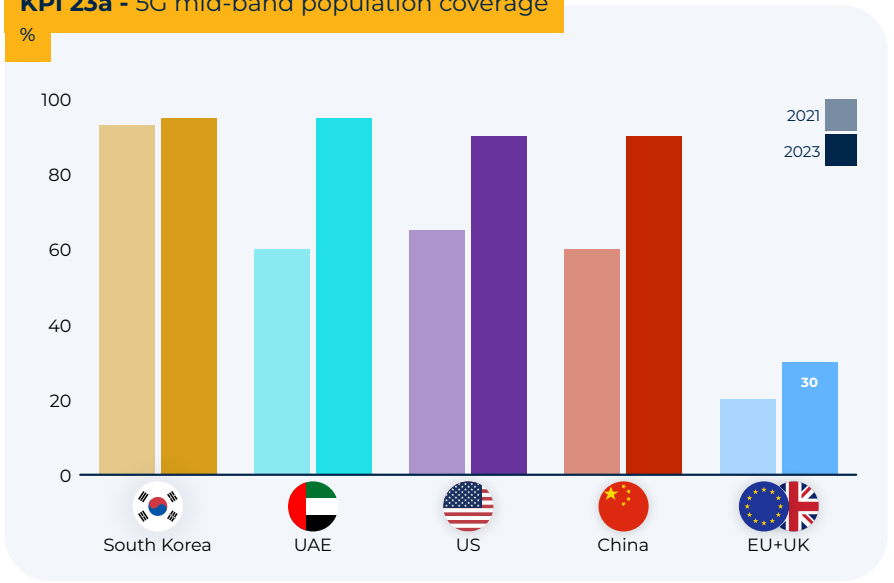
- The EU is home of two of the three largest suppliers of telecom network equipment.
- Europe's deployment of 5G technology is dramatically lagging behind its global peers and other ambitious jurisdictions. In Europe both 5G mid-band coverage and subscription penetration are expanding much more slowly.
- Europe is even further behind in the implementation of vastly superior 5G Standalone '5GSA' technology: 93% of Europe's commercial public networks that support 5G still run on non-standalone mode. A lack of 5GSA availability also holds back innovation applications and business models.
- Europe was late in allocation of 5G spectrum. Timely addressing Europe's fragmented approach on spectrum will be a condition for Europe to lead in future 6G deployments.

RECOMMENDATIONS

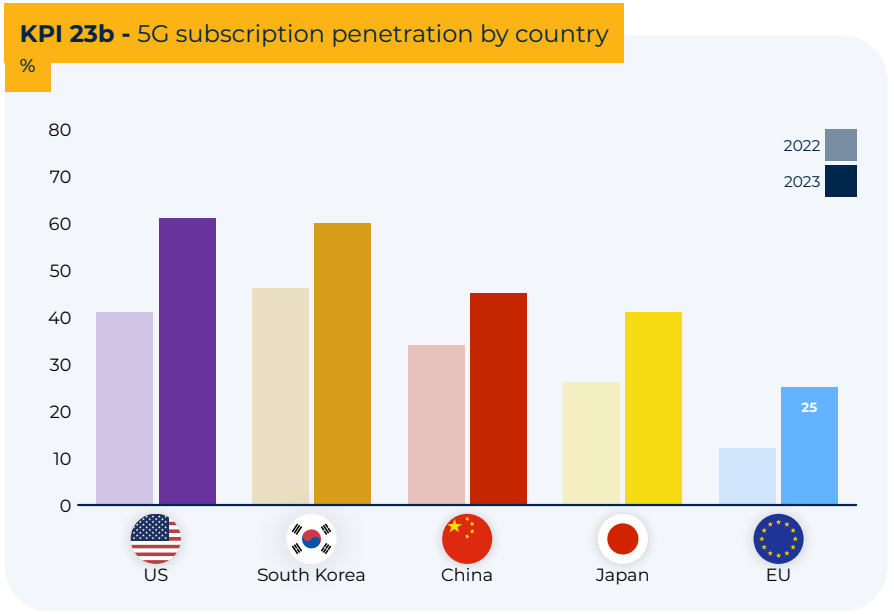
- Europe needs to leverage its current strength in advanced network technologies.
- The EU must do much more to incentivise private investment in 5G (and 5GSA) including through:
  - modernising the current regulatory environment, reducing barriers, to deployment and harmonising spectrum allocation conditions;
  - allowing more market consolidation so that telecommunication companies can harness economies of scale and invest more and faster.

Note: The mid-band spectrum at 3.6 GHz can carry significant amounts of data up to 900 megabits per second (compared to ca. 150 megabits per second for 4G) over significant distances.
Source: Ericsson

