



## Putting the EU Industrial Strategy into action

KPIs for tracking progress and benchmarking competitiveness



# Foreword

The COVID-19 crisis has exposed all of us in society to unprecedented challenges. It is affecting the way we live and work. The impact on the European economy is tremendous, at a time when European industry was already facing many challenges: climate change, disruptive technological developments and increased protectionism and trade tensions to name but a few.

The crisis triggers an ever-more urgent need for coordinated action to turn these challenges into opportunities and to secure Europe's continued prosperity.

We as industry are at the centre of this and we are strongly affected, yet we remain committed and optimistic about Europe. The COVID-19 crisis has not changed the recommendations made in last years' ERT publication - *Turning Global Challenges into Opportunities* - Europe's chance to lead. On the contrary, we are more committed than ever to a sustainable future built on the twin green and digital transitions and based on free and fair trade and competition. We are convinced that through innovation and winning business models, we can make the EU a new powerhouse of economic growth and a role model to other regions. Together, public and private sector hand in hand, we can manage with courage and determination.

In its New Industrial Strategy for Europe published in March 2020, the European Commission sets the right ambition to put European industry at the heart and centre of a powerful and sovereign Europe. It defines the right priorities for European industry to become a leader of industrial transformation. We as European leaders in industry welcome this very much, also seeing a lot of overlap with ERT's own ideas.

Now that the priorities are clear, we ask our political leaders to urgently begin implementing the new strategy. This must be accompanied with quantifiable targets, together with a transparent and concise set of Key Performance Indicators (KPIs). This approach will help bring the strategy to life and keep track and correct course when needed. Only if we monitor, measure, adjust and tackle opportunities, will we truly be able to strengthen the EU's industrial competitiveness in a sizeable way.

As the EU has clear targets under the Green Deal and President von der Leyen announced a "common plan for a digital Europe with clearly defined goals for 2030", any update of the Industrial Strategy would need to benefit its efficient implementation and thus also contain numerical targets with accompanying indicators.

The companies led by ERT Members have longstanding experience with Key Performance Indicators. We hope that the ideas in this publication can help the European Commission and the EU Member States to define these new KPIs together, as we all share the same ultimate goal: to reinforce Europe's competitiveness and make the European economy flourish, by creating a better, more prosperous future for the people.



**Dr Martin Brudermüller**

Chair, ERT Committee on Competitiveness & Innovation  
CEO & Chairman of the Board of Executive Directors, BASF

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# Introduction

The European Commission's new Industrial Strategy<sup>1</sup>, published on 10 March 2020, aims to ensure Europe's industrial competitiveness amid intensifying global competition and a pressing need to transition to a climate-neutral and digitally-advanced industrial model.

The relevance of a strong strategy for industry has only increased with the outbreak of the coronavirus pandemic. Equally important is the implementation of the strategy which must start now as only a competitive industry can mobilise the resources to transition successfully to a greener and more digital economy and ensure future jobs as well as resilience.

In the concluding chapter of the strategy (p.16), the Commission indicated it wants to "increase political ownership of the strategy", including through "regular progress points at the Competitiveness Council and in the European Parliament". It has also committed to "monitoring the strategy's implementation regularly" by tracking a "set of Key Performance Indicators (KPIs)". The pandemic has made the need for such KPIs even more pressing, to measure more systematically the evolution of the EU's competitiveness in the coming years as this will be crucial to the recovery.

**As President von der Leyen announced in her State of the European Union on 16 September that the strategy would be updated, this would be the ideal occasion to add not only KPIs but also targets in 2030 for the competitiveness of the EU as a whole in international comparison.**

The European Round Table for Industry (ERT) has a history of benchmarking the EU's competitiveness. Since ERT's creation in the 1980s, the CEOs and Chairs of leading multinational companies of European parentage have repeatedly issued reports and spoken up on the need to compare the performance of the EU economy and its companies with other geographies.

The most recent ERT Benchmarking Report was released in December 2019 and assessed Europe's industrial competitiveness in more than 40 areas. ERT also published simultaneously a position paper on the EU's industrial strategy called *Turning Global Challenges into Opportunities – A Chance for Europe to Lead*, as input for the Commission's new strategy<sup>2</sup>.

ERT shares the main priorities in the New Industrial Strategy. However, as the strategy claims it lays out "the vision of what we want to achieve by 2030", ERT underscores the lack of quantifiable objectives, targets and indicators. KPIs must now complement the Commission's (updated) strategy to make it happen and to change direction when needed. Current low productivity levels, underfunded R&D, the lack of key infrastructure as well as barriers to scale up innovative businesses constitute concrete areas for immediate improvement of Europe's competitiveness.

In order to translate strategies into practice, it is our firm conviction that **decision-makers need more data-driven and comprehensive evidence** to devise and implement the right policies.

**The twin transitions to a climate-neutral and digitally advanced industrial model can only succeed with a strong EU industry at its core:** industry plays a key role in the green transition to tackle climate change by developing low-carbon technologies and sustainable products and solutions; the digital transition will ensure that European products and services can compete globally and is a prerequisite for green success. These transitions will require the mobilisation of significant investment, for Europe to become a place where companies

<sup>1</sup> COM(2020) 102 final, see [https://ec.europa.eu/info/sites/info/files/communication-eu-industrial-strategy-march-2020\\_en.pdf](https://ec.europa.eu/info/sites/info/files/communication-eu-industrial-strategy-march-2020_en.pdf)

<sup>2</sup> See <https://ert.eu/wp-content/uploads/2019/12/2019-12-09-Turning-Global-Challenges-into-Opportunities-A-Chance-for-Europe-to-Lead-Full-Version-Publication.pdf>



can innovate more and scale up to become true leaders in their new product segments at global level. Our goals on these issues should be quantified and progress measured meticulously. This will contribute to achieving the Commission's stated ambition towards open strategic autonomy.

As ERT continues to emphasise the importance of forward-looking policies and strengthening research and innovation (e.g. Horizon Europe and the Digital Europe Programme), ERT regrets the cuts that were proposed for these programmes in the Multiannual Financial Framework and the Next Generation EU Recovery Instrument. In order to inform future policy and budgetary decisions better, more quantitative data on competitiveness will be critical.

In this paper, ERT proposes a set of KPIs that the Commission could use to assess progress in achieving the priorities set out in the New Industrial Strategy until 2030. In order to monitor their implementation, **our approach has been to single out ambitions in the text of the strategy and to develop indicators and targets on the basis of available data sources.**

Building on our experience with the ERT Benchmarking Reports and the recommendations for KPIs published by the Austrian Presidency of the EU in its report on industrial policy published in November 2018<sup>3</sup>, as well as on previous work of the European Commission, research institutes and universities, **we propose a set of 28 indicators** to benchmark the EU's competitiveness with other competitors. We also suggest using these metrics to track progress of the EU's

twin transitions towards climate neutrality and technological leadership.

As industrial companies, we recognise that the Commission cannot be held solely responsible for meeting the targets. The Commission can however be responsible for quantitatively tracking the progress on the qualitative priorities it puts forward. Having reliable data on competitiveness at hand will, in turn, help to shape the regulatory environment in a way that enables the growth of businesses. Different stakeholders in Europe must play their part. Policymakers at different levels in Europe, corporate decision-makers and many other stakeholders influence EU industrial competitiveness. Tracking performance is not about blaming and shaming, but about having a realistic view of EU performance. **Only clear evidence can help design effective policies and investment decisions going forward.**

## Methodology

We propose a balanced scorecard of 28 KPIs. The concept of the balanced scorecard was created by Kaplan and Norton (1992) to provide a comprehensive assessment of an organisation's performance.<sup>4</sup> It combines indicators under four headings that represent and focus attention on the key components, time scales and perspectives of an organisation's strategy. The model ensures that an organisation assesses short and long-term metrics, lagging and leading indicators, and external and internal performance perspectives. We have adapted the model for our purposes, given that the EU is a public institution pursuing policy objectives.



<sup>3</sup> 14217/18 COMPET 764, see <https://data.consilium.europa.eu/doc/document/ST-14217-2018-INIT/en/pdf>

<sup>4</sup> Kaplan and Norton (1992), "The Balanced Scorecard - Measures that Drive Performance", Harvard Business Review, January/February.

## Under our adapted balanced scorecard, the four headings or “quadrants” are:

### 1. Output Performance:

Under this heading, we measure the value that industry is creating in the EU. We look at the success of companies in growing and operating at scale in order to compete internationally. We also measure the success of firms in producing strategically important technologies.

### 2. Internal Processes:

This dimension looks at the way production is organised in the EU. This can be captured by indicators measuring the integration and effectiveness of the Single Market and how the EU adapts its way of production to new challenges from the digital and climate transitions.

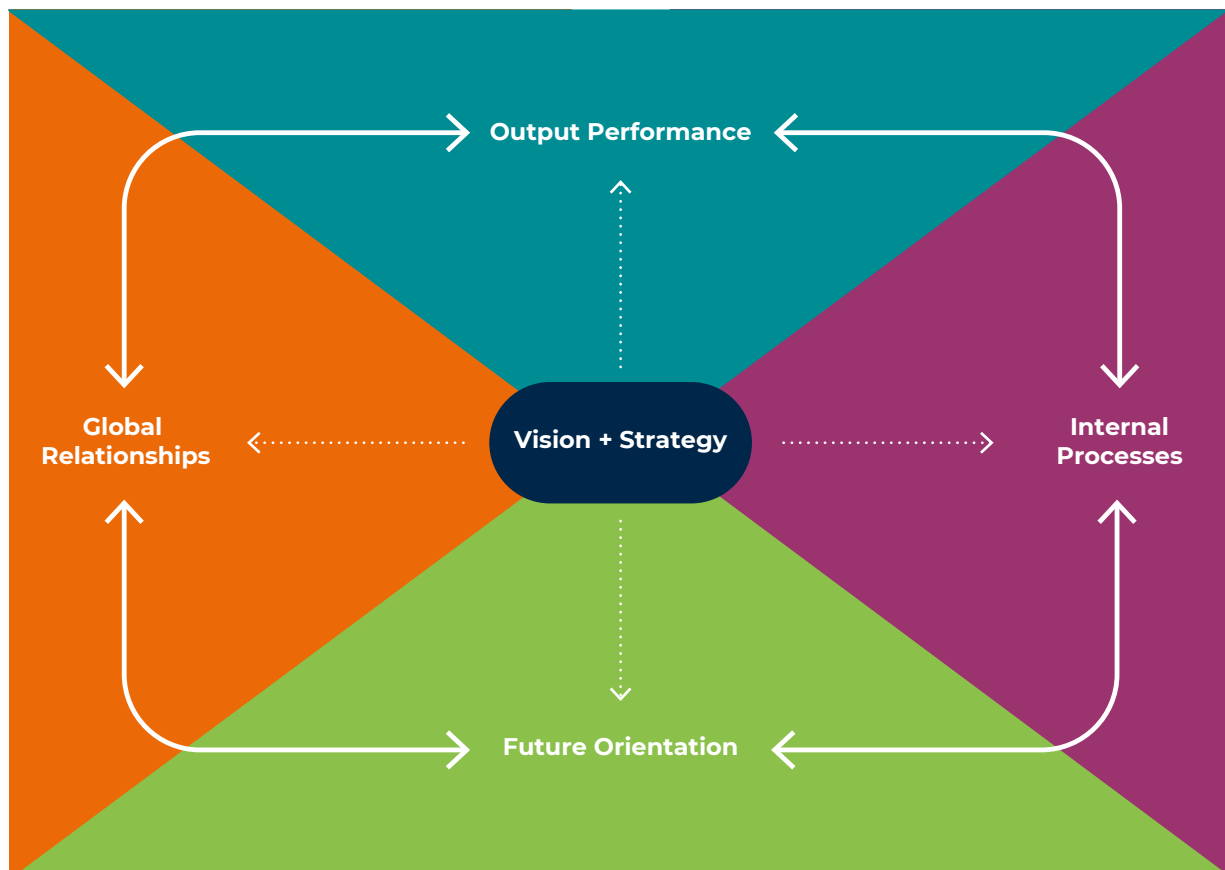
### 3. Future Orientation:

This reflects how EU industry is investing in productive assets that will yield returns in the future. This includes research and development (R&D) and key technologies that will allow for more productive processes and new products in the future. The extent to which the workforce provides the right skills and continues to adapt to new knowledge generation is also captured.

### 4. Global Relationships:

This measures the success of European products on international markets and how open the EU is to imports from abroad. It also measures the extent to which foreign investors and talent view the EU as an attractive destination. Lastly, it measures the success of the EU in working with international partners to reduce obstacles for cross-border business.

**Fig. 1: An adapted balanced scorecard approach**



Tracking performance over a ten-year period until 2030 raises particular challenges. One is that the KPIs must be as relevant ten years from now as they are today. This requires that indicator definitions are consistent and clear over time. Political and economic circumstances will change over the next decade. Without clarity about what KPIs are meant to assess and what data and sources are being used, decision-makers may be unsure about the direction to follow. At the same time, there needs to be some flexibility to allow the framework to be adjusted as circumstances change. Given the inherent uncertainty, policymakers will need to reassess targets periodically, and set new goals or adjust older ones. The Commission and industry stakeholders should periodically reassess KPIs and targets to maintain the political momentum that is needed to ensure a long-term focus on performance. Our proposed KPI framework leaves some flexibility in certain areas that will allow it to be adjusted in response to changing circumstances and ambitions.

We have put a strong emphasis on using **indicators** that benchmark the EU against other geographies where possible and sensible, as this is most revealing about how the EU is competing with the rest of the world. We consider the EU<sup>5</sup> as a single economic entity and focus less on intra-EU differences. When comparing the EU with other geographies, we exclude intra-EU flows. ERT's Benchmarking Report took a similar approach, assessing the competitiveness of EU industry relative to other geographies. This also reflects our understanding of competitiveness. While some organisations use a definition that primarily focuses on domestic factors that drive productivity, others such as the UN Industrial Development Organization (UNIDO) also emphasise the importance of trade and market share in global competition. Our approach assumes that international competitiveness is determined by both domestic factors and presence on global markets, in line with UNIDO's definition.



We have developed **targets** for 2030 that we believe reflect the EU's priorities or should guide the collective endeavour of industry stakeholders in maintaining and increasing European industrial competitiveness. We have calibrated targets, so they are tough but achievable. The academic evidence suggests that targets that are believed to be impossible to reach are largely ineffective, as they lack credibility and breed resentment that is counterproductive to meeting the objectives. Targets that are incremental and easy to reach are also ineffective, as there is a risk of complacency. It is important to note that target setting, even more than indicator selection, is more art than science. It requires judgement about what is economically and politically feasible within a period of time that is inherently uncertain. We furthermore sought to limit the number of indicators to ensure the framework is effective and that it allows European decision-makers to evaluate the EU's performance quickly.

The balanced scorecard approach focuses on **outcomes and performance drivers**, rather than inputs. Outcome measures describe the results of past actions and are more prevalent in the output performance and global relationships quadrants. Performance drivers are the factors that will determine or influence future outcomes. These are more often found in internal processes and future orientation quadrants. Our scorecard aims to combine outcome measures and performance drivers in a balanced way within and between quadrants.

<sup>5</sup> We define the EU as the EU-27 as of 2020.

## A scorecard for EU industrial competitiveness

Table 1 shows our set of 28 KPIs that reflect our mapping of the Commission's objectives and priorities – notably the twin transitions as well as ambitions to achieve open strategic autonomy and a global level playing field – in four quadrants, preceded by five overarching impact indicators.

We have put five **impact indicators** on top of our scorecard which link industrial competitiveness and the performance of the EU economy as a whole. While we have not developed targets for these indicators, they are important to understand the role that industry plays in the EU economy, and how changes in its competitiveness over the next decade might affect the overall economic and social conditions in the EU, thus underscoring the importance of an effective European industry strategy.

While industry, which includes the activities of mining, manufacturing and utility companies accounts for 20% of total EU gross value added, differences in employment and labour compensation levels show that industry wages and salaries are significantly above the EU average and an important contributor to high living standards. Industry also invests more than

its share of the economy would suggest and is the key source of receipts from goods trade.

The **first quadrant** of KPIs focuses on the EU's performance in industrial production. The indicators show that EU industry as a whole, as well as technologically advanced manufacturing sub-sectors, have lost global market share in terms of gross value added over the last two decades. While Europe is likely to continue to lose market share due to higher growth in the rest of the world, it should target a level of industrialisation that is not below the world's average and aim to maintain a leading position in more technologically sophisticated sub-sectors.

Falling productivity growth has held back the expansion of industry and needs to increase through higher investment, the development and adoption of digital technologies, and a workforce that provides the right skills.

This will lead to more dynamic sectors where innovative firms can grow fast and scale up to compete internationally. Seizing the business opportunities from the digital and climate transitions will be particularly important for the EU's industrial competitiveness over the next decade.





