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COMMISSION STAFF WORKING DOCUMENT

Key Performance Indicators (KPIs)

Overview of Resilience Measures by Selected Global Players

Accompanying the document

Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions

The 2025 Annual Single Market and Competitiveness Report

{COM(2025) 26 final} - {SWD(2025) 12 final}

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Annex 1
Key performance indicators and External Vulnerability Index

I. Overview of key performance indicators on the Single Market and long-term competitiveness

Table 1: Summary of key performance indicators (KPIs)

KPI	What it measures	Target	Latest EU value
Productivity			
KPI 1: Labour productivity	GDP per hour worked in PPP terms		At 77.8% of US levels (2023) At 74.2% of US levels (2022)
Single Market			
KPI 2: Integration in the Single Market	Share of EU GDP represented by trade between EU Member States		23.8% for goods (2023) 26.0% for goods (2022) 7.6% for services (2023) 7.8% for services (2022)
KPI 3: Conformity deficit	Share of EU Single Market Directives transposed by Member States for which infringement proceedings for incorrect transposition have been launched by the Commission	0.5%	0.9% (2024) 1.1% (2023)
KPI 4: Ease of regulatory compliance	Ease of regulatory compliance, based on survey data with companies responding to the question: "In your country, how easy is it for companies to comply with government regulation and administrative requirements (e.g. permits, reporting, legislation)? (1 = Extremely complex; 7 = Extremely easy)" in the survey for the Global Competitiveness Index of the World Economic Forum.		3.87 (2023) 3.80 (2022)
Research and Innovation			
KPI 5: R&D expenditure	Total private and public expenditure in research and development as share of GDP.	>3% by 2030	2.22% (2023) 2.21% (2022)
KPI 6: Patent applications	Patent applications per million inhabitants.		152.8 (2023) 151.8 (2022)
KPI 7: Venture capital investment	Venture capital investment (share of GDP)		0.05% (2023) 0.09% (2022)
Digitalisation			
KPI 8: Digital intensity in SMEs[62]	Share of EU enterprises with at least a basic level of digital intensity. A basic level entails the use of at least four of twelve selected digital technologies (such as using any AI technology; having e-commerce sales account for at least 1% of total turnover; etc.) as defined in the Digital Decade policy programme.	90% by 2030	57.7% (2023) 54.8% (2021)

KPI 9: Digital technologies adoption by companies	Share of European enterprises that have taken up cloud computing services, data analytics and/or Artificial Intelligence. Target set in the Digital Decade policy programme.	75% by 2030	Cloud computing services: 38.9% (2023) 34.0% (2021) Data analytics: 33.2% (2023) Big data: 14.2% (2020) Artificial intelligence: 8.0% (2023) 7.6% (2021)
Education and skills			
KPI 10: Employment rate	The share of working-age people employed.	78% by 2030	75.3% (2023) 74.6% (2022)
KPI 11: Adult participation in education and training	Share of adult population participating in education and/or training at least once per year.	60% by 2030	39.5% (2022) 37.4% (2016)
KPI 12: ICT specialists	ICT specialists as a share of total employment	20 million ICT specialists, ca 10% of total employment	9.8 million, 4.8% of employment (2023) 9.4 million, 4.6% of employment (2022)
KPI 13: PISA score	15-year-olds' performance in the OECD's PISA tests covering mathematics, reading and science. High scores indicate better performance.		Maths: 474 (2022) Maths: 492 (2018) Reading: 475 (2022) Reading: 488 (2018) Science: 484 (2022) Science: 488 (2018)
Access to private capital and investment			
KPI 14: Private investment	Private investment (share of GDP)		18.5% (2023) 19.3% (2022)
KPI 15: Private savings invested in bonds, shares, investment funds and similar	Volumes of households' savings in bonds; listed shares; and investment, insurance and pension funds, relative to the volumes of households' cash holdings and bank deposits. It gives an idea of the share of savings directly feeding into investment in the real economy, easing companies' access to finance.		43% (2023) 42% (2022)
Public investment and infrastructure			
KPI 16: Public investment	Public investment (share of GDP)		3.49% (2023) 3.24% (2022)
Energy			
KPI 17: Electricity prices for non-household consumers	Electricity prices for non-household consumers (EU ID price band, large commercial consumers) with recoverable taxes and levies excluded.		EUR 0.16 per kWh (2024) EUR 0.20 per kWh (2023)
KPI 18: Electrification	Electricity as a share of the total energy consumption.		21.3% (2022) 20.8% (2021)
KPI 19: Share of energy from renewable sources	Renewable energy generation as a share of the overall energy consumption.	45% in 2030	24.5% (2023) 23% (2022)
Circular Economy			
KPI 20: Circular material use rate	Material recovered and fed back into the economy, as a share of the overall use of material.	23.4% by 2030	11.8% (2023) 11.5% (2022)