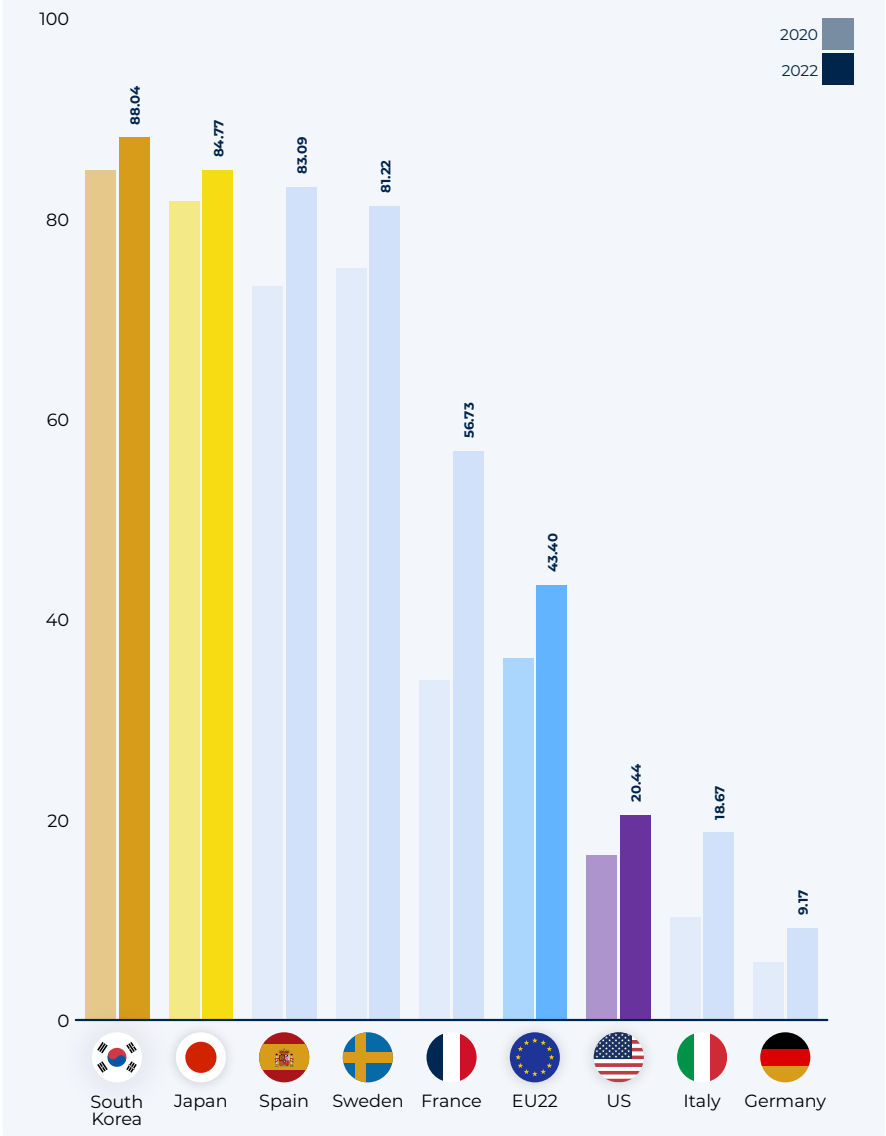
KPI 23a - 5G mid-band population coverage



KPI 23b - 5G subscription penetration by country



KPI 24 - Fibre connection in total fixed broadband



EU policy makers should drive futureproof rules that enable faster investment in fibre networks

OBSERVATIONS

- Very High-Capacity Networks (VHCN), such as fibre, are key to strengthening digital infrastructures. Increasing VHCN deployment is important as a foundational aspect of the connected world.
- Fibre is also significantly more climate-friendly than other types of fixed broadband, partly because it is more power-efficient to operate.
- The huge differences in fibre roll-out and speed across Europe undermine the digitalisation of our economies – and Europe's industrial competitiveness versus our more advanced or faster moving peers.

RECOMMENDATIONS

- The European Commission's Digital Decade ambition, i.e. by 2030 all European households should be covered by a Gigabit network, has to remain a priority.
- To achieve this:
  - EU policymakers need to deliver future-proof policies which incentivise sustainable investments in gigabit connectivity infrastructure.
  - Removing barriers to the digital Single Market is vital.

Note (1): EU22 includes EU Member States that are also OECD members.
Source (1): OECD

The EU needs a long-term strategy to build a competitive semiconductor ecosystem

OBSERVATIONS

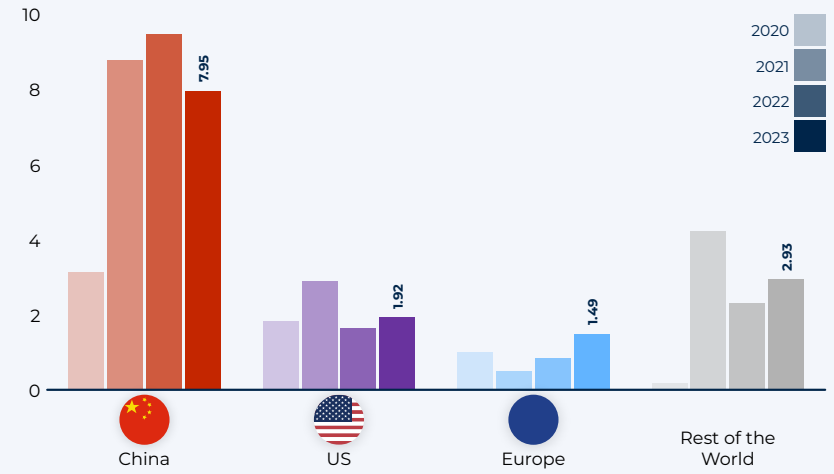
- Success in the digital and the green transitions depends on the secured availability of various types of semiconductors. For Europe, in the current geopolitical situation, this is no longer a given.
- The EU debate focuses strongly on creating European capacity for the most advanced (i.e. smallest) chips. Yet concerns arise too for the EU's existing producers of large 90nm+ chips (relevant e.g. for the EU automotives sector), who feel pressure notably due to Chinese overcapacity: China is expected to produce nearly twice the amount needed for domestic use by 2030.
- With the Chips Act, EU and Member States are stepping up public support for private sector investments to double the capacities of semiconductor fabrication on EU soil. Yet this will take time.
- VC investment in the semiconductor industry in Europe (and even the US) is negligible compared to the amounts pumped into this industry in China.