**Table 1 : Set of Indicators****Industry Contribution to the EU Economy**

Gross value added	Employment	Wages and salaries	Fixed investment	Goods exports
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**Balanced Scorecard on industrial competitiveness**

#	*	Indicator	2030 Target	#	*	Indicator	2030 Target
<b>Output Performance</b>				<b>Internal Processes</b>			
1	●	Industry gross value added	Equal EU global economic share (GMSI = 1)	8	●	Intra-EU trade in goods	Increasing intra-EU goods trade to 25% of GDP
2	●	Medium and high tech manufacturing gross value added	Outperform EU global economic share (GMSI = 1.3)	9		Ease of doing business	Rank among the top five economies
3	●	Labour productivity growth in industry	Significant increase in productivity growth to 2-2.5%	10	●	Industry GHG emissions	Reduce economy-wide greenhouse gas emissions by at least 55%*
4	●	High-growth enterprises in manufacturing	Increase rate by half from 10% to 15%	11	●	Industrial electricity prices	Narrow the relative price disparity with key competitors
5	●	Companies in Fortune Global 500 by revenue	Equal EU global economic share (GMSI = 1)	12		Circular material use rate	Double the rate from 11% to 22%
6		Industrial alliances	Outperform EU global economic share (GMSI = 1.3)	13	●	DESI business digitisation index	Increase index score from 42 to 90
7		Firms in Dow Jones Sustainability Index	Leader in number and market cap	14	●	Number of industrial robots	Narrow the gap with current leaders
<b>Future Orientation</b>				<b>Global Relationships</b>			
15	●	Investment rate in industry	Increase rate from 25% to 30%	22	●	Exports of manufactures	Equal EU global economic share (GMSI = 1)
16	●	Industrial R&D investment	Outperform EU global economic share (GMSI = 1.5)	23		High technology exports	Outperform EU global economic share (GMSI = 1.3)
17	●	Venture capital investment	Equal EU global economic share (GMSI = 1)	24	●	Net exports in recyclable raw materials	Reduce net exports to zero
18	●	Adult participation in education, training	Increase rate from 38% to 60%	25		Economic openness	Remain the most open large economy
19	●	Graduates in STEM and related fields	Increase rate from 17 to 25	26	●	FDI inflows	Be the largest destination for FDI
20	●	5G adoption rate	On par with US and China	27		International students	Be the most attractive destination
21	●	Artificial intelligence investment	20bn per year in 2021-30	28		Investment and trade barriers	Reduce net new barriers to zero

**Special Commission focus:** Digital transition Low-carbon transition Open Strategic Autonomy / global level playing field

**\*Included in this or similar form in:** Austrian Presidency Report ERT Benchmarking Report 2019

\* This is the target proposed by the European Commission, not yet adopted.

The **second quadrant** focuses on how the EU organises industry internally, what processes it employs and to what extent it is achieving progress in the twin transitions. The Single Market is the EU's key asset driving competitiveness, and much can be done to increase its efficiency. The next decade should therefore see another push to increase the economic and trade integration between the various Member States. Small and medium-sized enterprises (SMEs) in particular should also benefit from a reduction in red tape and regulatory obstacles, an area where the EU currently ranks in the lower midfield compared to other geographies.

The move to a climate-neutral and circular economy will require massive innovation and dramatic changes in how products are made, reused and recycled, but should not undermine the EU's competitiveness and lead to the offshoring of energy-intensive industry. European firms still struggle with the adoption of digital technologies, but only their widespread application in the production process will lead to productivity gains and maintain the EU's competitiveness.

The **third quadrant** on future orientation is mostly about investment, skills and enabling technologies. Europe has consistently underinvested in industry compared to other competitors. It is losing market share in R&D, which is key to developing new and more sophisticated technologies and products.

Europe is also lagging in providing venture capital financing for new firms, which would allow them to scale up and create jobs and value. Investment in human capital – the knowledge and skills of Europeans – is critical to provide the workforce that can adapt to technological changes. The number of those who reskill and upskill later in life has risen somewhat over the last decade, but the pace is not quick enough to deal with the coming changes.

While some parts of Europe have increased the number of students in scientific and technical fields, the EU as a whole has not made progress in recent years. The EU is also lagging behind in developing and deploying enabling technologies. Catching up with main industrial competitors in the adoption of 5G and investment in key enabling technologies such as artificial

intelligence, advanced materials and sustainable development, will be critical over the next decade.

The **fourth quadrant** on global relationships seeks to capture the EU's presence in international markets through trade and its international attractiveness for businesses, investors and talent. EU industry has lost market share on international markets in recent years, albeit at a slower pace than the EU in the global economy.

The EU should make sure to seize the opportunities that arise from faster economic growth abroad, especially in segments with high technological content. By contrast, a serious move towards the adoption of circular economy practices requires the EU to reduce its exports of recyclable raw materials, which have risen strongly over the last 15 years.

The EU remains an open economy and should defy protectionist tendencies that are increasingly popular in other economies. As trade and investment barriers rise for European companies around the world, the EU should work with its partners to reduce the imposition of new measures that distort trade and investment flows. In recent years, the EU has lost its position as the most attractive place for foreigners to invest and should aim to regain this position over the next decade, welcoming investors eager to create value in Europe. The EU is also increasingly successful in attracting foreign talent and should become the most attractive place for foreign students.

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The next section describes each indicator in more detail. Each indicator is based on the Commission's new Industrial Strategy. Every pages provides a definition outlining the indicator's importance, discussing any limitations and explaining the reasoning behind the target for 2030.

The Annex lists the sources and publications that have been reviewed to select indicators, ranging from Commission Communications and Council Reports to studies by research institutes and other industry stakeholders.

### Box 1: EU global market share and industry: a global market share index (GMSI)

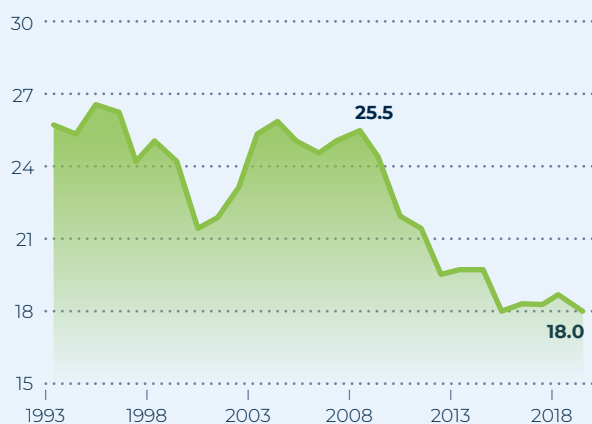
The European Commission previously defined targets about the share of industry in the EU economy, such as 20% by 2020 (see COM(2014) 14 final). In contrast to these initiatives, we do not propose a fixed share for industry in the EU economy by 2030. The reason is that a hard target risks playing industry against other sectors with a perhaps even distributional connotation. Conversely, industry will benefit from fast growing services sectors, especially those with high technological content.

EU industry is not competing with the European services sector, but with the industrial sectors in other geographies. As a result, we propose focusing on the EU's market share in the global industry sector. There is no scientific way to determine a desired target. In our proposal, **we compare the EU's global market share in industry with its share in the global economy** as a good first orientation.

A ratio of one would mean that the EU's market share in industry reflects its share in the global economy. In other words, EU industry would perform at least as well in defined areas as the world average. For a bloc that counts itself among the key industrialised economies, this should be a useful orientation. But this **"global market share index" (GMSI)** also provides a tool to determine where the EU should strive to have a bigger market share or accept a share that is smaller than its share in the global economy.

#### EU share in the global economy

%, based on GDP in nominal \$



Source: IMF

One could argue that such targets bring back an industry share in the economy through the back door. But this would only be true if, for instance, the share of industry in the global economy was stable over time. In fact, however, the share of industry in the global economy has fallen from about 30% in 1970 to just below 25% before the global financial crisis and to now about 22%. This trend suggests that the industry share in the global economy might fall further in the next decade.

Orientating the EU's industry market share on the bloc's total share in the global economy is a flexible target. It recognises that the EU share in the global economy – and hence industry – may continue to fall in the next decade due to structural factors. **The EU's share in global output has already fallen from 25.8% in 1993 to 18.0% in 2019, according to IMF data.** This is not to say that the EU's economy has shrunk. In fact, the size of the EU economy has more than doubled over the same period, growing from \$7.3trn to \$15.5trn. But faster growth in emerging and developing economies has led to relative shifts in the global economy away from advanced economies in North America, Europe and Japan to rising economies elsewhere, notably in Asia.

This trend is expected to continue. Advanced economies have generally lower growth rates due to market saturation and diminishing returns to capital. Furthermore, Europe's demographic changes, i.e. the ageing of its population and declining labour force, means its growth potential will be below the world's average for the foreseeable future.

As a result, the EU's share in the global economy is expected to continue to fall in the next decade, especially if European policymakers do not manage to stimulate growth to see the EU economy match its potential. The bloc's global market share should be maximised, and industry will benefit from overall growth in the EU.

A **target level** for 2030 has been defined for each indicator, prioritising indicators that benchmark the EU's performance against its competitors. In many cases, we propose targets that put the market share of EU industry in relation to the EU's share of the global economy (see box 1 on the previous page). Where this approach does not appear sensible or feasible, we propose benchmarking the EU against key competitors or define where the EU should rank by 2030. For indicators that measure progress in achieving specific policy goals, we have defined absolute targets.

We have considered any target levels which the Commission had already defined. In the other areas, we have considered research or identified the leaders within the EU that set the benchmark for other Member States.

## Conclusion

The competitive landscape for EU industry has changed dramatically over the last decade. Various indicators reveal that Europe has lost ground compared to old and new competitors. The Commission's New Industrial Strategy provides a good starting point to make European industry fit for the next decade – but it is not enough.

This set of 28 KPIs should enable the European Commission to evaluate progress on the priorities it puts forward, and to set targets for 2030. In line with the conclusion of the strategy, ERT invites the European Commission to develop and formally adopt Key Performance Indicators, as a basis for regular monitoring. The indicators as well as the targets should be discussed by the relevant Directorates-General and stakeholders and be finalised in March 2021, one year after the publication of the strategy.

If the New Industrial Strategy is going to be updated, as announced by President von der Leyen in September, the opportunity should be seized to add clear indicators and targets. Given

that the EU is going to set targets for the digital transition besides those for the green transition, we also need targets for the EU's competitiveness, as the EU cannot succeed its twin transition when its competitiveness is backsliding.

**Every year, the Commission should publish data on the basis of the KPIs presented as a new “European Competitiveness Report”.**

## **This set of 28 KPIs should enable the European Commission to evaluate progress on the priorities it puts forward, and to set targets for 2030**

Such Reports were published by the Commission from 1997 to 2014 before they were discontinued.

The focus of such a report should be on the global stage and thus measure the competitiveness of the EU as a whole in comparison with other geographies.

The findings should be presented to the

Competitiveness Council and be discussed with relevant stakeholders, such as in the new Industrial Forum and within the industrial ecosystems. These discussions should in turn inform the Commission as well as the Member States on future actions and investment that may be needed to improve the EU's competitiveness and boost its industry. Where relevant, KPIs could be adapted or added and targets adjusted.

Not measuring the implementation of this new strategy in a regular and systematic way with quantitative data presents the risk that it will suffer the same fate as several other strategies for European industry that were adopted in the past two decades. If this strategy is to be the true game-changer which EU industry urgently needs, we strongly encourage that the Commission should set up a dedicated service for measuring progress and engage in a close dialogue with representatives of the business community.



# Overview of Indicators (& targets)

This section provides more detail on each indicator. The first part contains a brief overview of the key impact indicators to understand how EU industrial competitiveness is affecting the economy as a whole. All data are sourced from Eurostat and indicators measure familiar concepts, which is why descriptions have been kept short. We have also not developed targets for these indicators.

The second part provides details about the 28 indicators we selected for the balanced scorecard for EU industrial competitiveness. We explain the relevance of each indicator and its link to the industrial strategy, provide definitions and sources, and discuss potential shortcomings and alternative indicators. We also explain the reasoning behind the targets for 2030. The data that informs these indicators are based on published sources, collected up to September 2020. We have also added a section on notable data gaps at the end.

## Industry contribution to the EU economy

### Total and EU share in

- Gross value added
- Wages and salaries
- Extra-EU goods exports
- Employment
- Gross fixed capital formation

## Balanced scorecard on EU industrial competitiveness

### Output Performance

1.	Industry gross value added	15
2.	Medium and high technology manufacturing gross value added	16
3.	Labour productivity growth in industry	17
4.	Share in total number of companies in manufacturing, %	18
5.	Companies in the Fortune Global 500 by revenue	19
6.	Industrial alliances	20
7.	Firms in Dow Jones Sustainability Index	21

### Future Orientation

15.	Industry investment rate	30
16.	Industrial R&D investment	31
17.	Venture capital investment	32
18.	Adult participation in education and training	33
19.	Graduates in STEM and related fields	34
20.	5G adoption rate	35
21.	Artificial intelligence investment	36

### Internal Processes

8.	Intra-EU goods trade	22
9.	Ease of doing business	23
10.	Industry greenhouse gas emissions	24
11.	Industrial electricity prices	25
12.	Circular material use rate	26
13.	DESI business digitisation index	27
14.	Installed industrial robots	28

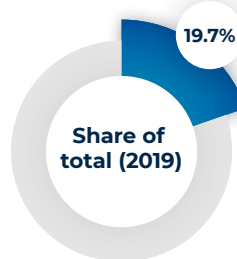
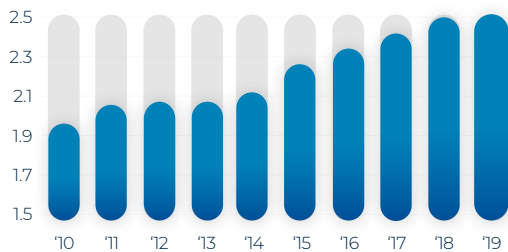
### Global Relationships

22.	Exports of manufactures	37
23.	High technology exports	38
24.	Net exports of recyclable raw materials	39
25.	Economic openness	40
26.	FDI inflows	41
27.	International students	42
28.	Trade and investment barriers	43

## Industry contribution to the EU economy

### Gross value added

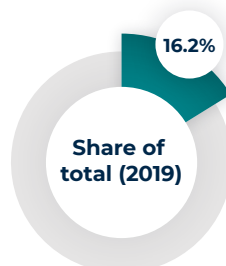
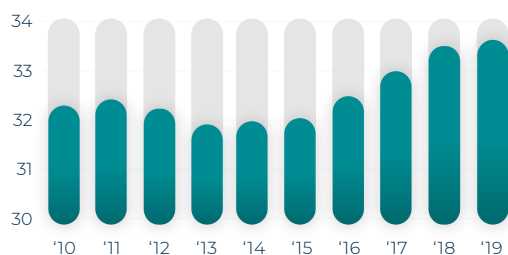
Industry, € trillion



EU industry generated gross value added of almost €2.5 trillion in 2019, about 20% of the EU's total gross value added.

### Employment

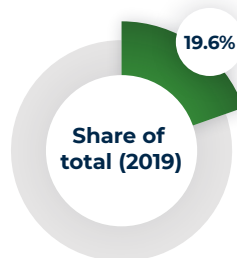
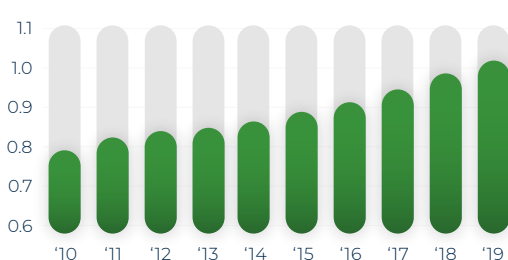
Industry, million



Nearly 34 million people are employed by EU industry. This means more than 16% of all employed Europeans work in industry.

### Wages and salaries

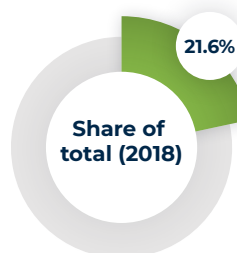
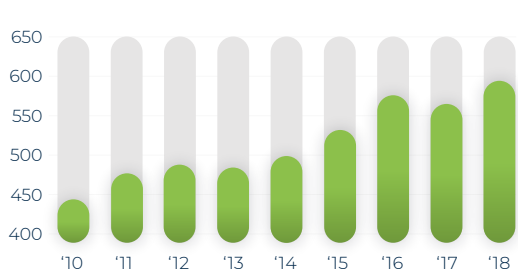
Industry, € trillion



Industry paid wages and salaries of more than €1 trillion in 2019, which is almost 20% of all wages paid in the EU.

### Gross fixed capital formation <sup>1) 2)</sup>

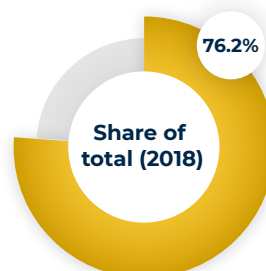
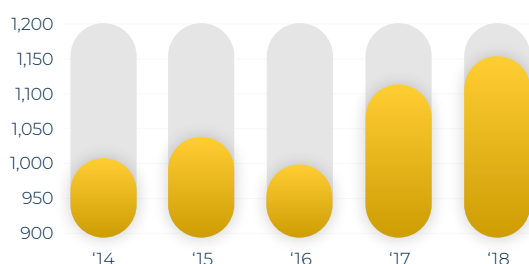
Industry, € billion



Industry invested more than €600 billion in fixed assets in 2018, which accounted for almost 22% of all such investment in the EU.

### Extra-EU goods exports <sup>1)</sup>

Industry, € billion



Industry exported goods to EU third countries worth more than €1 trillion in 2018. This was more than three-quarters of all extra-EU goods exports.