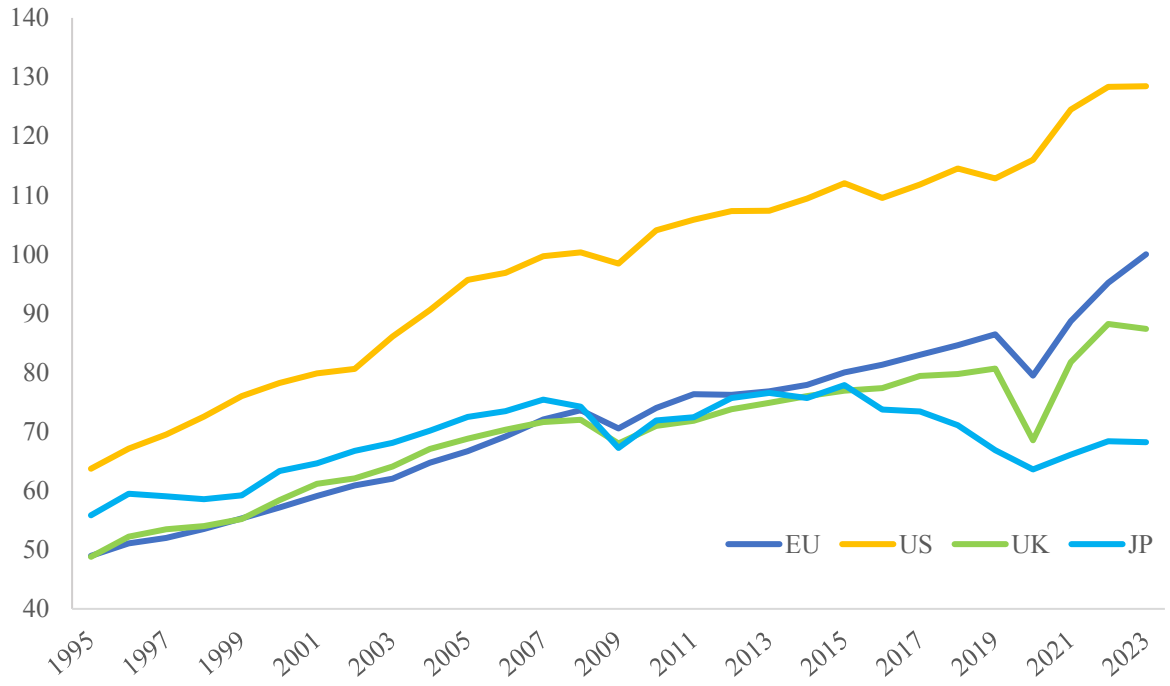
Trade and strategic dependencies			
KPI 21: Trade with the rest of the world as share of GDP	The EU's degree of economic integration with the rest of the world.		14.8% for goods (2023) 17.4% for goods (2022) 7.4% for services (2023) 7.8% for services (2022)
KPI 22: Exports of goods and services as a share of worldwide imports	The EU economy's global weight and market share.		20.4% for goods (2023) 16.1% for goods (2022) 31.9% for services (2023) 33.5% for services (2022)

1. The state of European competitiveness

KPI 1: Labour productivity

Figure 1 shows the trend in labour productivity, meaning the economic output per hour worked in the economy. While EU-27 labour productivity has remained stable at around 77% of US levels over the past 30 years, there is a considerable drop in relative labour productivity among the EU's early Member States (Germany, France, Italy, Spain, Netherlands, Belgium, Ireland, Austria, Portugal, Finland, and Greece), compensated by increased labour productivity in Member States that joined more recently.