RECOMMENDATIONS

- The EU must build on the Chips Act to advance a long-term strategy for the development of the entire EU semiconductor & semiconductor manufacturing equipment ecosystem to strengthen its role in the global value chain.
- The regulatory framework should aim to promote innovation and investments through public-private partnerships and incentives for investment. Targeted and risk-based regulation will help avoid unnecessary regulatory burden.
- The EU and Member States should urgently put in place additional policy measures to deepen the talent & skills pool available to the industry.

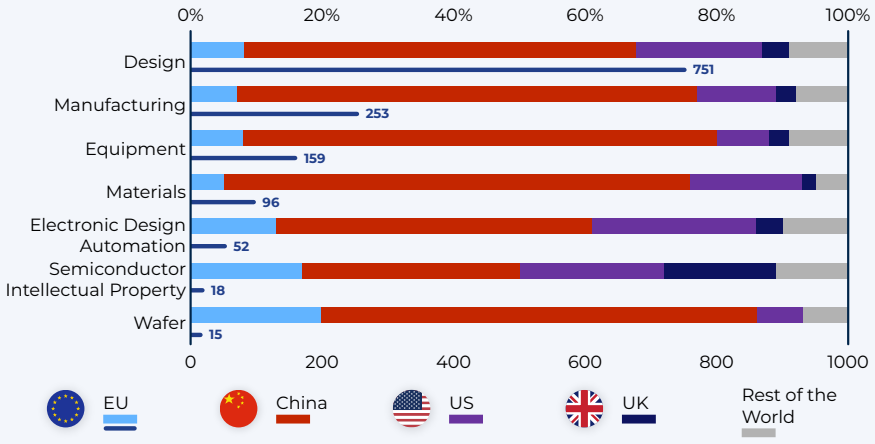
Note (1): Europe is defined as the continent
Note (2): Europe defined as the continent
Source (1): Pitchbook
Source (2): Stiftung Neue Verantwortung

KPI 25 - VC investment in semiconductor industry
USD bn

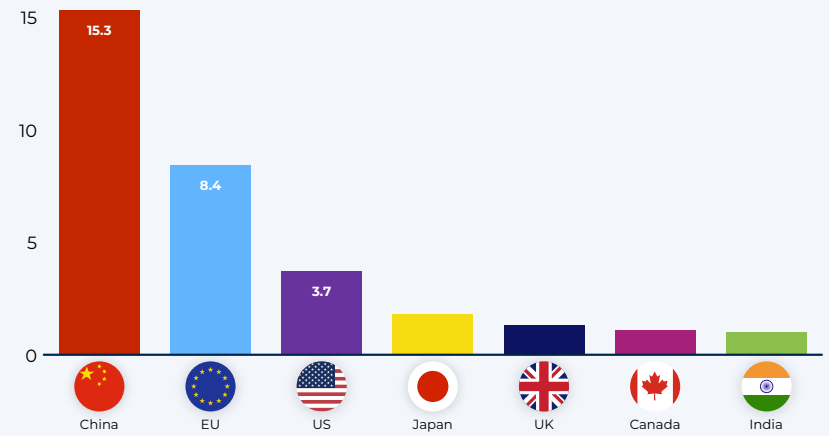


KPI 26 - Startups by country in the semiconductor value chain
Accummulated data for 2020-2022, % Top Axis

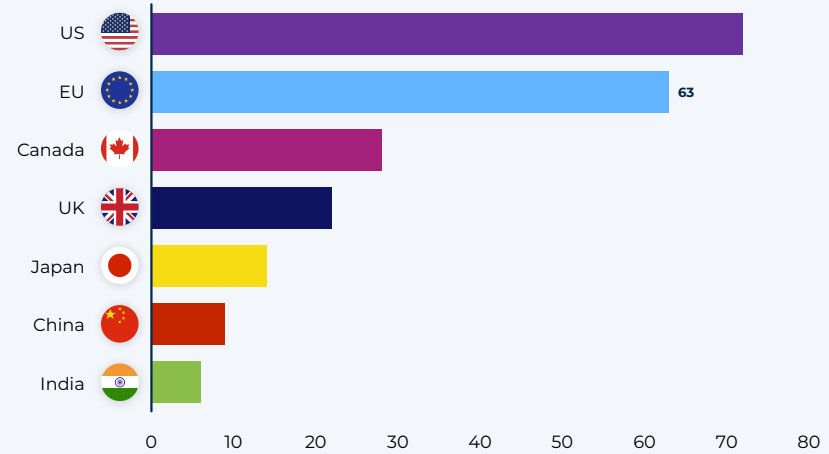
Start-ups per activity total numbers (lower axis)



KPI 27 - Total announced government investment in quantum technology until 2022,
USD bn



KPI 28 - Number of quantum technology start-ups by country / region in 2022



EU institutions must prioritise a quantum computing strategy for the full value-chain

OBSERVATIONS

- Quantum Computing is one of the most disruptive upcoming technologies. It has the potential to be exponentially more powerful than even the fastest super computers. Implications – both gains and risks – are immense; as are implications for national security.
- The Chinese government has been investing by far the most in quantum technology.
- US public investment is lower, but technology development is managed by a national committee (NQI) with direct ties to the US President.
- After the US, the EU has the most vibrant QC start-up scene – although attracting much less private investment. Yet, Europe lacks infrastructure (cloud, chips production). Other countries (US, China, Canada) are more than ten years ahead in hardware development. Europe still is strong in applications in areas such as chemicals.