<sup>1)</sup> Missing data has been imputed with latest available figures; <sup>2)</sup> excludes Croatia. Source: Eurostat, own calculations

## Balanced scorecard on EU industrial competitiveness

ERT KPI Report 2020

# Output Performance

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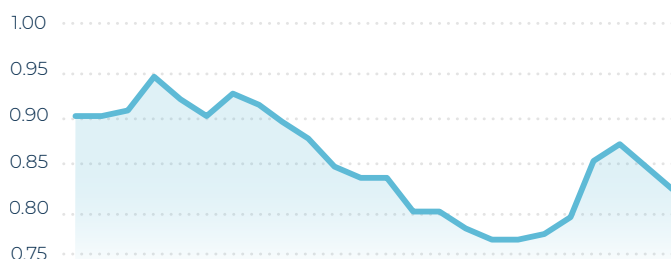
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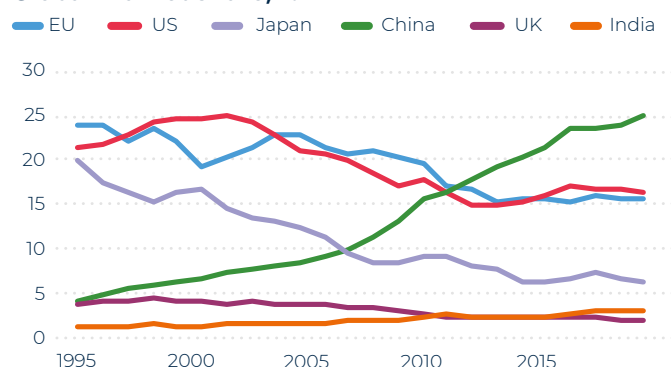


## 1. Industry gross value added

### Global market share index



### Global market share, %



### Indicator Overview

<b>Source</b>	UN Statistics Division
<b>Collected since</b>	1970
<b>Frequency</b>	annual
<b>Lagging</b>	1-2 years
<b>Latest (year)</b>	15.5% (2018)
<b>2030 Target</b>	EU's global market share in this category to be at least equal to the EU's share in the global economy (GMSI = 1)
<b>Further reference</b>	<ul style="list-style-type: none"> <li>• Austrian Presidency Report</li> <li>• ERT Benchmarking Report 2019</li> </ul>

### Definition and relevance

Gross value added is defined as the value of output minus the value of intermediate consumption. It measures the contribution of a sector or area to a country's gross domestic product (GDP) and is a key indicator of economic activity. Industry, as also defined in the EU Industrial Strategy, comprises mining, manufacturing and utilities but excludes construction. Manufacturing accounts for three-quarters of global industrial gross value added.

### Data collection

The UN Statistics Division compiles national accounts data from around the world on a gross value-added basis by sector. Data collection requires the compilation of data from national and international sources from all countries with the UN estimating missing data points and converting series into nominal US dollars. Data lags more than national accounts data from Eurostat, for instance, but it provides the most comprehensive overview of the global size of industry, and thus allows us to calculate the share of the EU in global industrial production.

### Target explanation

The EU's global leadership position in industry has been challenged in recent years, with its global market share falling to 15.5% in 2018, which was below the EU's global economic weight of 18.7%. While the EU's global market share is set to fall further in the next decade, the bloc should aim to have its industry market share reflecting its global economic weight. In other words, the EU's market share in global industrial production should reflect the EU's share in the global economy (GMSI = 1).

### Additional observations

A narrower indicator for industry, such as manufacturing production, is also possible. But the combination of the broader indicator with indicator 2 on medium and high technology manufacturing (see next page) provides a more comprehensive view. The 2018 report from the Austrian Presidency Report included manufacturing gross value added per capita, which demonstrates its important contribution to Europe's high living standards. But market share is better suited to gauge international competitiveness.



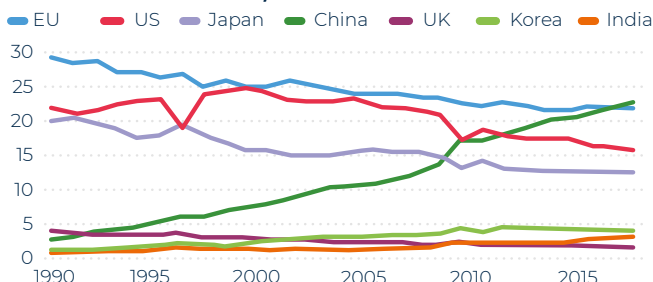


## 2. Medium and high technology manufacturing gross value added

### Global market share index (GMSI)



### Global market share, %



### Indicator Overview

<b>Source</b>	UNIDO
<b>Collected since</b>	1990
<b>Frequency</b>	annual
<b>Lagging</b>	2-3 years
<b>Latest (year)</b>	21.9% (2017)
<b>2030 Target</b>	EU Global market share in this category to outperform EU share in global economy by 30% (GMSI =1.3)
<b>Further reference</b>	ERT Benchmarking Report 2019

### Definition and relevance

Medium and high technology manufacturing includes industries with a high intensity in research and development (R&D). It includes chemicals, pharmaceuticals, defence equipment, computer, electronics, electrical equipment, machinery, motor vehicles and medical instruments industries. Industrial production of technologically sophisticated products is important to ensure Europe's high living standards. The share of medium-high and high technology industries has also been recognised as one of the UN Sustainable Development Goals indicators related to industrialisation.

### Data collection

UNIDO publishes its annual Industrial Competitiveness Index since 1990, for which it compiles data on manufacturing value added. The organisation identifies manufacturing sectors by their intensity of R&D expenditure incurred in the production process. It has grouped manufacturing activities into three groups: medium(-high) and high, medium and low technology manufacturing.<sup>6</sup> The methodology is similar to the one developed by the OECD, which groups manufacturing activities into four categories. The original indicators provided by UNIDO are manufacturing gross value added and the share of medium and high technology manufacturing in total manufacturing. However, this allows for the calculation of global market share as the data covers 150 economies comprising well over 95% of world GDP.

### Target explanation

The data suggests that the EU has been the largest producer of sophisticated manufacturing output for many years. However, since 2017 it has lost the top position to China. But the EU market share in this category is still 20% higher than the EU share in the global economy. Given faster growth outside the EU but the strong European position in this industry segment, the EU should aim to have a market share by 2030 that is 30% higher than the EU share in the global economy (GMSI = 1.3).

### Additional observations

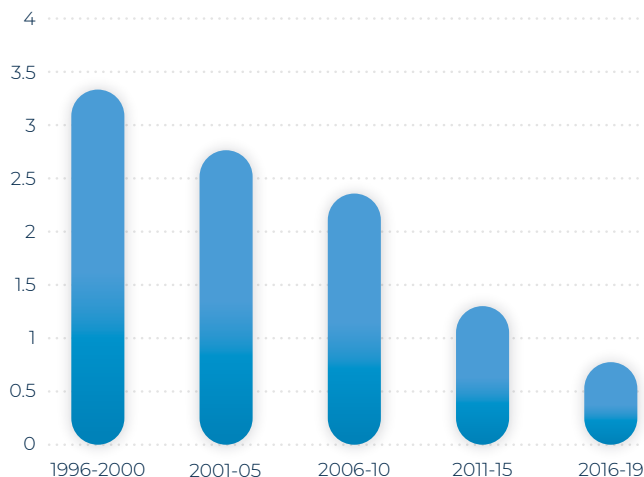
An alternative is to use the OECD approach and rely on data that focuses more narrowly on high technology manufacturing output. However, the EU has a strength in – or is reliant on – medium-high technology sectors, so this broader definition seems to provide a more useful indicator. We have relied on the OECD's high technology definition with regards to exports (indicator 23).

<sup>6</sup> UNIDO: Classification of manufacturing sectors by technological intensity (ISIC Revision 4). See: <https://stat.unido.org/content/focus/classification-of-manufacturing-sectors-by-technological-intensity-%2528isic-revision-4%2529%3Fsessionid=4DBIA3A5812144CACC956F4B8137C1CF>



### 3. Labour productivity growth in industry

#### Gross value added per hour worked in the EU, constant prices, average annual growth in %



#### Indicator Overview

Source	OECD
Collected since	1995
Frequency	annual
Lagging	1 Year
Latest (year)	-1.0% (2019)
2030 Target	To achieve a significant increase in productivity growth (average annual growth 2-2.5%)
Further reference	ERT Benchmarking Report 2019

#### Definition and relevance

There are different measures of labour productivity. The clearest and most useful definition is gross value added per hour worked. The level of productivity is the most important factor determining wages and the standard of living. Productivity growth is also a major factor in an economy's ability to grow. It likely will be the key driver of growth in the EU over the next decade.

#### Data collection

The OECD provides productivity data by main economic activity. It is sourced from the OECD Annual National Accounts. The organisation also publishes an annual Compendium of Productivity Indicators which includes a wide range of productivity measures by sectors. We have chosen the output per hour worked measure even though the OECD does not provide comparable data for main competitors, such as the US. The OECD so far only provides data for the EU-28, but the organisation is expected to reflect the new composition of the EU in its indicators soon.

#### Target explanation

There has been a wide debate about slowing productivity since the global financial crisis. Research suggests that productivity is often pro-cyclical, meaning that in times of downturns productivity tends to fall, and in times of economic growth, productivity tends to increase. There has also been a debate about growing productivity differences between the EU and the US in the earlier part of the century, which the European Commission recognised in its European Competitiveness Report 2013<sup>7</sup>. OECD data suggests the gap has shrunk somewhat in recent years, largely due to low productivity growth in the US. Productivity growth can be very volatile on an annual basis. We should strive to increase average productivity growth significantly in industry. The experience of the last quarter century suggests that raising average productivity growth to 2-2.5% on an annual basis could be a significant but achievable increase.

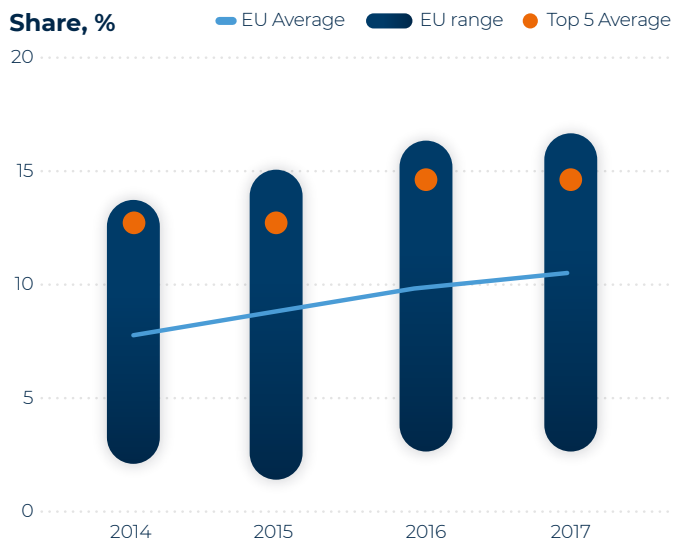
#### Additional observations

An alternative measure for which comparable data are available is gross value added per person employed. But using this indicator could raise other questions about comparability as differences in productivity could also be explained by differences in working hours. We therefore suggest to focus on productivity growth in the EU only on an output per hour worked basis.

<sup>7</sup> European Commission (2013): European competitiveness report 2013, see: <https://op.europa.eu/en/publication-detail/-/publication/98e62e79-c64c-4044-ae65-b349758c5418>



#### 4. Share in total number of companies in manufacturing, %



#### Indicator Overview

<b>Source</b>	Eurostat
<b>Collected since</b>	2014
<b>Frequency</b>	annual
<b>Lagging</b>	2-3 years
<b>Latest (year)</b>	10.4% (2017)
<b>2030 Target</b>	Increase rate by half from 10% to 15%
<b>Further reference</b>	Austrian Presidency Report

#### Definition and relevance

High-growth enterprises are defined as companies with at least ten employees in the beginning of their growth which have average annualised growth in the number of employees of more than 10% per annum over a three-year period. High-growth enterprises play a central role in the expansion of the economy and job creation. The ability of smaller companies to innovate, grow and compete in Europe's manufacturing sector is critical for a dynamic European industry. The indicator for high-growth enterprises is complementary to indicator 5 on companies in the Fortune Global 500 (next page) as competitiveness is driven by both small innovative companies and large firms that can exploit scale and compete internationally.

#### Data collection

Eurostat has collected the data since 2014 as part of their business demography monitoring. Eurostat's data are in line with a Commission regulation from 2014 and covers firms with annual growth of 10%. It only includes European countries. While the OECD provides data for countries outside of Europe, for instance the US, its definition still follows the Eurostat-OECD Manual on Business Demography Statistics from 2008 and only includes companies that have annual growth of 20% or more<sup>8</sup>. As a result, data for European and non-European countries is not comparable.

#### Target explanation

Given the lack of feasible comparison with non-EU countries, a target should be based on the leaders within the EU. The average rate in the top five Member States is 15% in 2017. The whole EU could aim by 2030 to increase by half its rate, which was at 10.41% in 2017, to reach the level of the current top five performers.

#### Additional observations

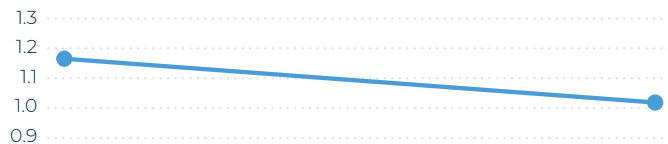
Other indicators can be used to capture this dimension. The most commonly used is the number of unicorn companies – usually defined as privately held start-ups with a valuation over \$1 billion. We included data from CB Insights in the ERT Benchmarking Report 2019. While useful to compare the EU's position vis-à-vis other major economies – i.e. China and US – and showcasing how Europe is lagging behind its competitors on tech innovation, the indicator is more focused on start-ups across all sectors, not only manufacturing. More structural differences in valuations between the EU and US due to the depth of their capital markets, for instance, are additional drawbacks of the data.

<sup>8</sup> OECD, Entrepreneurship at a Glance 2017, High-growth enterprises rate, see: [https://www.oecd-ilibrary.org/docserver/entrepreneur\\_aag-2017-17-en.pdf?expires=1595929226&id=id&accname=guest&checksum=2CFF85793F05621CC94C0EA36C3476C2](https://www.oecd-ilibrary.org/docserver/entrepreneur_aag-2017-17-en.pdf?expires=1595929226&id=id&accname=guest&checksum=2CFF85793F05621CC94C0EA36C3476C2)

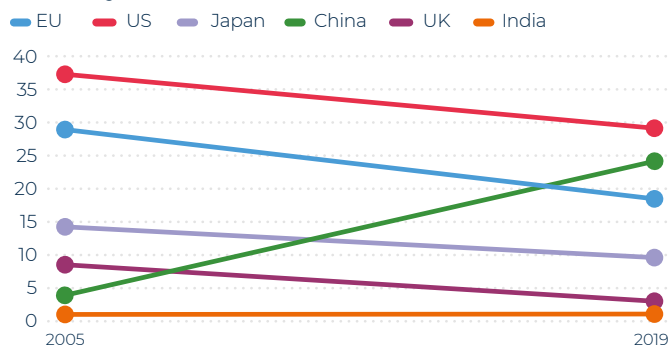


## 5. Companies in Fortune Global 500

### Global market share index (GMSI)



### Share by revenues, %



### Indicator Overview

<b>Source</b>	Fortune
<b>Collected since</b>	1995
<b>Frequency</b>	annual
<b>Lagging</b>	<1 year
<b>Latest (year)</b>	19.6% (2019)
<b>2030 Target</b>	EU global market share in this category to be higher than the EU share in the global economy (GMSI > 1)
<b>Further reference</b>	ERT Benchmarking Report 2019

### Definition and relevance

This indicator measures the share of EU companies in the Fortune Global 500 by revenue. Large companies play an important role for national economies and international competition. Previous EU-sponsored work led by Bruegel/EFIGE came to the conclusion that “large firms contribute disproportionately to a country’s economic performance: they are more productive, pay higher wages, enjoy higher profits, and are more successful in international markets.” It also concluded that firms that export tend to be larger and spend more on R&D.<sup>9</sup> However, the existence of large companies can also be the result of a lack of competition, necessitating a balanced view on firm dynamics. Hence, this indicator should be considered together with indicator 4 (previous page).

### Data collection

The Fortune Global 500 ranks the world’s largest firms by revenue since 1995. It provides a good indication about the extent to which countries that host these companies can grow businesses that compete internationally. The usual international definition is that a company is large when it has 250 and more employees. Many family-run companies would perhaps describe themselves as medium-sized even though they fit into the category of large firms by their number of employees. This indicator does not measure all large companies, but only the world’s largest 500.

### Target explanation

Large markets should in theory produce more large firms due to the home base. In 2005, the share by revenue of EU companies in the Fortune Global 500 was 20% higher than the EU’s share in the economy. However, the EU’s market share in this category is now only at the same level as its global economic share. The EU should at least maintain a market share in the group of companies that reflects its economic weight. Ideally it should increase rather than decrease.

### Additional observations

A wider set of large companies could have the advantage to include smaller “large” companies that are equally able to compete internationally. However, and unlike the Fortune Global 500, the most recognised larger set of companies, the Forbes 2000, only includes publicly listed firms. We therefore propose to follow the indicator from Fortune.