RECOMMENDATIONS

- Europe must catch up with the leading nations and develop own technological capabilities, including in the development of commercially viable QC prototypes.
- The EU needs a quantum computing strategy that spans the full value chain and:
  - reduces bureaucratic hurdles;
  - identifies and promotes domestic potentials;
  - proposes applications for both Quantum and High Performance Computing;
  - incentivises companies to invest in this technology;
  - sets a foundation for a cross-industry application portfolio;
  - guides the joint implementation of reference applications.

Source (1): McKinsey, Pitchbook, ICV Thinktank, IT Orange
Source (2): McKinsey, CapitalIQ, Crunchbase, Pitchbook, Quantum Computing Report

WHAT INDUSTRY EXPECTS FROM THE EU AND MEMBER STATES

Making Europe's green transition a success story for industry

Europe's emissions are decreasing steadily **(KPI 29 & 30)**, but for faster scale-up of green technologies, policymakers need to create business cases.

In the meantime, high energy prices **(KPI 31)** are hitting competitiveness vis-à-vis global peers – and creating a common market with upgraded infrastructure has become even more urgent.

Whilst renewable energy generation **(KPI 32 & 33)** needs to accelerate and also factor-in infrastructure needs...

... the EU still has to set a clear course for interconnected grids, electrification and CCUS to spur investment **(KPIs 34 & 35)**.

Europe's hydrogen markets also need scaling up – in terms of infrastructure **(KPI 36)** and to build a vibrant and innovative hydrogen ecosystem **(KPI 37)**.

And finally – to manage its dependencies on key inputs for the green transition **(KPI 38)**, Europe has to build a strong circular economy, as well as realistic partnerships with countries that are rich in critical raw materials.

EU policymakers should create a business case for scaling up green technologies faster

OBSERVATIONS

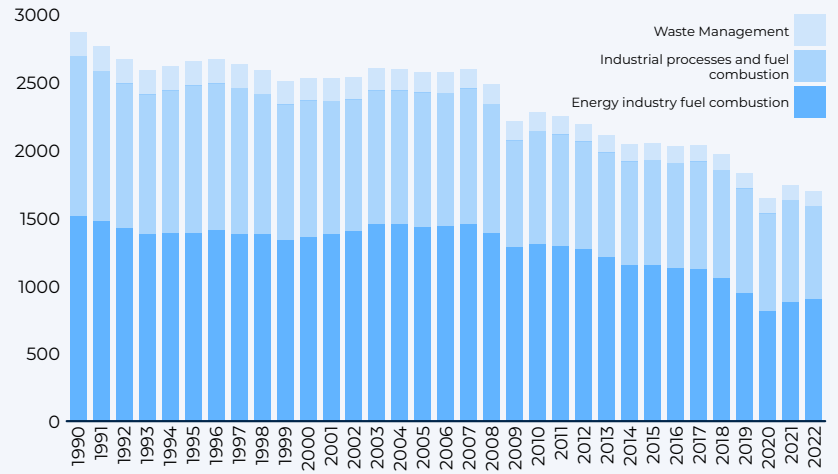
- EU industry emissions remain on a downward trend, bringing the decline since 1990 to 39%.
- If momentum is kept and investment in renewables is accelerated, the EU can meet its goal of a 55% reduction from 1990 levels by 2030.
- Energy intensity is decreasing in the EU and in other major economies.
- Emissions intensity is decreasing in the EU and the US, but increasing in China and India.

RECOMMENDATIONS

- De-industrialisation and cutting demand in the EU are not the answer to the climate challenge: climate action should be seen as an opportunity to create industrial and economic value.
- To advance even faster in the greening of our economy, Europe needs a policy shift: Incentivise demand for decarbonised solutions and create a business case for a massive scale-up of existing technologies (rather than just set targets and increase reporting requirements).
- To incentivise other global economies, climate diplomacy, technological collaboration and a well-designed WTO-compatible carbon-border adjustment mechanism will be vital.
- Importantly, all GHGs should be considered, not just CO2.

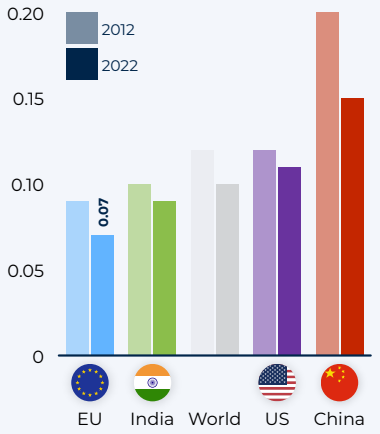
Note (1): EEA classifications of GHG emissions in the industrial sector: emissions from fuel combustion in manufacturing industries and construction, industrial processes and product use, fuel combustion in energy industries and fugitive emissions in energy production and waste management.
Note (2): Calculated in PPP constant 2017 USD bn.
Source (1): European Environment Agency
Source (2) BP, World Bank, Global Counsel calculations

KPI 29 - Industry GHG emissions in the EU in million tonnes



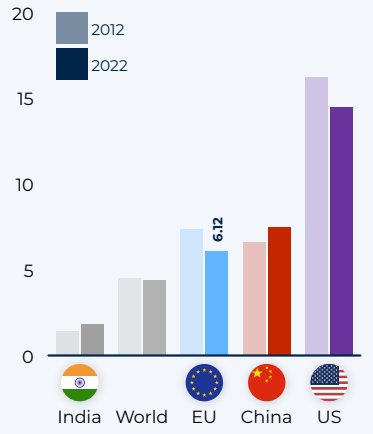
KPI 30a - Energy intensity

Million tonnes of oil equivalent of primary energy consumption / GDP

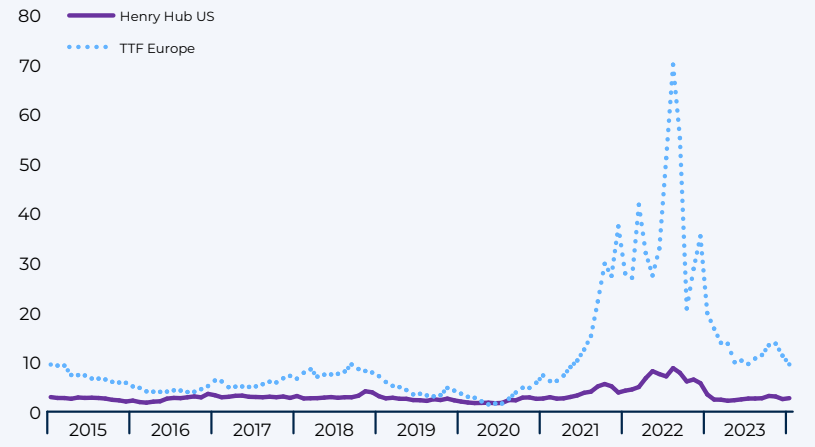


KPI 30b - Emmisions intensity

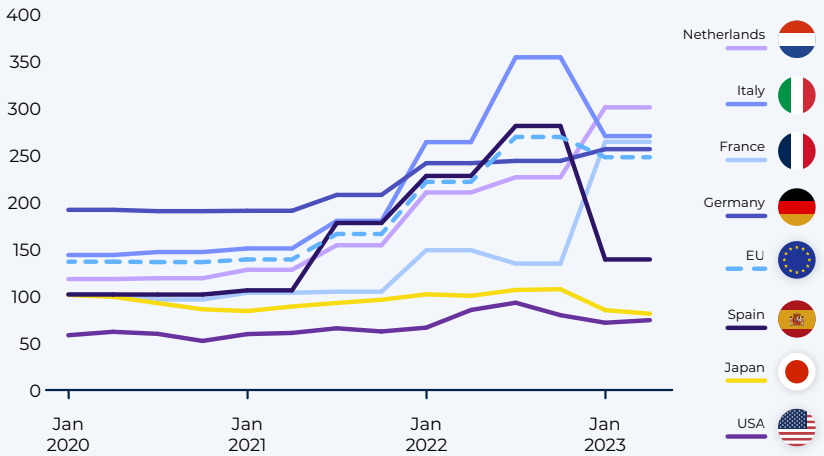
CO2 emissions per capital (tonnes)



KPI 31a - US and European gas prices
USD / MMBtu



KPI 31b - Retail electricity prices paid by industrial customers,
EUR / MWh



The EU urgently needs a common market for energy with upgraded infrastructure

OBSERVATIONS

- Russia's war in Ukraine has led to a steep increase of energy costs in 2022 and energy security has become a political priority – and a concern for governments, industry and citizens.
- Europe's high energy costs affect the global competitiveness of Europe's industries – especially in energy intensive sectors but also downstream. There is a real risk that this will culminate in the deindustrialisation in specific sectors / geographies with significant value chain implications.
- Electricity prices reflect not only generation costs, but also national taxes and levies. In the EU in 2021 different types of taxes added up to 40% of electricity prices[A], while in the US electricity is barely taxed

RECOMMENDATIONS

- The EU urgently needs a common market for energy, harmonised permitting and tax systems, and a simple, stable and predictable regulatory framework to facilitate investment.
- Europe's energy infrastructure needs an upgrade to make a common market reality. To support infrastructure transition it is key to accelerate permitting and policy environments that enable private investment.
- Indirect emission costs for electro-intensive companies should be compensated as long as the electricity market is not yet fully decarbonised and fossil-fired power generators set the marginal price.
- Long-term contracts and transnational renewables Power Purchase Agreements contribute to lower energy prices and should be promoted.