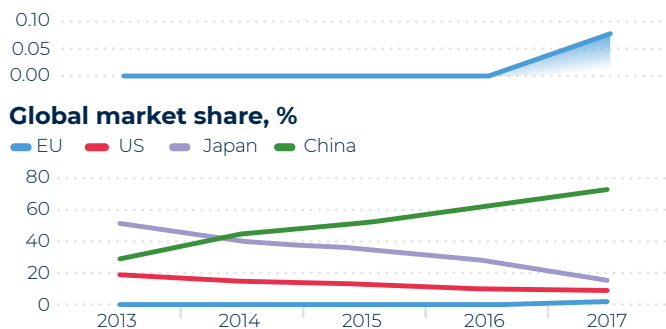
<sup>9</sup> EFIGE, European Policy Brief, see <https://www.bruegel.org/wp-content/uploads/2015/09/EFIGE-Policy-Brief-4.pdf>





## 6. Industrial alliances

### Electric Vehicle (EV) and energy storage lithium-ion battery cell production capacity, global market share index (GMSI)



### Indicator Overview

<b>Source</b>	International Energy Agency, others
<b>Collected since</b>	2013
<b>Frequency</b>	annual
<b>Lagging</b>	2-3 years
<b>Latest (year)</b>	2% (2017)
<b>2030 Target</b>	EU global market share in this category to outperform EU share in global economy by 30% (GMSI = 1.3)

### Definition and relevance

This indicator should assess how successful the EU is in establishing production within the region, in particular in key strategic or "anchor" areas such as those identified in the European alliances. The European Commission and Member States have recognised the rising challenges to European industrial ecosystems from rapid technological changes and fiercer competition. There is more focus on industrial value chains that are key to ensure that value creation continues to take place in the EU. The Strategic Forum has advised the Commission on the key strategic value chains and identified six areas where the EU should build own production capacity, involving all stakeholders along the value chain. To this aim, the Commission has fostered greater use of the instrument Important Projects of Common European Interest (IPCEI) to connect stakeholders across the EU and mobilise public and private investment. It has initiated the European Battery Alliance which brings together different stakeholders and relies on IPCEIs to build a European production capacity in battery cells. A European Clean Hydrogen Alliance and a Critical Raw Materials Alliance have both been initiated.

### Data collection

The International Energy Agency (IEA) provides data on battery cell production capacity. It could also be a good source for data on other energy-related technologies in future. Different data sources should be considered, depending on the establishment of industrial alliances and their product focus. This composite indicator could be calculated as:

$$\text{Composite indicator Industrial Alliances} = \frac{\text{Sum (global market share of all alliances)}}{\text{Number of alliances}}$$

### Target explanation

Most European industry alliances will concern medium and high technology manufacturing. The target should therefore be consistent with indicator 2. The EU should target a global market share of every alliance that outperforms the EU's share in the global economy by 30% (GMSI = 1.3).

### Additional observations

There are some challenges with the approach described above. Some alliances might not focus on one particular product but on a set of products. If no key product can be identified, the use of several products would need to be weighted correctly in the calculation of the composite indicator. Data limitations are another challenge. While the IEA produces figures on battery cell production, data for clean hydrogen, for example, is harder to find given the infancy of the industry. The EU could work with organisations such as the IEA or OECD to produce internationally comparable data on output in key industrial segments. A comprehensive balanced scorecard should take all industrial alliances into account and could also include other strategic "anchor" areas (e.g. chip manufacturing, pharma, etc.). The changing nature of this indicator makes a regular re-assessment of KPIs and targets important, as we have described in the methodology section.

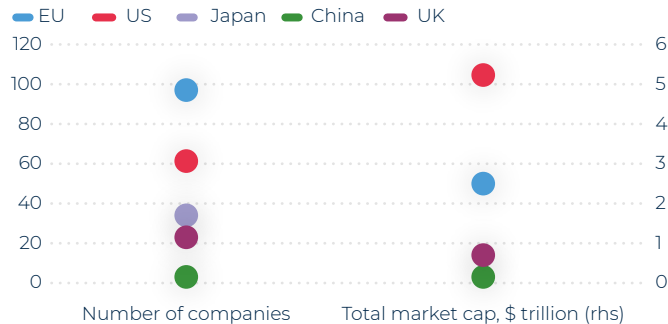
*"The European Green Deal is Europe's new growth strategy... relevant players should work together to create lead markets in clean technologies and ensure our industry is a global frontrunner"*

(EU Industrial Strategy, p.3)



## 7. Firms in Dow Jones Sustainability Index (DJSI)

**Number (left) and \$ trillion on right-hand side (rhs)**



### Indicator Overview

<b>Source</b>	S&P Dow Jones
<b>Collected since</b>	1999
<b>Frequency</b>	daily / annual
<b>Lagging</b>	N/A
<b>Latest (year)</b>	97 companies (1 <sup>st</sup> ), \$2.4 trillion (2 <sup>nd</sup> ) (mid-2020)
<b>2030 Target</b>	EU companies to lead in terms of numbers and market capitalisation

### Definition and relevance

The DJSI is one of the most respected set of indices capturing companies that are recognised for their environmental sustainability leadership. Decisions on which companies are included are made once each year in September based on updated sustainability scores. We would merge the DJ Sustainability World Developed Index and the DJ Sustainability Emerging Markets Index to capture European performance in sustainability leadership more broadly. European leadership in more sustainable practices and producing cleaner technologies will be key to make a success of the transition to carbon neutrality.

### Data collection

DJSI indices have been produced for more than 20 years through a partnership between S&P Dow Jones Indices and RobecoSAM, a European asset manager that specialises in sustainable investing. Through a proprietary methodology, the indices tilt constituents towards those deemed more sustainable on a best-in-class basis. The Developed Markets index tracks the performance of the top 10% of sustainable companies in each industry, across developed markets globally. The Emerging Markets index tracks the top 10% of companies in 20 emerging markets based on long-term economic, environmental, and social criteria. Index construction uses a rules-based selection process based on a company's Total Sustainability Score, a metric calculated in RobecoSAM's annual Corporate Sustainability Assessment, which in turn uses an industry-specific questionnaire that assesses long-term plans (rather than historical impact). It includes around 80-120 unique questions on financially material Environmental, Social and Governance (ESG) factors. Crucially, the methodology gives a high weighting to economic long-term value creation when identifying sustainability leaders. Not all companies choose to respond but for those above a specified size, RobecoSAM completes the questionnaire based on publicly available data. Constituent weighting is based on market capitalisation, and the index is rebalanced on a yearly basis.

### Target explanation

The EU should be the global leader in the clean economy over the next decade to make a success of the transition to carbon neutrality. A target that aims at leadership in both the number of companies in the index and market capitalisation would reflect this ambition.

### Additional observations

A drawback levelled at most sustainability index providers is that questionnaire-based scores create a company size bias, as larger companies are more likely to possess the resources to respond, thereby avoiding zero scores. We have considered other indices, such as 'MCSI' and 'Sustainalytics' as well as various measures that are more focused on output and value added, rather than financial markets. Eurostat provides data on the circular economy and environmental goods and services sector activities. However, data are narrower and not comparable internationally. We have also considered the Clean 200, a list of companies ranked by their revenues in clean activities, which also appears narrower. The EU could work with international organisations such as the OECD to assess more widely and in a comparable fashion the green economy across the world.

ERT KPI Report 2020

# Internal Processes

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## 8. Intra-EU trade in goods

### Intra-EU goods trade, % of GDP



### Indicator Overview

<b>Source</b>	Eurostat
<b>Collected since</b>	2002
<b>Frequency</b>	annual
<b>Lagging</b>	< 1 year
<b>Latest (year)</b>	22.0% (2019)
<b>2030 Target</b>	Increase intra-EU trade in goods to 25% of GDP
<b>Further reference</b>	Austrian Presidency Report

### Definition and relevance

Goods trade within the EU is defined as total exports of all movable property including electricity from one Member State to another. The level of intra-EU goods trade measures the extent to which product markets in the EU are integrated. It shows how economic actors across the EU can make use of regional differences in production factors and specialise in what they can do best, and how the Single Market is driving competition. The indicator is thus also a measure of the efficiency of the Single Market and reveals progress on removing barriers. It can therefore also be a helpful indicator to measure the implementation of the Single Market Enforcement Action Plan of 10 March 2020.<sup>10</sup>

### Data collection

Eurostat has provided annual data on intra-EU goods trade in its current form since 2002 and recently updated its data to reflect the composition of the EU after the UK's departure. Eurostat also provides data on the EU's GDP.

### Target explanation

The OECD calculated that intra-EU-27 trade in goods in 2010 reached around 20% of the bloc's GDP, while the same trade between US states accounted for 38% of GDP. The organisation concluded that the "home bias" in product markets in the EU appears to be much greater than in the US.<sup>11</sup> The Single Market Enforcement Action Plan<sup>12</sup> refers to research carried out by the European Parliament which has found that additional merchandise exports of up to €269 billion, worth 2% of GDP in 2012 terms, could be generated over the longer term if all barriers to FDI and non-tariff barriers within the Single Market were removed. The study only considered the statistical effect without considering dynamic effects.<sup>13</sup> The EU could aim to make another major leap in product market integration and target intra-EU goods trade at 25% of GDP by 2030.

### Additional observations

One could also measure intra-EU services trade, which is another important focus of the industrial strategy. The focus on goods trade allows us to take into account how deep product market integration is between US states when thinking about a target level for 2030. Industrial firms also account for the lion's share of goods trade.

<sup>10</sup> European Commission, Long-term action plan for better implementation and enforcement of Single Market rules, 10 March 2020. See: [https://ec.europa.eu/info/sites/info/files/communication-enforcement-implementation-single-market-rules\\_en\\_0.pdf](https://ec.europa.eu/info/sites/info/files/communication-enforcement-implementation-single-market-rules_en_0.pdf)

<sup>11</sup> OECD Economic Surveys: European Union 2012, p. 32. See: [https://www.oecd-ilibrary.org/economics/oeecd-economic-surveys-european-union-2012\\_eco\\_surveys-eur-2012-en](https://www.oecd-ilibrary.org/economics/oeecd-economic-surveys-european-union-2012_eco_surveys-eur-2012-en)

<sup>12</sup> COM(2020) 94 final, see [https://ec.europa.eu/info/sites/info/files/communication-enforcement-implementation-single-market-rules\\_en\\_0.pdf](https://ec.europa.eu/info/sites/info/files/communication-enforcement-implementation-single-market-rules_en_0.pdf)

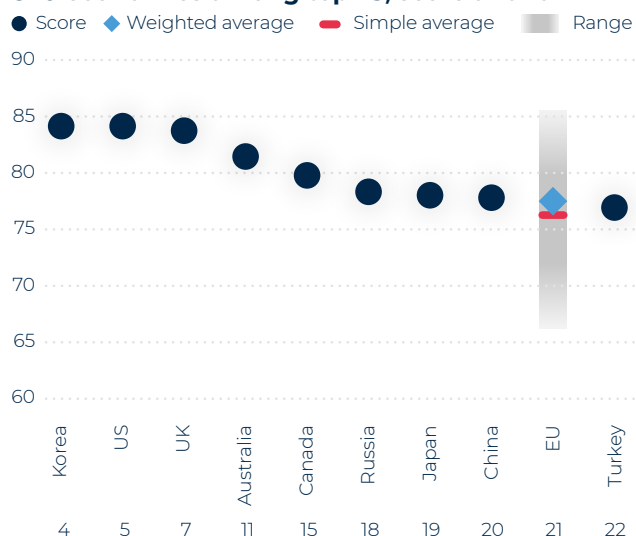
<sup>13</sup> European Parliament (2019): Europe's two trillion euro dividend, see: [https://www.europarl.europa.eu/RegData/etudes/STUD/2019/631745/EPRS\\_STU\(2019\)631745\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2019/631745/EPRS_STU(2019)631745_EN.pdf) and for the original study, see: [https://www.europarl.europa.eu/EPRS/EPRS\\_STUDY\\_536353\\_CoNE\\_Single\\_Market\\_L.pdf](https://www.europarl.europa.eu/EPRS/EPRS_STUDY_536353_CoNE_Single_Market_L.pdf)





## 9. Ease of doing business

### G20 economies among top 25, score and rank



### Indicator Overview

<b>Source</b>	World Bank, IMF, own calculations
<b>Collected since</b>	2003
<b>Frequency</b>	annual
<b>Lagging</b>	< 1 year
<b>Latest (year)</b>	rank 21 (2019)
<b>2030 Target</b>	To rank among the top five economies

### Definition and relevance

Ease of doing business measures how important aspects of business regulation are affecting small domestic firms located in the largest business city of an economy. It focuses on regulations in 12 areas: starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts, resolving insolvency, employing workers, and contracting with the government. The last two areas are not included in the overall ease of doing business score. The data provide the most internationally recognised set of indicators on red tape and burdensome regulations that can impede economic activity and make it harder for firms, especially SMEs, to seize economic opportunities.

### Data collection

The World Bank has published its Doing Business report on an annual basis since 2003. The methodology is based on questionnaires and has slightly changed over time to improve the accuracy of the data and reflect changes in regulation.<sup>14</sup> While the data do not provide a score for the EU as a whole, we have calculated a simple and weighted score for the EU which reflects the relative economic size of each Member State, using IMF data. Scores from the latest report show that the EU would rank 21st among all economies (disregarding Member States), and 9th among the 17 G20 economies (excluding the EU Member States of the G20, France, Germany and Italy). The grey bar also shows the range of scores across Member States. The World Bank is currently conducting a review of the dataset, which means that some changes could be made retrospectively to the data.

### Target explanation

The World Bank has noted that a higher ease of doing business is associated with higher levels of entrepreneurship, while cutting red tape reduces the cost for businesses. Europe should be ambitious in creating a conducive business environment, aiming to rank the EU's weighted score among the top five economies globally by 2030.

### Additional observations

We could have chosen an indicator that focuses more specifically on the application and divergence of regulations across the EU. This would however not capture the international environment in which European industry competes.

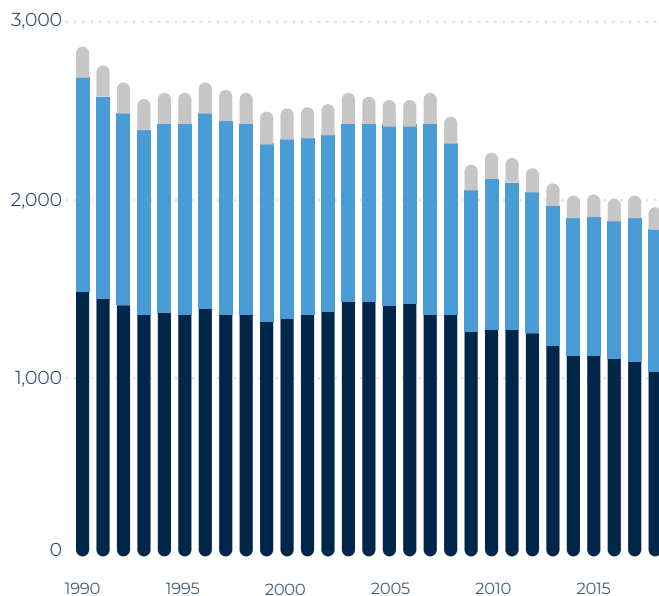
<sup>14</sup> World Bank, Doing Business 2020, see <https://openknowledge.worldbank.org/bitstream/handle/10986/32436/9781464814402.pdf>



## 10. Industry greenhouse gas (GHG) emissions

### Million tonnes in the EU

● Energy industry fuel combustion ● Industrial processes and fuel combustion ● Waste management



### Indicator Overview

<b>Source</b>	European Environment Agency, Eurostat
<b>Collected since</b>	1990
<b>Frequency</b>	annual
<b>Lagging</b>	1-2 years
<b>Latest (year)</b>	1,965 million tonnes (2018)
<b>2030 Target</b>	55% reduction from 1990 levels*
<b>Further reference</b>	ERT Benchmarking Report 2019

### Definition and relevance

Greenhouse gas (GHG) emissions include CO<sub>2</sub> and CO<sub>2</sub> equivalents of other greenhouse gases. The latter include N<sub>2</sub>O (nitrous oxide), CH<sub>4</sub> (methane), HFC (hydrofluorocarbons), PFC (perfluorocarbons), SF<sub>6</sub> (sulphur hexafluoride) and NF<sub>3</sub> (nitrogen trifluoride). GHG emissions are considered the key driver of human-made climate change. The European Green Deal aims to reduce the net emission of GHG to zero by 2050.

### Data collection

The European Environment Agency (EEA) reports GHG emissions by source sector on an annual basis. Data are also available on Eurostat. Based on the EEA's classifications, GHG emissions in the industrial sector include 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. Industrial combustion and processes made up 23% of total GHG emissions in the EU, while energy industries accounted for 30% and waste management for 3%.

### Target explanation

Since 1990, the EU has been able to reduce industry emissions significantly, through a number of policy measures, including promoting renewables and carbon pricing. GHG emissions have fallen from 2,867 million tonnes in 1990 to 1,965 million tonnes in 2018. A 50-55% reduction from 1990 levels would mean industry should omit not more than 1,434 million tonnes by 2030. In other words, emissions would have to fall on average by almost 3% each year to meet the target. The target could be adjusted following the European Commission's current review of its 2030 emissions reduction targets.

### Additional observations

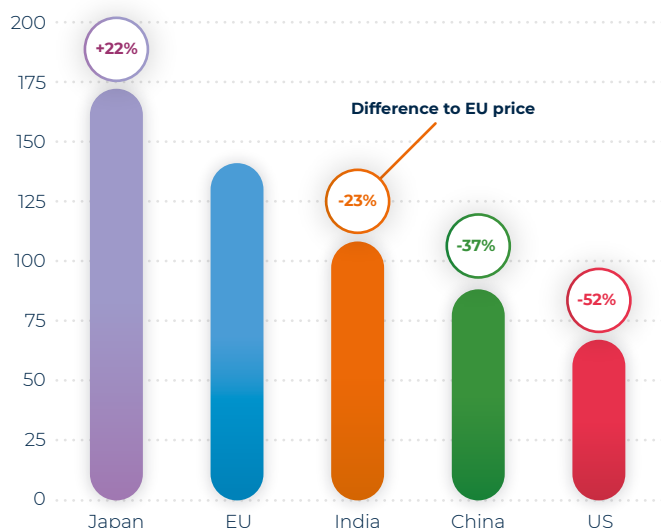
We could have included an indicator on carbon intensity or energy efficiency. But ultimately, the EU's policy goal of net-zero by 2050 requires the reduction of GHG emissions. Other indicators in the scorecard will signal how EU industry is able to do this while staying competitive internationally.

\* This is the target proposed by the European Commission, not yet adopted.



## 11. Industrial electricity prices

\$ / MWh



### Indicator Overview

<b>Source</b>	International Energy Agency, Eurostat
<b>Collected since</b>	1970 (China: 2015)
<b>Frequency</b>	annual
<b>Lagging</b>	1-2 years
<b>Latest (year)</b>	\$140.9 per MWh (2018)
<b>2030 Target</b>	Narrow the price gap with key competitors
<b>Further reference</b>	<ul style="list-style-type: none"> <li>• Austrian Presidency Report</li> <li>• ERT Benchmarking Report 2019</li> </ul>

### Definition and relevance

Electricity price data can be hard to compare as levels can differ regionally within economies, and from consumer to consumer depending on their uptake and other characteristics. Differences in taxation can add further complexities. But electricity prices are crucial as energy is a key factor of production. Low carbon electricity in particular is becoming increasingly important on the EU's pathway to climate neutrality. High energy prices can trigger improvements in energy efficiency but are often the cause of the industry's inability to compete internationally with market players from third countries.

### Data collection

In its annual report World Energy Prices, the International Energy Agency (IEA) publishes data on industrial electricity prices for more than 100 economies which it deems largely comparable. We complement the IEA data, which do not cover the EU as a whole, with figures from Eurostat. As the Commission noted in its previous report *Energy prices and costs in Europe*<sup>15</sup>, Eurostat's price Band ID (2 000 MWh < Consumption < 20 000 MWh) is best to reflect industrial consumers. We convert Eurostat's data from euro into US dollars.

### Target explanation

The EU has high electricity prices for industrial users in international comparison. This has in large part to do with a rising share of taxes and levies in the total price, which accounts for about 40% of the total price for electricity for industrial users. The latest data from 2018 shows that industrial electricity prices are significantly lower in the EU's key competitor markets, China and the US, while Japanese industry pays higher prices than the average industrial consumer in the EU. A further increase in the price difference – Chinese and US industrial consumers pay 37% and 52% less than their peers in the EU – would especially hurt energy intensive industries. The EU should aim to narrow the price difference with its key competitors over the next decade.

### Additional observations

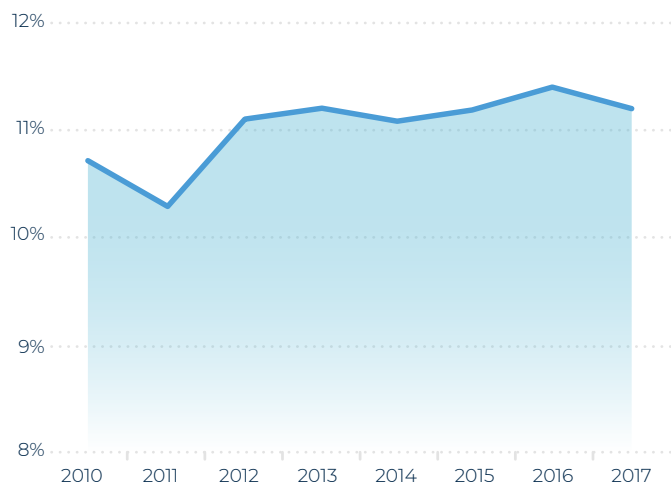
The Austrian Presidency Report contained an indicator on the electricity price for medium-size industries, which likely also referred to Eurostat's price. Our inclusion of IEA data covering key industrial competitors however provides a more complete and realistic picture of EU competitiveness.

<sup>15</sup> COM(2019)1 final, see [https://ec.europa.eu/energy/sites/ener/files/documents/swd\\_-\\_v5\\_text\\_6\\_-\\_part\\_1\\_of\\_4.pdf](https://ec.europa.eu/energy/sites/ener/files/documents/swd_-_v5_text_6_-_part_1_of_4.pdf)



## 12. Circularity rate

### Circular material use rate in the EU, %



### Indicator Overview

<b>Source</b>	Eurostat
<b>Collected since</b>	2010
<b>Frequency</b>	every 2 years
<b>Lagging</b>	2-3 years
<b>Latest (year)</b>	11.2% (2017)
<b>2030 Target</b>	Double the current rate from 11% to 22%

### Definition and relevance

The circular material use, also known as circularity rate, is defined as the ratio of the circular use of materials to the overall material use. In other words, the indicator captures the share of material recovered and fed back into the economy in the overall material use. The overall material use is measured by summing up the aggregate domestic material consumption and the circular use of materials. A higher circularity rate value indicates that more secondary materials substitute for primary raw materials thus reducing the environmental impacts of extracting primary material. The move from linear to circular economic practices is a key ingredient for achieving a carbon neutral economy.

### Data collection

Eurostat publishes data on the circular material use rate. Data sources used for waste statistics are available only every second year. As a result, Eurostat estimates data for the missing odd years to ensure data for the circularity rate is available for every year even though data are published only every two years. Despite this data lag, the indicator is the most useful to comprehensively describe the concept of circularity in production.

### Target explanation

The Circular Economy Action Plan sets the clear target of doubling the EU's circular material use rate in the coming decade (p.4).<sup>16</sup> This would mean a rate of at least 22% by 2030.

### Additional observations

It will be important for the European Commission to work on improving the data gathering for measuring circularity, possibly in cooperation with relevant international bodies. The definition currently used by Eurostat doesn't capture the use of bio-sourced materials, also not the recovery of energy which both increase the economy's circularity. The Ellen MacArthur Foundation's definition of circularity does so however, as do indicators used by other international instances like the World Economic Forum. Other indicators considered for this dimension are less precise and less complete in illustrating circularity. For example, recycling rates only capture part of the process of circular economy. Eurostat data for "private investments, jobs and gross value added related to circular economy sectors" also offer a narrow view of the circular economy as it focuses exclusively on the recycling, and repair and reuse sectors. There are currently also no internationally comparable data in this area.

<sup>16</sup> COM(2020) 98 final, see [https://ec.europa.eu/environment/circular-economy/pdf/new\\_circular\\_economy\\_action\\_plan.pdf](https://ec.europa.eu/environment/circular-economy/pdf/new_circular_economy_action_plan.pdf)

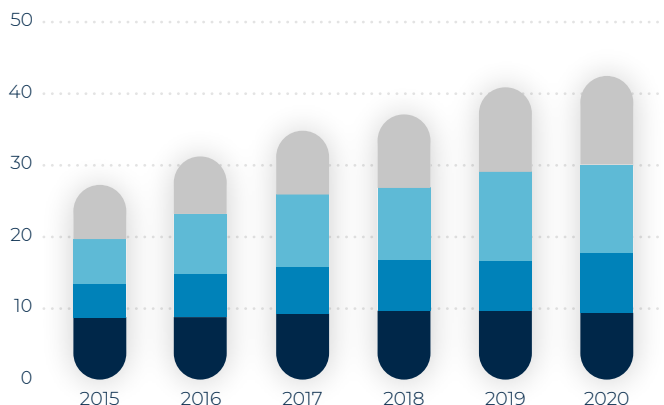


### 13. Business digitisation

#### Business digitisation index for the EU

● Electronic info sharing ● Social media ● Big data analysis

● Cloud services



#### Indicator Overview

<b>Source</b>	European Commission
<b>Collected since</b>	2015
<b>Frequency</b>	annual
<b>Lagging</b>	< 1 year
<b>Latest (year)</b>	42.3 (2020)
<b>2030 Target</b>	Increase index score from 42 to 90
<b>Further reference</b>	<ul style="list-style-type: none"> <li>• Austrian Presidency Report</li> <li>• ERT Benchmarking Report 2019</li> </ul>

#### Definition and relevance

Business digitisation captures the extent to which companies have integrated new technologies into their processes. It measures the share of enterprises which employ or rely on electronic information sharing, social media, big data analysis and cloud technologies. Digital technologies are key to enable businesses to gain competitive advantage, improve their services and products, and expand their markets, therefore opening up new opportunities and boosting the development of new technologies and innovation.

#### Data collection

The European Commission publishes the Digital Economy and Society Index (DESI) every year.<sup>17</sup> It is based on surveys collecting relevant data on Europe's digital performance and the evolution of EU Member States in digital competitiveness. DESI is built on five dimensions: connectivity, human capital, use of internet services, integration of digital technology and digital public services. Business digitisation is part of the fourth dimension – integration of digital technologies in businesses – which measures the digitisation of businesses and e-commerce. It draws on information from Eurostat's *Community survey on ICT usage and eCommerce in Enterprises*. The main DESI and sub-indices are normalised from 0 to 100.

#### Target explanation

The four sub-dimensions of business digitisation are normalised using the min-max method. The choice of minima and maxima is carefully assessed, taking into account the likely evolution of each indicator and the balance between indicators. The four indicators that underpin the business digitisation dimension are barely halfway through their respective maxima values (electronic information sharing 34% out of 60%, social media 25% out of 50%, big data analysis 12% out of 33% and cloud services 17% out of 50%). The EU should aim to almost reach the frontier by more than doubling the current level to 90 by 2030.

#### Additional observations

The indicator relies on surveys, so may be less robust than hard statistical data. However, it has important advantages. First, the concept of business digitisation as envisaged by the Commission offers a comprehensive view of the level in which enterprises embed basic and advanced technology into their day-to-day activities. Second, as the DESI index is published annually with data from the previous year, it is a leading indicator that offers up-to-date information. There currently is no data available that would allow for a comprehensive international comparison between the EU and other geographies.

<sup>17</sup> European Commission, The Digital Economy and Society Index (DESI), see <https://ec.europa.eu/digital-single-market/en/desi>



*“Europe must also speed up investment in research and the deployment of technology, in areas such as artificial intelligence, 5G, data and metadata analytics.”*

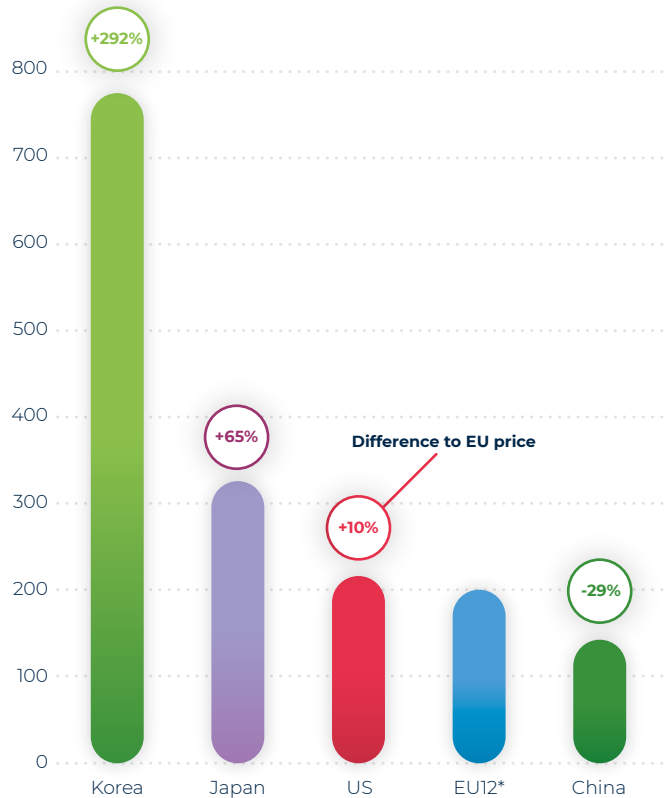
(EU Industrial Strategy, p.4)

*“The EU will also support the development of key enabling technologies that are strategically important for Europe’s industrial future. These include robotics.”*

(EU Industrial Strategy, p.13)

## 14. Industrial robots

### Installed robots per 10,000 workers



### Indicator Overview

<b>Source</b>	International Federation of Robotics
<b>Collected since</b>	varies depending on regional source
<b>Frequency</b>	annual
<b>Lagging</b>	1-2 years
<b>Latest (year)</b>	198 (2018)
<b>2030 Target</b>	Be in the top 3 of countries making use of robots
<b>Further reference</b>	Austrian Presidency Report

### Definition and relevance

The indicator measures the robot density in the manufacturing industry by calculating the number of installed industrial robots per 10,000 employees. Automation is a key driver for competitiveness and productivity, and – if correctly managed through the necessary upskilling of the workforce – can fuel growth, innovation and technological advancement. Automation of activities can help businesses to improve performance, by reducing errors and improving precision and pace, and to carry out operations beyond human capabilities. Robots will be increasingly connected with big data analysis and other digital technologies through the Internet of Things

### Data collection

The data are collected by the International Federation of Robotics (IFR), an umbrella association bringing together the robotics industry, national or international industry associations and research & development institutes. It is the most commonly used primary resource of statistical data in the field of industrial robots.

### Target explanation

While the manufacturing sectors in some Member States – e.g. Germany, Sweden, Denmark – are already among the most automated in the world, the EU as a whole is still lagging behind some key competitors, namely the US, Japan and South Korea. In order to develop and maintain its competitiveness, the EU should aim to narrow the gap with those leading industrial countries by 2030. It should aim to be in the top 3 countries with most installed robots.

### Additional observations

Data from the IFR statistical department is not publicly available in its entirety. As a result, data presented in this report for the EU only refers to an average of 12 Member States (Germany, Sweden, Denmark, Italy, Belgium, the Netherlands, Austria, Slovenia, Spain, Slovakia, France, Finland)\*.

ERT KPI Report 2020

# Future Orientation

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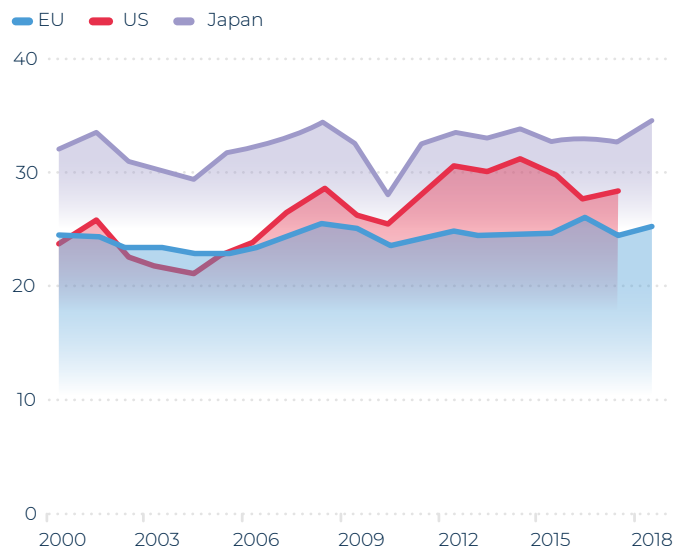
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## 15. Industrial investment rate

### Industrial gross fixed capital formation as a share of industrial gross value added, %



### Indicator Overview

<b>Source</b>	OECD, Eurostat
<b>Collected since</b>	2000
<b>Frequency</b>	annual
<b>Lagging</b>	2 years
<b>Latest (year)</b>	25.3% (2018)
<b>2030 Target</b>	Increase the investment rate to 30% of industry gross value added
<b>Further reference</b>	<ul style="list-style-type: none"> <li>• Austrian Presidency Report</li> <li>• ERT Benchmarking Report 2019</li> </ul>

### Definition and relevance

The indicator shows the total industrial gross fixed capital formation as a share of its gross value added. Gross fixed capital formation includes spending for buildings and structures, machinery and equipment including ICT equipment, and intellectual property such as R&D. Fixed capital is a key production factor and a main driver of growth, innovation and technological change. Industrial competitiveness is strongly linked with its ability and willingness to use resources to invest in future projects, operations, processes, products and innovations. Industrial investment is therefore key to build a resilient and competitive economy but dependent on a favourable business environment with the right legal and tax framework. Public initiatives can also help mobilise industry investment.