Note (2): Industrial prices in the EU are represented by the ID consumption band for the purposes of international comparison
Footnote (A): https://ert.eu/documents/2022bmr/
Source (1): IMF
Source (2): Source: Eurostat, EIA, DESNZ, Japanese Statistics Bureau, Macrobond

EU and Member States should speed up on renewable energy generation, factoring in infrastructure needs

OBSERVATIONS

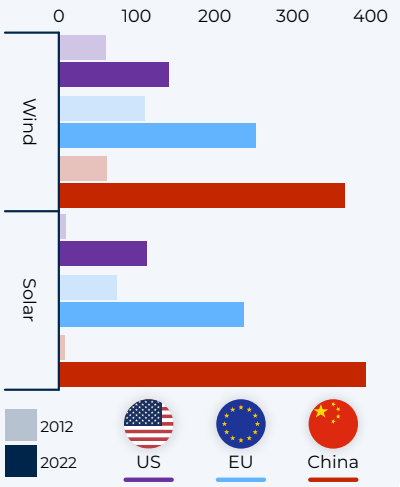
- China is world leader in both wind and solar power capacity, showing unrivaled capacity growth over the last 10 years. For both wind and solar capacity, Europe comes second before the US, but the US have achieved faster growth in solar capacity.
- And yet, in the EU the share of renewables in the energy consumption mix is substantially higher and has been growing faster than in China and the US. This reflects also Europe's success in lowering energy intensity as compared to its peers.
- Cost of solar energy generation differs globally as well as across Europe.
- According to industry experience, renewable energy generation is cost-competitive compared to non-renewable sources. Aligning electricity infrastructure investments with renewable energy deployment will impact on electricity cost in the short term and ultimately allow the reduction of the total energy bill

RECOMMENDATIONS

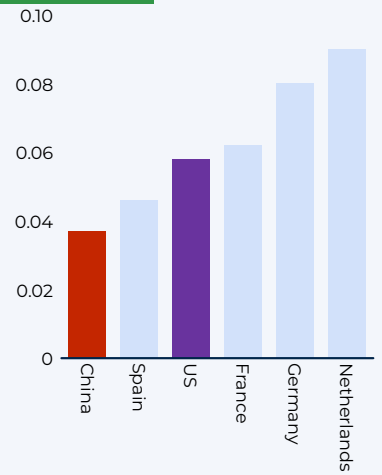
- The EU and Member States should promote a faster build-up of green energy generation, generating greater economies of scale for equipment producers and therefore lower costs per unit.
- EU action also should include:
  - Facilitating access to input materials (including Critical Raw Materials) at better conditions.
  - Supporting innovation to increase the yield of wind turbines and solar panels made in Europe.
- Energy from renewable sources needs to be managed efficiently. Europe needs to think of energy production and grid flexibility together to drive down all-in costs. Action points include:
  - investing in digitalised and integrated electricity grids across borders; and
  - building a Single Market for Energy.

  Addressing system needs will lead to lower consumer prices and to socio-economic welfare gains.