### Data collection

The OECD collects data on gross fixed capital formation by main economic activity for some of its Member States, notably the US and Japan, as well as on gross value added by main economic activity. However, the organisation does not provide data for the EU as a whole. We have complemented the OECD figures with data from Eurostat, which provides figures for gross fixed capital formation and gross value added by sector.

### Target explanation

The investment rate of industry in the EU has only marginally increased in the past 20 years while the US and Japan (for which data are available) have seen their levels remain significantly higher or increase over the same period. Gross fixed capital formation by industry in both countries average 30% of the sector's gross value added since 2000, while the same level was about 25% in the EU. Lower fixed investment, such as machinery, equipment and ICT in the EU has been identified as a key impediment to higher productivity and competitiveness.<sup>18</sup> The EU should aim to increase the level of industry investment by a fifth to about 30% of the sector's gross value added.

### Additional observations

The Austrian Presidency Report proposed to focus on manufacturing only, but we would include the complete industrial sector as for instance the power sector will require large investments to achieve the vision of a low carbon economy.

<sup>18</sup> See for instance European Investment Bank, Investment Report 2019/20, see <https://www.eib.org/en/publications/investment-report-2019>

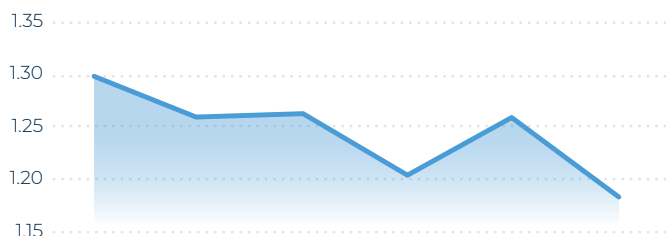
*“European companies have seen their global share of research and development spending decline over the past five years... The key to addressing this trend will be to unlock investment in innovation.”*

(EU Industrial Strategy, p.10)

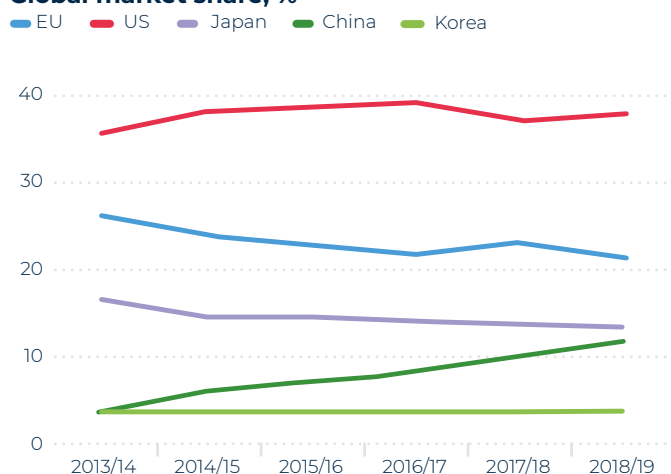


## 16. Industrial R&D investment

### Global market share index (GMSI)



### Global market share, %



### Indicator Overview

<b>Source</b>	European Commission
<b>Collected since</b>	2000
<b>Frequency</b>	annual
<b>Lagging</b>	1-2 years
<b>Latest (year)</b>	21.7% (2018/19)
<b>2030 Target</b>	EU share in global industrial R&D to outperform EU share in global economy by 50% (GMSI = 1.5)
<b>Further reference</b>	<ul style="list-style-type: none"> <li>• Austrian Presidency Report</li> <li>• ERT Benchmarking Report 2019</li> </ul>

### Definition and relevance

The indicator measures the global share of expenditure in R&D by the top 2,500 companies globally. Industrial R&D investment is the cash investment which is funded by the companies themselves. It excludes R&D undertaken under contract for customers such as governments or other companies. It also excludes the companies' share of any associated company or joint venture R&D investment when disclosed. However, it includes research contracted out to other companies or public research organisations, such as universities. Research and development are key to developing new products and services, especially those with a higher technological content.

### Data collection

The data are retrieved from the European Commission's Industrial R&D Investment Scoreboard which covers R&D spending globally made by the 2,500 largest enterprises. The data reflect companies' latest available financial statements at the time of publication. Reporting periods can differ across jurisdictions. Therefore, the data do not necessarily correspond with the calendar year.

### Target explanation

The EU's global share of industrial R&D investment has declined in recent years while US and Chinese enterprises have increased their share of expenditure. Therefore, by 2030, the EU should aim to close the gap with the US, which maintains the lion's share, by reversing the current declining trend. The EU's share in global industrial R&D as captured by the scoreboard should reflect the EU's technological leadership and outperform its share in the global economy by 50% (GMSI = 1.5).

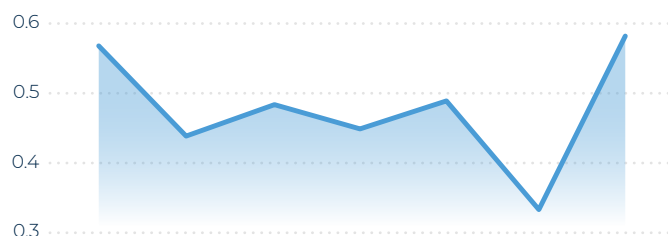
### Additional observations

The Austrian Presidency Report proposed a broader measure of R&D investment. However, the industrial strategy refers explicitly to the data of the scoreboard, which is more focused on industry and thus appears to be a more useful measure.

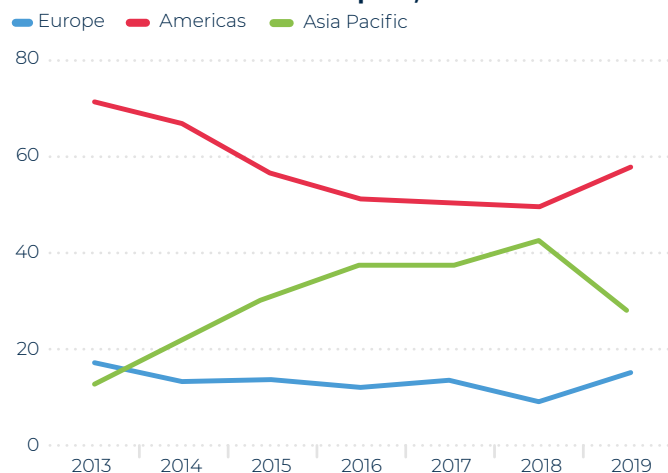


## 17. Venture capital investment

### Global market share index (GMSI)



### Market share of invested capital, %



### Indicator Overview

<b>Source</b>	KPMG
<b>Collected since</b>	2010
<b>Frequency</b>	annual
<b>Lagging</b>	< 1 year
<b>Latest (year)</b>	15% (all of Europe in 2019)
<b>2030 Target</b>	EU global market share in this category to reflect its share in the global economy (GMSI = 1)
<b>Further reference</b>	ERT Benchmarking Report 2019

### Definition and relevance

The indicator measures the value of venture capital deals across the world and the market share of key regions. It thus indicates the attractiveness and ability of the EU to invest in and scale up young firms. Investment in young but promising firms, many of which are tech savvy, will be important for EU industry – for its growth and transition to a more digital and carbon neutral model.

### Data collection

KPMG publishes its Venture Pulse report on a quarterly basis where it provides data on global venture capital deals. The data have been collected since 2010. One of the main shortcomings with the published figures is that data are presented regionally, and it is therefore not possible to distinguish between the EU and other economies in Europe.

### Target explanation

Due to the characteristics of Europe's economy and its capital markets model, the level of venture capital investments has historically been low compared to other markets and has experienced only slow growth in the past ten years. As a result, Europe's market share has shrunk and will suffer significantly from the UK departure from the bloc. While the US remains the preferred destination for investment and drives the global growth of venture capital deals, China has seen its market share increase rapidly since 2014 and the value of venture capital deals in China is now about three times that of Europe. Europe should aim to close the gap to its main competitors and at least target a global market share that reflects its share in the global economy (GMSI = 1).

### Additional observations

Private sources of data on financial transactions could provide a more granular picture and distinguish between the EU and the rest of Europe. KPMG's reports rely on data from PitchBook. Prequin Ltd. is another data provider in the market. A more nuanced look would reveal that about half of Europe's venture capital deals take place in the UK, meaning the EU in its new shape likely accounts for less than 10% of global investment.



*“Making lifelong learning a reality for all will become all the more important: in the next five years alone, 120 million Europeans will have to upskill or reskill.”*

(EU Industrial Strategy, p.11).



## 18. Adult participation in education and training

Over the last 12 months, share of total, %

● Including guided-on-the-job training activities

● Excluding guided-on-the-job training activities



### Indicator Overview

<b>Source</b>	Eurostat
<b>Collected since</b>	2007
<b>Frequency</b>	annual
<b>Lagging</b>	up to 4 years
<b>Latest (year)</b>	38% (2016)
<b>2030 Target</b>	Increase rate from 38% to 60%
<b>Further reference</b>	Austrian Presidency Report

### Definition and relevance

The participation rate of adults in formal and informal education and training activities offers good insight into the share of the population actively engaged in upskilling or reskilling. The indicator encompasses all learning activities undertaken by adults between 25 and 64 years old with the aim of improving knowledge, skills and competences, within personal, civic, social or employment-related perspectives. This includes any activity with the intention to improve knowledge, skills, and competencies and covers both formal and non-formal education and training. Given the expected rapid technological changes over the next decade, much of the current workforce will need to upskill and reskill to provide the skills needed by EU industry.

### Data collection

Eurostat gathers data through the Adult Education Survey which covers adults' participation in education and training (formal, non-formal and informal learning) and is one of the main data sources for EU lifelong learning statistics. Its reference period is 12 months before the interview and it is conducted every five years, so the latest data is from 2016. Formal education and training refer to "education that is institutionalised, intentional and planned through public organisations and recognised private bodies", while non-formal "institutionalised, intentional and planned by an education provider" in addition, alternative or complementing the formal education. The latter includes courses, workshops and seminars and guided on-the-job training.

### Target explanation

In the European Skills Agenda, the Commission has set out as a 2025 target for the participation rate in learning (excluding guided-on-the-job training activities) over the previous 12 months to be 50%<sup>19</sup>. As the current (2016) level for the indicator is 38%, the target for 2030 should be even more ambitious with 60%.

### Additional observations

As a result of the inclusion of the 2025 target in the Skills Agenda, the frequency of the data gathering by Eurostat for this indicator should increase to an annual basis. Eurostat also provides data on adult participation in education and training through its EU Labour Force Survey. The reference period for this survey is four weeks before the interview. For this indicator, Eurostat provides data annually up to 2019. The indicator based on a 12-month reference period offers a more comprehensive picture of the participation of adults in learning activities to upskill and reskill. However, its main shortcoming is that the data is only gathered every five years. It is also important to note that neither indicator tracks if the skills acquired by adults also increases their opportunities on the job market. An indicator on reskilling should also look at the involvement into targeted trainings linked to the twin transitions. Data on this can be found in reports by McKinsey<sup>20</sup> on the future of work which, however, are not published regularly and therefore less suitable for a regular monitoring.

<sup>19</sup> COM(2020) 274 final, see <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0274&from=EN>

<sup>20</sup> McKinsey Global Institute, The Future of Work in Europe, see <https://www.mckinsey.com/featured-insights/future-of-work/the-future-of-work-in-europe>

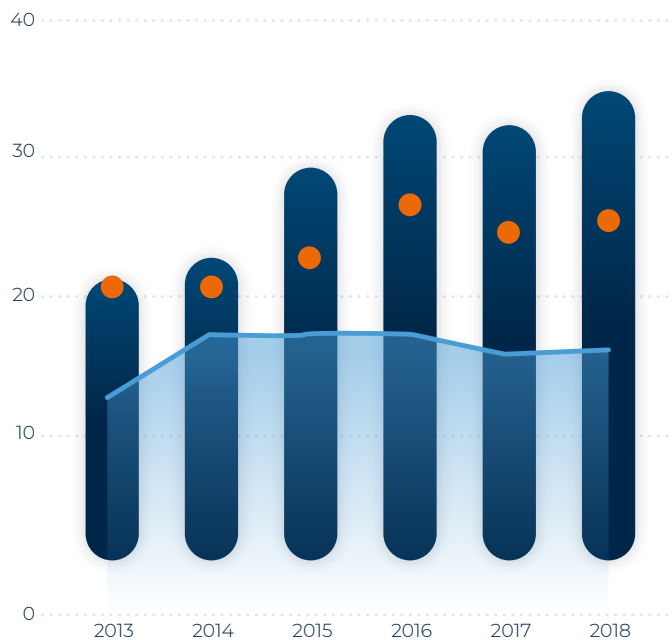
*“Our higher and vocational education and training systems will also need to provide more scientists, engineers and technicians for the labour market.”*

(EU Industrial Strategy, p.11)



## 19. Graduates in STEM and related fields

Per 1,000 inhabitants — EU — EU range — Top 5 average



### Indicator Overview

<b>Source</b>	Eurostat
<b>Collected since</b>	2013
<b>Frequency</b>	annual
<b>Lagging</b>	1-2 years
<b>Latest (year)</b>	17.6 (2018)
<b>2030 Target</b>	Increase rate to 25
<b>Further reference</b>	Austrian Presidency Report

### Definition and relevance

The indicator shows the number of graduates in tertiary education in science, mathematics, computing, engineering, manufacturing and construction per 1,000 inhabitants. As such, the data are wider than the narrower STEM (science, technology, engineering and maths) and offer a more comprehensive picture for the skills required in industry and manufacturing. Skills in STEM fields are considered crucial to accompany the digital and green twin transitions, for example by fostering innovation in cutting-edge ICT areas such as artificial intelligence or cybersecurity.

### Data collection

Eurostat publishes data on an annual basis. The data are not comparable with non-EU countries and data from third-country national authorities is often missing, outdated or not comparable due to different methodologies.

### Target explanation

In its European Skills Agenda, the European Commission acknowledges that only one in five young people in Europe graduates from STEM tertiary education, resulting in fewer than two million STEM graduates every year. It therefore suggests that the number needs to increase, for example by promoting STEM pathways, in particular among young women. However, the Commission has not defined a precise target. The data also reveal that some Member States have made significant progress in recent years while the overall number for the EU remained relatively unchanged. The EU as a whole should strive to close the gap with its frontrunners and aim to achieve 25 STEM graduates per 1,000 inhabitants, up from 17.6 in 2018.

### Additional observations

The Austrian Presidency Report proposed to use data from the OECD, which could offer the possibility for international comparison. However, the data collected by the organisation have significant shortcomings. They are lagging much further than Eurostat figures and are often incomplete for some countries. Besides, vocational training in technical and digital fields will also be crucial for industry over the next decade. As a result, this indicator could be complemented with an indicator on vocational training. So far, however, figures on vocational training do not distinguish between fields across the EU.

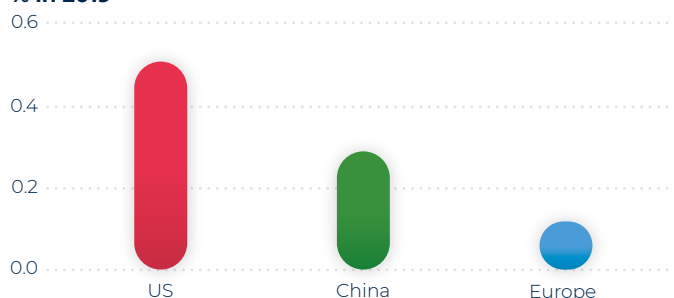
*"The successful roll-out of highly secured and state-of-the-art 5G network will be a major enabler for future digital services and be at the heart of the industrial data wave."*

(EU Industrial Strategy, p.4)



## 20. 5G adoption rate

% in 2019



Note: illustration only, data estimated based on various GSMA publications

### Indicator Overview

Source	GSMA
Collected since	-
Frequency	annual
Lagging	<1 year
Latest (year)	<1% (2019)
2030 Target	To be on par with the US and China

### Definition and relevance

The 5G adoption rate measures the amount of 5G connections as a share of total mobile connections, which include internet users but also other connectivity use cases, such as corporate networks, though it does not cover cellular IoT. It indicates where Europe stands on 5G migration, reflecting the uptake of 5G broadband services and infrastructure. 5G will enable new high-value services and generate huge opportunities for smart manufacturing, transport, farming and healthcare. It will be key to enable the digital transformation of Europe's industry, with the development of smart factories. 5G also has the potential to connect numerous IoT sensors, creating digital industrial ecosystems, composed of various industries, research centres and end users.

### Data collection

The GSMA provides data on 5G adoption in key regions. Its published data do not distinguish however between EU and non-EU countries in Europe. As the adoption rate is still close to zero in most regions and is only expected to rise over the next decade, the availability of data in public could improve.

### Target explanation

Securing a first-mover advantage in 5G infrastructure roll-out will be essential to take early advantage of the new market opportunities offered by this technology. China and South Korea have already implemented ambitious 5G industrial policy to promote their domestic suppliers on the global stage, while Europe is lagging behind. At present, 5G commercial services have been delayed in Europe, covering fewer users and providing lower performance than in other markets. Therefore, Europe should bridge this investment gap and aim to be on par with the US and China on 5G adoption to catch up with its competitors in the global technological race.

### Additional observations

This indicator only reflects progress made in rolling out nation-wide 5G mobile infrastructure, since new industrial use cases, which go beyond mobile broadband, will require the deployment of additional 5G access network assets. But data in this area are not available as industrial use cases of 5G are just emerging and high band spectrum has not yet been allocated. In future, however, data could be available on the proportion of 5G macro and small cells (low, mid and high band) used for industrial cases. These industrial cases could include smart manufacturing, mobility, farming and healthcare. An alternative to this indicator would be to focus on network investment. IDATE data suggests that European operators have significantly smaller revenues and as a result are less able to invest in infrastructure. The EIB has also estimated that the EU is facing a digital infrastructure investment gap of €42 billion per year until 2025.<sup>21</sup> The EU should aim to catch up in network investment with its main competitors. For more analysis on the slow progress in Europe on 5G roll-out, see also the recent ERT Assessment Paper which demonstrates that Europe is being outpaced by other regions.<sup>22</sup>

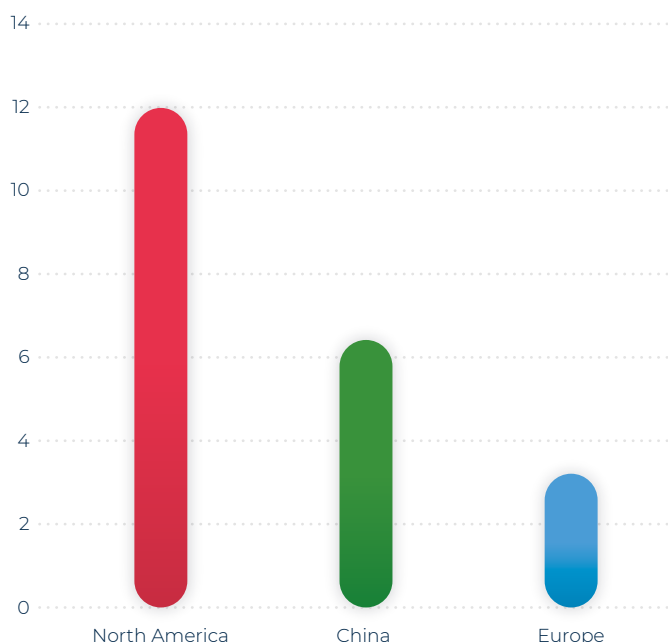
<sup>21</sup> COM(2020) 456 final, see: [https://ec.europa.eu/info/sites/info/files/economy-finance/assessment\\_of\\_economic\\_and\\_investment\\_needs.pdf](https://ec.europa.eu/info/sites/info/files/economy-finance/assessment_of_economic_and_investment_needs.pdf)

<sup>22</sup> ERT, Assessment of 5G Deployment Status in Europe (18 September 2020), see: <https://ert.eu/documents/5g-assessment>



## 21. Artificial intelligence investment

AI investment in \$ billion in 2016



### Indicator Overview

<b>Source</b>	McKinsey/European Commission
<b>Collected since</b>	-
<b>Frequency</b>	-
<b>Lagging</b>	-
<b>Latest (year)</b>	\$3.2 billion (2016)
<b>2030 Target</b>	€20 billion per annum over the next decade, i.e. €200 billion from 2021-30
<b>Further reference</b>	ERT Benchmarking Report 2019

**Further notes** This indicator is about total investment in AI in Europe, i.e. from the public (Commission, member states etc) and private sector.

### Definition and relevance

Technological changes will leave their mark on industry and create new markets. The Commission has identified six broad Key Enabling Technologies (KETs) that it wants to prioritise in research and innovation support. The list of KETs could expand in future. The current six technologies are advanced manufacturing, advanced materials and nanomaterials, life-science technologies, micro/nano-electronics and photonics, artificial intelligence (AI) and security and connectivity. AI in particular is expected to drive enormous change, requiring a high level of investment to ensure that Europe is not falling behind main competitors.

### Data collection

Data on AI investment in the EU have not been recorded in a systematic way. The European Commission has often cited a McKinsey report from 2017 which does not provide a detailed geographical breakdown but only provides figures for wider regions. Despite the current lack of data, it is important to track investment in AI in the EU.

### Target explanation

In its recent White Paper on Artificial Intelligence, the European Commission has stressed the target to boost private and public sector investment in AI over the coming decade. It states the objective "to attract over €20 billion of total investment in the EU per year in AI over the next decade".<sup>23</sup>

### Additional observations

This indicator on AI investment could even be widened into a broader composite indicator that also includes investment in other KETs. The Commission is currently in the process of updating data on KETs and will publish it on a new Advanced Technologies for Industry website. Initiatives under the EU Industrial Strategy and the Green Deal such as the EU Hydrogen Strategy, initiatives included in the Digital Europe programme or the new cyber security strategy as well as other upcoming initiatives will contain pledges for increased investment and could be the basis to complement with other KETs.

<sup>23</sup> COM(2020) 65 final, see [https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020\\_en.pdf](https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf)

ERT KPI Report 2020

# Global Relationships

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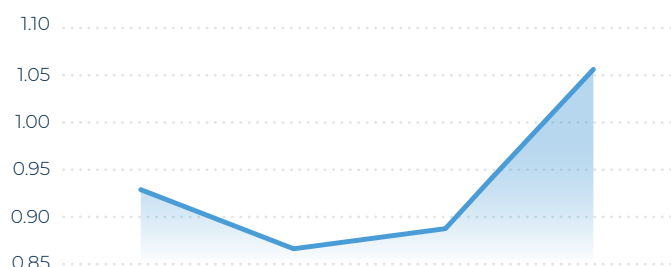
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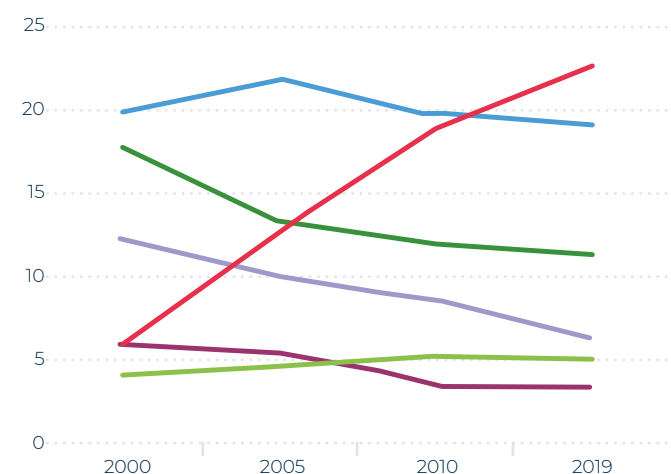
## 22. Exports of manufactures

### Global market share index (GMSI)



### Global Market share, %

EU US Japan UK China Korea



### Indicator Overview

<b>Source</b>	World Trade Organization
<b>Collected since</b>	1948
<b>Frequency</b>	annual
<b>Lagging</b>	1-2 years
<b>Latest (year)</b>	19.0% (2018)
<b>2030 Target</b>	EU market share to reflect share of EU in global economy (GMSI = 1)
<b>Further reference</b>	<ul style="list-style-type: none"> <li>• Austrian Presidency Report</li> <li>• ERT Benchmarking Report 2019</li> </ul>

### Definition and relevance

The ability of the European industry to participate successfully in global trade and access global markets indicates how competitive and demanded its products are. International trade has been widely linked to economic growth, competitiveness, innovation and technological advancement. The indicator shows the share of EU manufacturing exports in the total value of manufactures exports. Manufactures trade is a sub-component of merchandise trade, which also includes agricultural products and fuel and mining products and covers all types of inward and outward movement of manufactured goods through a country or territory including movements through customs warehouses and free zones.

### Data collection

The World Trade Organization, in close cooperation with UNCTAD, publishes data each year on manufactures exports which is sourced from UN Comtrade, the International Monetary Fund, Eurostat, as well as national sources. Where needed, reported data are complemented by estimations produced by the WTO.

### Target explanation

The EU has seen its global market share shrinking in recent years, in particular as China's manufacturing exports market share sharply increased in the past 20 years. The EU should ensure that its industrial exports remain at least in line with the weight of the EU's economy in the world (GMSI = 1).

### Additional observations

The last publication, as of July 2020, has been the *World Trade Statistical Review 2019* which includes data up to 2018. The next version is expected to include separate data for the EU after the UK's departure.



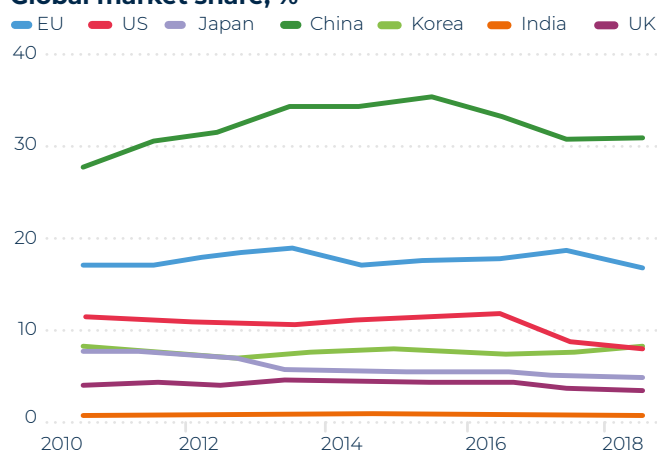


## 23. Export of high technology manufactured goods

### Global market share index (GMSI)



### Global market share, %



### Indicator Overview

<b>Source</b>	World Bank, Eurostat
<b>Collected since</b>	at least 2010
<b>Frequency</b>	annual
<b>Lagging</b>	1-2 years
<b>Latest (year)</b>	16.8% (2018)
<b>2030 Target</b>	EU market share in this category to outperform EU share in global economy by 30% (GMSI = 1.3)

### Definition and relevance

High technology exports are products with high R&D intensity, such as aerospace, computers, pharmaceuticals, scientific instruments and electrical machinery. It follows a methodology developed by the OECD, which distinguishes four manufacturing sectors by their R&D intensity. A significant presence on international markets indicates EU competitiveness in high technology segments that are high in value addition.

### Data collection

The World Bank publishes data on high technology exports in its World Development Indicators. It sources trade data from the UN Comtrade database and excludes re-exports. As the World Bank does not provide data on intra-EU and extra-EU trade, we have complemented the data with figures from Eurostat on high technology exports and rebased world exports by subtracting intra-EU trade. Eurostat also follows the OECD methodology.

### Target explanation

The EU's market share in high technology exports has been relatively stable since 2010 and reached 17% in 2018. EU market share is still underweight compared to its share in the global economy. By 2030, the EU could strive to have a market share in high technology exports that is larger than its share in the global economy by at least 30% (GMSI = 1.3).

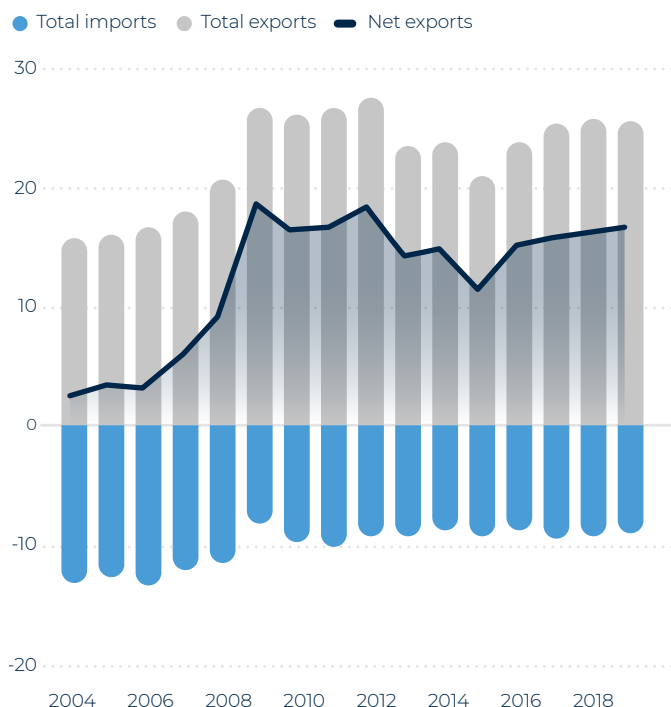
### Additional observations

It is important to note that the location of production, which is shown by the trade data, does not give a complete picture of high technology sectors. It is equally important where a large part of the value addition, especially research and development, takes place. The OECD's Trade in Value Added (TiVA) database can provide insight into this, which is likely to be why the Austrian Presidency Report included it as an indicator. But data can be lagging by up to five years. Indicators 1 and 2 on gross value added in the balanced scorecard provide more recent insights into the value addition of the industrial sector.



## 24. Net exports of recyclable raw materials

### Total waste to/from EU, million tonnes



### Indicator Overview

<b>Source</b>	Eurostat
<b>Collected since</b>	2004
<b>Frequency</b>	annual
<b>Lagging</b>	<1 year
<b>Latest (year)</b>	16.6 million tonnes
<b>2030 Target</b>	To reduce net exports to zero
<b>Further reference</b>	Austrian Presidency Report

### Definition and relevance

The indicator shows the amounts of selected waste that are shipped outside the EU minus imports. This net export figure covers the following materials: plastics; paper and cardboard; precious metal; iron and steel; copper aluminium and nickel. In a circular economy, residual materials are recycled and re-injected into the economy as new raw materials. Not only does this have environmental benefits and does this limit potential problems for importing third countries, but it also has the advantage of increasing the security of raw materials supply as non-hazardous waste can be a potential source of key raw materials.

### Data collection

Eurostat publishes data on intra and extra-EU trade flows on an annual basis which it collects from trade in goods data.

### Target explanation

Exports of recyclable raw materials have increased dramatically over the last 15 years. The new Circular Economy Action Plan recognises this and points out that "the Commission will take action with the aim to ensure that the EU does not export its waste challenges to third countries."<sup>24</sup> Reducing net exports of recycled raw materials to zero over the next decade would fulfil this policy goal.

### Additional observations

Like the circularity rate, the indicator is part of the European Commission's Circular Economy Monitoring Framework which was established in early 2018, following the 2015 Circular Economy Action Plan, to monitor progress towards a circular economy on the thematic area of "secondary raw materials" – i.e. those residual materials recycled and reintroduced in the economy. But as mentioned above, the indicator is also useful to assess how the EU is able to make itself less dependent on the import of critical raw materials.

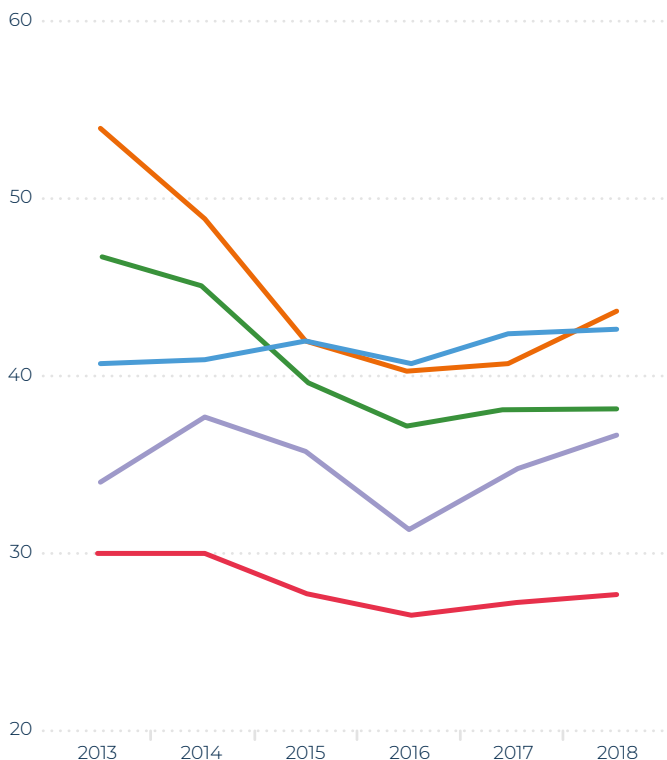
<sup>24</sup> COM/2020/98 final, see: [https://eur-lex.europa.eu/resource.html?uri=cellar:9903b325-6388-11ea-b735-01aa75ed71a1.0017.02/DOC\\_1&format=PDF](https://eur-lex.europa.eu/resource.html?uri=cellar:9903b325-6388-11ea-b735-01aa75ed71a1.0017.02/DOC_1&format=PDF)



## 25. Economic openness

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

EU US Japan China India



### Indicator Overview

<b>Source</b>	Eurostat, World Bank
<b>Collected since</b>	at least 2013
<b>Frequency</b>	annual
<b>Lagging</b>	1-2 years
<b>Latest (year)</b>	42.7% (2018)
<b>2030 Target</b>	To be the most open, top five economy over the next decade

### Definition and relevance

Economic openness, defined as the share of total trade in the economy, indicates the extent to which trade barriers are low and competition is allowed freely. Openness is an indispensable enabler of growth, job creation, and poverty reduction. Trade provides new market opportunities for domestic firms, stronger productivity and innovation through competition. It enables a global division of labour, contributes to rising living standards and helps foster international cooperation due to deeper economic integration. It also increases individual choices and provides entrepreneurial opportunities in an open market economy. The last decades have shown that no country can develop successfully without harnessing economic openness.

### Data collection

The World Bank provides data on exports and imports of goods and services as a share of GDP. The indicator for the EU has been derived from Eurostat, using extra-EU trade flows only.