KPI 32a - Wind - **KPI 32b -** Solar

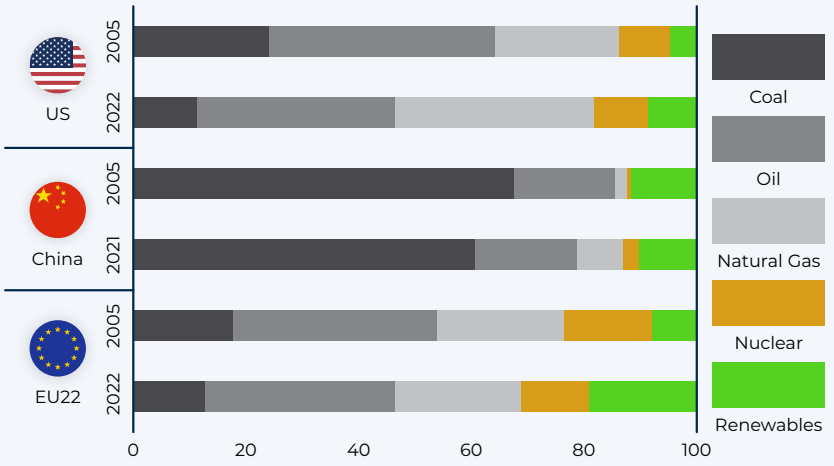


KPI 32c - Solar Levelised Cost of Electricty (LCOE), 2022, USD/kWh



KPI 33 - Final energy consumption in 2005 and 2022

Share by source, %



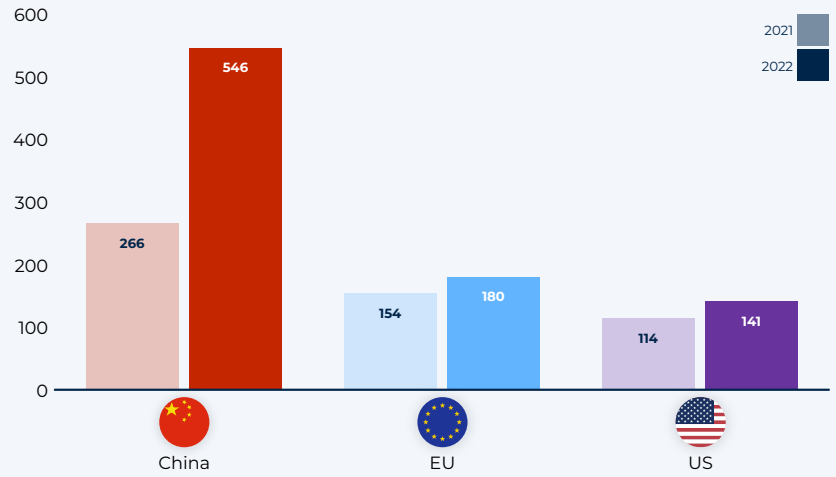
Note (2): No 2022 data for China

Source (1) BP Statistical Review of World Energy

Source (2): IEA

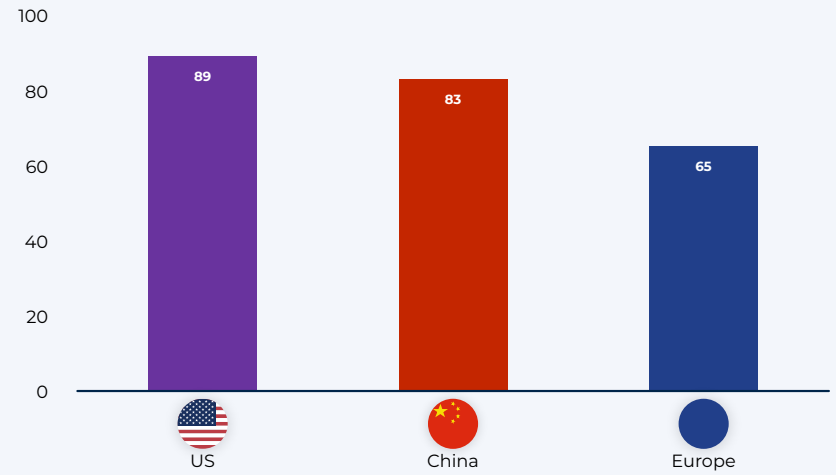
KPI 34 - Low-carbon energy transition investment

USB bn



KPI 35 - Electricity network investment

Investment spending in USD bn, 2022



EU policymakers must set a clear course for interconnected grids, electrification and CCUS

OBSERVATIONS

- China is far ahead in terms of capital invested into the low carbon energy transition and its various technologies. And China's investment is accelerating - unlike in Europe and the US (although the US IRA may have an impact as of 2023)
- Already today digitalisation and interconnected, smart grids across Member States are an important part of the answer to Europe's high electricity prices and the challenge to secure steady 'green' electricity supply.
- Looking forward – with electrification as the key for Europe's green transition – electricity grids are set to become an important bottleneck. And yet:
- Investment in Europe is far below levels in the US and China.

RECOMMENDATIONS

- It is time to answer the remaining questions on the desired outcome of Europe's energy transition: What future do nuclear energy and CCS have in Europe? How will public and private sector pull together to build infrastructure for electrified transport?
- To prevent bottlenecks for an electrified economy, the EU and Member States need to enable interconnected and digitalised grids across Europe:
  - streamline coordination, planning processes and permitting across the EU;
  - set regulatory incentives to foster anticipatory investments in electricity networks.

Note (1) Low carbon energy transition investment includes renewable energy, nuclear, energy storage, CCS, hydrogen, electrified transport, electrified heat, sustainable materials.
Note (2): Europe shows the continent (43 countries).
Source (1): Bloomberg New Energy Finance
Source (2): IEA

Both EU and Member States should facilitate the scale-up of Europe's hydrogen markets

OBSERVATIONS

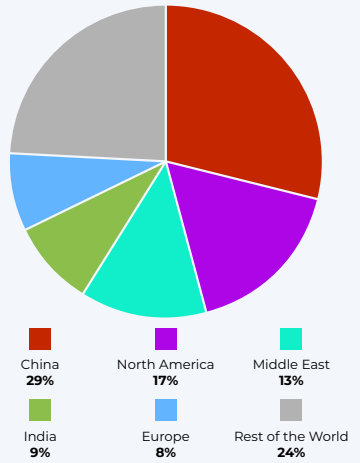
- Hydrogen is very prominent in the EU public debate, but the EU is a much smaller user than China, the US or the Middle East.
- Over the last three years, investment in electrolyser installation has surged across the globe. Europe's investment comes second after China – but the US Inflation Reduction Act could change that ranking very quickly.
- US start-ups attract most the investment across all areas, except fuel cells (dominated by China) and project development (very prominent in the EU).

RECOMMENDATIONS

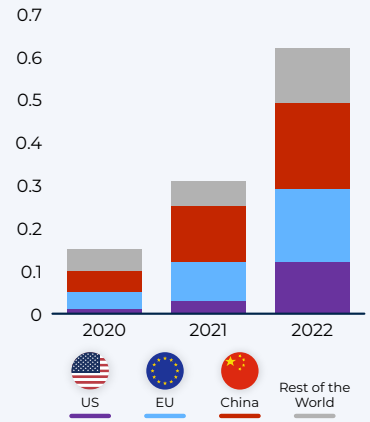
- Europe needs to scale its market for hydrogen to incentivise investment and innovation 'made in Europe'.
- EU and national power grid regulation should be linked more closely to molecule grids, at least in integrated planning which identifies both producers and off-takers' needs.
- The EU and Member States should facilitate cross-sectoral collaboration and market dialogue about technical requirements and network codes.
- Third-party access to gas infrastructure should be non-discriminatory – and access rules need to be flexible and encourage investments.
- The EU needs to put in place certification schemes in line with RED III.