### Target explanation

The indicator shows that the EU (again, excluding intra-EU trade) has consistently been more open than the US and Japan. While its trade with the rest of the world has accounted for more than 40% of GDP since 2013, the same figure is about 10 percentage points lower for the US with Japan fluctuating in the middle. Economic openness in China and India has been higher but has fallen in recent years. The EU should defy protectionist tendencies and aim to be the most open top five economy in the next decade.

### Additional observations

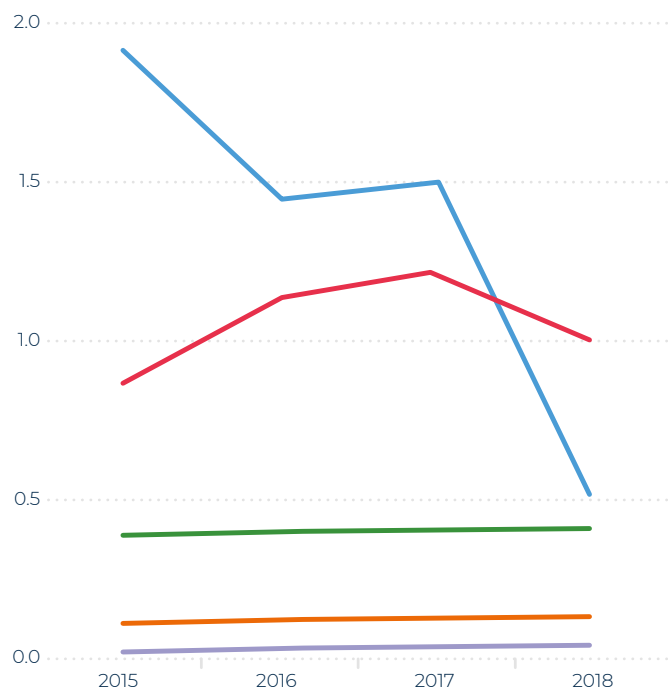
The indicator does not directly provide insight about barriers in specific sectors and restrictions for foreign investment and migration. Indicators 26, 27 and 28 help to provide a more nuanced view.



## 26. FDI inflows

**FDI inflows, \$ trillion, 3-year moving sum**

— EU — US — Japan — China — India



### Indicator Overview

<b>Source</b>	UNCTAD, Eurostat
<b>Collected since</b>	1980, 2004
<b>Frequency</b>	annual
<b>Lagging</b>	1-2 years
<b>Latest (year)</b>	EU: \$520 billion; US: \$1,001 billion (2016-18)
<b>2030 Target</b>	To be the leading destination for FDI over the next decade
<b>Further reference</b>	<ul style="list-style-type: none"> <li>• Austrian Presidency Report</li> <li>• ERT Benchmarking Report 2019</li> </ul>

### Definition and relevance

Foreign Direct Investment (FDI) is defined as an investment involving a long-term relationship and reflecting a lasting interest and control by a resident entity in one economy (foreign direct investor or parent enterprise) in an enterprise resident in an economy other than that of the foreign direct investor (FDI enterprise or affiliate enterprise or foreign affiliate). The IMF defines FDI to involve an ownership of at least 10% in the company. FDI is defined as one of the following: intra-company loans, equity capital and reinvested earnings. Greenfield investment, the setting -up of new production, is often most closely associated with FDI. But FDI can also occur through equity investments, mergers and acquisitions. FDI inflows signal the attractiveness of Europe as a place to do business. The industry sector is often a key destination for investment.

### Data collection

UNCTAD collects data on FDI inflows by country. It does not exclude intra-EU FDI flows. To account for this, we have used Eurostat data to calculate the FDI inflows into the EU from outside the bloc. Data can be volatile on an annual basis, which is why we would focus on the sum of a longer period or the entire next decade.

### Target explanation

Until recently, the EU was the largest destination for FDI globally. However, it has lost this position in recent years as inflows even turned negative in some years. The EU should reverse this trend and aim to be the most attractive destination for FDI over the next decade.

### Additional observations

FDI inflows have become more controversial in recent years as foreign investors, especially state-backed ones, could also seek to acquire strategically important technology through unfair means. This would undermine the EU's competitiveness, and would be visible in other indicators of the balanced scorecard. The EU should take appropriate measures to ensure that foreign investment in the EU does not distort competition in the longer term.

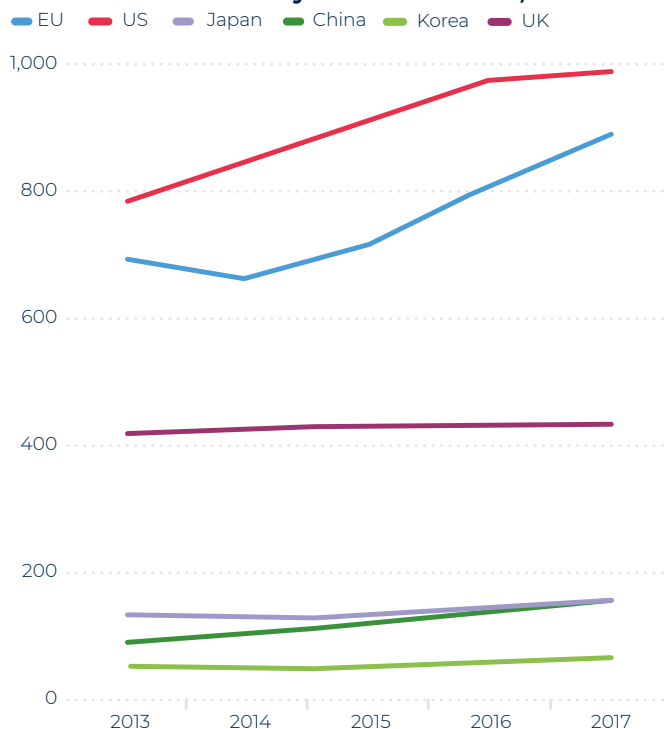
*"Better attracting skills and talent from abroad will also help to address the EU's labour market needs."*

(EU Industrial Strategy, p.11)



## 27. Destination for foreign students

### Inbound internationally mobile students, thousands



### Indicator Overview

<b>Source</b>	UNESCO, own calculations
<b>Collected since</b>	1998
<b>Frequency</b>	annual
<b>Lagging</b>	3 years
<b>Latest (year)</b>	EU: 886k; US: 985k (2017)
<b>2030 Target</b>	To be the top destination for international students

### Definition and relevance

The indicator measures the number of students who have crossed a national or territorial border for the purpose of education and are now enrolled outside their country of origin. Openness to foreign talent is important for EU industrial competitiveness as Europe's population is ageing and skills needs are changing rapidly. Besides ICT, new roles in fields such as AI and robotics, which will become increasingly relevant across a wide range of activities, could be hard to fill. Bringing international students into the EU is one way of attracting and retaining top international talent.

### Data collection

The UNESCO Institute for Statistics publishes data on bilateral student flows. We have excluded intra-EU student movements to assess how the EU compares at a global level taking the EU as a single entity.

### Target explanation

This indicator shows that the EU is already an attractive destination for non-EU international students, attracting almost 900,000 international students in 2017. Comparatively lower (sometimes free) tuition fees, culture, and opportunities to travel make Europe interesting, though language and fewer internationally recognisable top universities may be barriers. The US attracted more students than the combined EU, while the UK alone attracted almost half as many international students as the EU. In light of the technological and demographic changes, the EU should strive to be the most attractive place for foreign students in the next decade.

### Additional observations

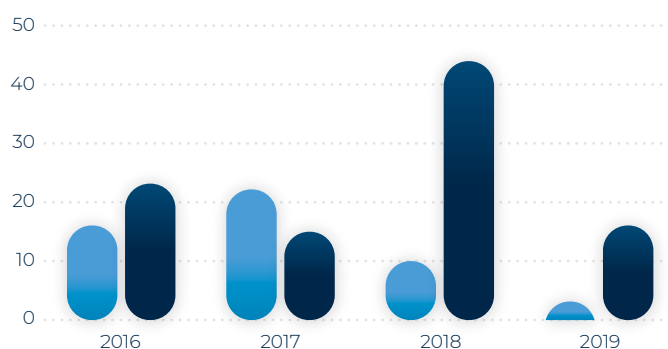
While the indicator captures the EU's attractiveness to foreign talent, it does not give information about the fields of study and the ability of Europe to retain talent. Last year, the OECD published for the first time the OECD Indicators of Talent Attractiveness, which also includes highly educated workers and students. But the OECD figures, as well as the IMD World Talent Ranking, provide indicators in a wide variety of areas on the environment for international talent rather than actual outcomes of attracting talent.



## 28. Trade and investment barriers

### New barriers for EU companies abroad, number and € billion

- Net number of restrictive measures
- Net trade flows negatively affected (€bn)



### Indicator Overview

<b>Source</b>	European Commission
<b>Collected since</b>	2008/2016
<b>Frequency</b>	annual
<b>Lagging</b>	1 year
<b>Latest (year)</b>	3 net restrictive measures; net €15.7 billion negatively affected (2019)
<b>2030 Target</b>	Reduce net new restrictive measures and negatively affected trade flows to zero

### Definition and relevance

The indicator on trade and investment barriers aims to monitor the number of new trade restrictive measures that EU businesses face abroad, against the number of those which were successfully removed – and their related impact on trade flows. It indicates the extent to which access to markets around the world is expanded or reduced for EU companies. European industry relies strongly on foreign export markets, and its presence there is a sign of its competitiveness. Given the EU's high economic openness, it also monitors reciprocity in trade relations.

### Data collection

The data are published annually by the European Commission in its Report on Trade and Investment Barriers.<sup>25</sup> It includes the restrictions recorded in the EU's Market Access Database which is based on information reported by European companies. The report therefore offers a detailed analysis of the types of new barriers that are causing most harm to EU companies and of restrictive measures that have been removed. The publication has provided data since 2008 but the Commission only started to estimate the value of trade flows affected by trade and investment barriers from 2016.

### Target explanation

Trade and investment barriers around the world have been on the rise in recent years. While the net number of new restrictive measures peaked in 2017, the trade flows affected by new barriers have remained high. The EU should continue to work with partners around the world to reduce barriers that distort competition. It should aim to bring the number of net new trade restrictions as well as the value of negatively affected trade flows to zero.

### Additional observations

The indicator offers a useful view of some of the challenges faced by EU firms in foreign markets but has some statistical limitations. First, the number of measures included is only based on those reported by businesses and might therefore not be comprehensive. Second, the Commission's estimates of the trade flows potentially affected are quantified based on EU export figures for the relevant HS codes, capturing the trade that happens despite the barrier. The impact of restrictive measures is likely to be underestimated as a result. The data also do not cover services and horizontal barriers. Moreover, most trade-restrictive measures reduce, rather than stop completely, the level of flows and their impact is hard to quantify precisely. We have considered data from Global Trade Alert as an alternative. But figures can change retrospectively as they are partly recorded with significant lags. Furthermore, Global Trade Alert does not offer a quantification of measures which offers useful additional information as a large number of measures can have a small impact and vice versa.

<sup>25</sup> For 2019 report, see: [https://trade.ec.europa.eu/doclib/docs/2020/june/tradoc\\_158789.pdf](https://trade.ec.europa.eu/doclib/docs/2020/june/tradoc_158789.pdf)



## Notable Data Gaps

In the process of developing the KPIs, we have identified data that would help track the implementation of the strategy but is currently not available.

The Commission could seek to collect data in these areas, perhaps in some cases in collaboration with international organisations to allow for a wide international coverage. Alternatively, the Commission could consider funding the collection of data by international bodies so that more comparative data would be easily available.

Together with a strong orientation towards innovation, the Single Market is the driver of competitiveness in Europe. The Commission's Single Market Scoreboard provides a useful overview of governance and policy indicators as well as data on intra-EU trade and FDI flows.<sup>26</sup> In a 2014 study for the European Parliament, its Directorate-General for Internal Policies noted the limited amount of analysis on the performance of the Single Market, but concluded that no single indicator could provide a comprehensive assessment.<sup>27</sup> The lack of performance indicators comparing the European Single Market with the internal markets of key competitors is even greater. We see this as a worthwhile area for future research and data collection.

Another challenge has already been noted by the report of the Austrian Presidency: the lack of data on the joint production of manufacturing and services, despite the fact that this so-called "servitisation" is an increasing trend.

A third important element, where further research and data collection is recommended, is the development of the international level playing field. The industrial strategy raises important concerns about it. Unfortunately, there exists little internationally comparable data in this area:

- Data on the international use of subsidies could indicate the extent to which governments are using forms of assistance to alter competition to the advantage of their companies in the global economy. Unfortunately, no consistent data exists about the use of subsidies internationally. The European Commission's latest White Paper on foreign subsidies recognises these limitations, noting missing transparency and compliance with obligations under WTO rules.<sup>28</sup> WTO subsidy and EU state aid definitions also differ.
- There currently is no data available on the size of international procurement markets outside of the OECD and about the extent to which foreign companies provide goods and services to public sector entities around the world. Data in this area would also help inform the debate around the International Procurement Instrument.

<sup>26</sup> European Commission, Single Market Scoreboard, see [https://ec.europa.eu/internal\\_market/scoreboard/performance\\_overview/index\\_en.htm](https://ec.europa.eu/internal_market/scoreboard/performance_overview/index_en.htm).

<sup>27</sup> DG Internal Policies, Indicators for Measuring the Performance of the Single Market – Building the Single Market Pillar of the European Semester, see [https://www.europarl.europa.eu/RegData/etudes/STUD/2014/518750/IPOL\\_STU%282014%29518750\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2014/518750/IPOL_STU%282014%29518750_EN.pdf). See also the Report on Mapping the Cost of Non-Europe, 2014-2019 which contains relevant background: [https://www.europarl.europa.eu/RegData/etudes/etudes/join/2014/563350/IPOL-EAVA\\_ET\(2014\)563350\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/etudes/join/2014/563350/IPOL-EAVA_ET(2014)563350_EN.pdf).

<sup>28</sup> COM(2020) 253 final, see [https://ec.europa.eu/competition/international/overview/foreign\\_subsidies\\_white\\_paper.pdf](https://ec.europa.eu/competition/international/overview/foreign_subsidies_white_paper.pdf).

## Annex 1a.

# Reports on global and European (industrial) competitiveness

We have reviewed the following reports and publications for the development of our set of Key Performance Indicators. The data for our final set of KPIs is sourced from the websites and databases listed further below.

**Austrian Institute of Economic Research (WIFO), Measuring Competitiveness, March 2018.**

<https://ec.europa.eu/docsroom/documents/28181/attachments/1/translations/en/renditions/pdf>

**Bruegel, Measuring Competitiveness in Europe: Resource Allocation, Granularity and Trade, January 2016.**

<https://www.bruegel.org/2016/01/measuring-competitiveness-in-europe-resource-allocation-granularity-and-trade/>

**Council of the EU, Presidency Report on Industrial Policy – Governance and Mainstreaming, November 2018.**

<https://data.consilium.europa.eu/doc/document/ST-14217-2018-INIT/en/pdf>

**ERT, European Competitiveness and Industry: Benchmarking Report 2019, December 2019.**

[https://ert.eu/wp-content/uploads/2019/12/ERT-Competitiveness-and-Industry-Benchmarking-Report-2019\\_II.pdf](https://ert.eu/wp-content/uploads/2019/12/ERT-Competitiveness-and-Industry-Benchmarking-Report-2019_II.pdf)

**European Commission, European Competitiveness Report 2014, September 2014.**

[https://ec.europa.eu/growth/content/european-competitiveness-report\\_en](https://ec.europa.eu/growth/content/european-competitiveness-report_en)

**European Policy Centre, An Industry Action Plan for a more competitive, sustainable and strategic European Union, November 2019.**

<https://www.epc.eu/en/publications/An-Industry-Action-Plan-for-a-more-competitive-sustainable-and-strate~2c7ab8>

**Industry4Europe, Setting Indicators for an Ambitious EU Industrial Strategy, March 2018.**

<https://www.industry4europe.eu/publications/setting-indicators-for-an-ambitious-eu-industrial-strategy/>

**International Institute for Management Development (IMD), World Competitiveness Yearbook 2020, June 2020.**

<https://www.imd.org/wcc/world-competitiveness-center-rankings/world-competitiveness-ranking-2020/>

**Strategic Forum, Strengthening Strategic Value Chains for a Future-Ready EU Industry, November 2019.**

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<https://www.doingbusiness.org/en/reports/global-reports/doing-business-2020>

**World Economic Forum, Global Competitiveness Report 2019, October 2019.**

<https://www.weforum.org/reports/global-competitiveness-report-2019>

## **Annex 1b.**

# **Databases and websites**

- European Commission
  - Digital Economy and Society Index (DESI)
  - Industrial R&D Investment Scoreboard
  - Trade and Investment Barriers Report
- Eurostat
- Fortune
- GSM Association (GSMA)
- International Energy Agency (IEA)
- International Federation of Robotics
- International Monetary Fund (IMF)
- KPMG
- Organisation for Economic Co-operation and Development (OECD)
- S&P Dow Jones
- UN Conference on Trade and Development (UNCTAD)
- UN Educational, Scientific and Cultural Organization (UNESCO)
- UN Industrial Development Organization (UNIDO)
- UN Statistics Division
- World Bank
- World Trade Organization

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