Note (2): 'Other Europe' is Europe without UK
Source (1) IEA Global Hydrogen Review 2023
Source (2): IEA, Cleantech Group, Crunchbase

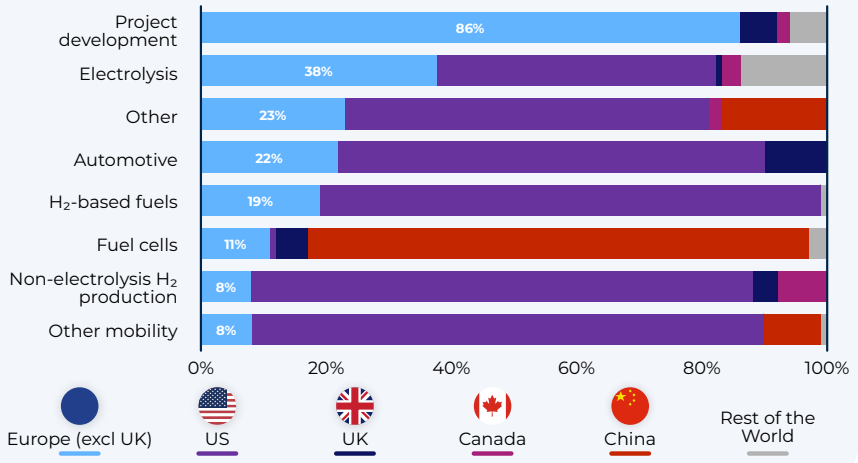
Hydrogen use by region
% of total hydrogen usage



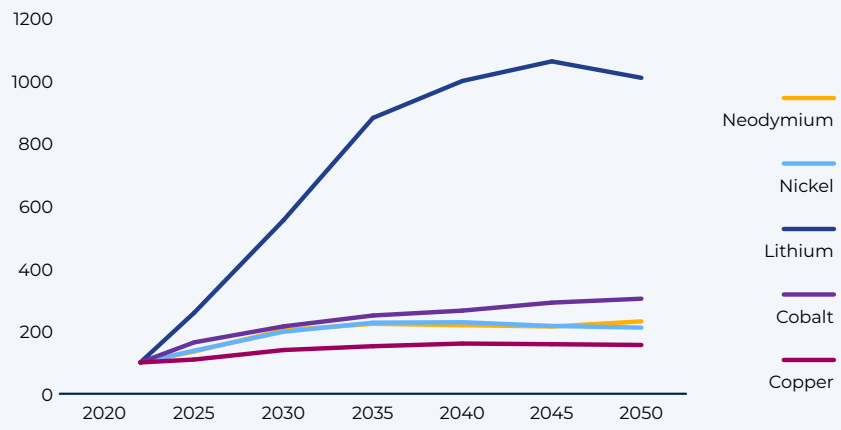
KPI 36 - Investment in electrolyser installations by region
USD billion



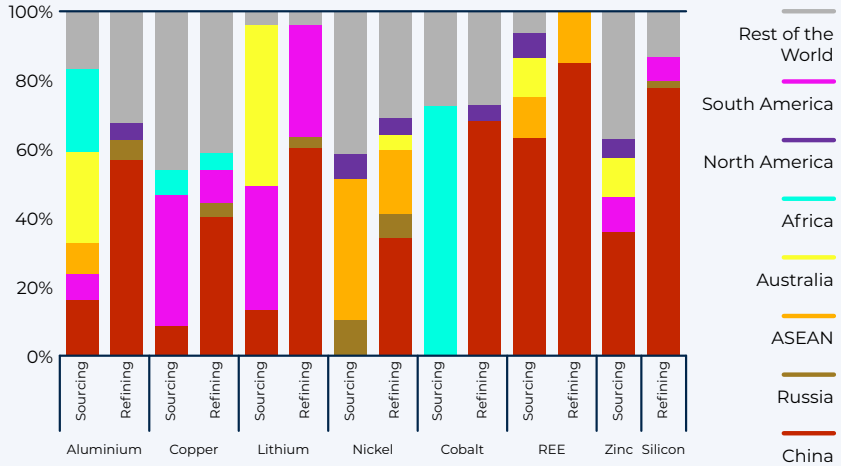
KPI 37 - Early and growth-stage equity investment in energy start-ups in hydrogen-related areas by region, 2018-2022



Demand for critical minerals in the Net Zero 2050 Scenario



KPI 38 - Critical Raw Materials
sourcing and refining locations, %, 2021



The EU needs a realistic approach to partnerships with CRM-rich countries and a strong circular economy

OBSERVATIONS

- Competition for critical minerals will accelerate as countries transition globally towards Net Zero by 2050.
- As of now critical raw materials are neither sourced nor refined on EU soil. I.e. EU industry must import CRMs to nearly 100% and has no guaranteed access to critical raw materials that will soon be in high demand globally.
- China has built a very strong position by sourcing rare earth elements (REEs) and zinc domestically by establishing refining dominance for most CRMs (including CRMs sourced elsewhere) on its own soil.
- Rising geopolitical tensions increase the risk of CRMs being weaponised.
- The Critical Raw Materials Act is a first step for Europe towards securing a sustainable supply of critical raw materials. However, it is uncertain whether it will be sufficient to the reach ambitious domestic production and processing benchmarks.

RECOMMENDATIONS

- Diversifying the supply of raw and processed materials from around the world through trade agreements and CRM-focused partnerships is key. To achieve this EU negotiators need to set realistic expectations for FTAs with raw-material-rich third countries.
- The EU must become much more ambitious for its circular economy and provide incentives as well as a true Single Market for secondary raw materials to enable economies of scale.

Source (1) IEA
Source (2): Eurometaux

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