Figure 1: Labour productivity in the EU and other advanced economies



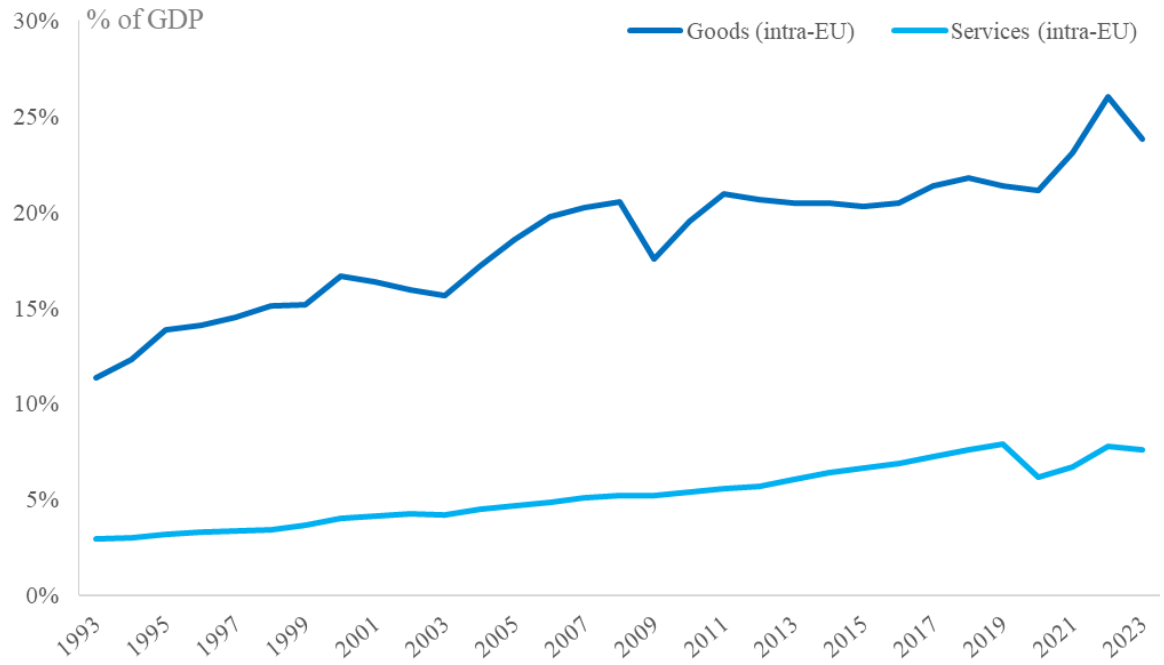
Source: annual macroeconomic (AMECO) database. GDP in purchasing power standards per hour worked. Values are indexed; EU-27 in 2023=100.

2. Completing the Single Market

KPI 2: Integration in the Single Market

Figure 2 shows the trend in cross-border trade flows in goods and services within the EU Single Market as a share of total EU GDP. Trade is measured by the average of imports and exports. The figure shows that in the past three decades, trade integration within the EU has more than doubled.

Figure 2: Integration in the Single Market: Intra-EU trade (% of GDP)



Source: Eurostat

National data, intra-EU goods, % of GDP (2023)

BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV
57	30.8	55	19	21.1	41.2	13.3	16.2	16.3	14.2	30	15.5	14	42
LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	**EU**
37.8	21.8	55.3	15.9	43.3	31.9	32.9	24.8	24.2	56.3	68.2	17.8	20.4	**23.8**

National data, intra-EU services, % of GDP (2023)

BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV
5.6	3.8	2.7	6.6	3.7	6.4	49.5	3.5	3.6*	4.2	5	2.2	25.7	3.7
LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	**EU**
3.4	21.9*	3.6	38.4	7	3.1	3.1	4.4	2.6	3	1.5	4.3	7.8	**7.6**

* ES and LU numbers are from 2022.

KPI 3: Conformity deficit

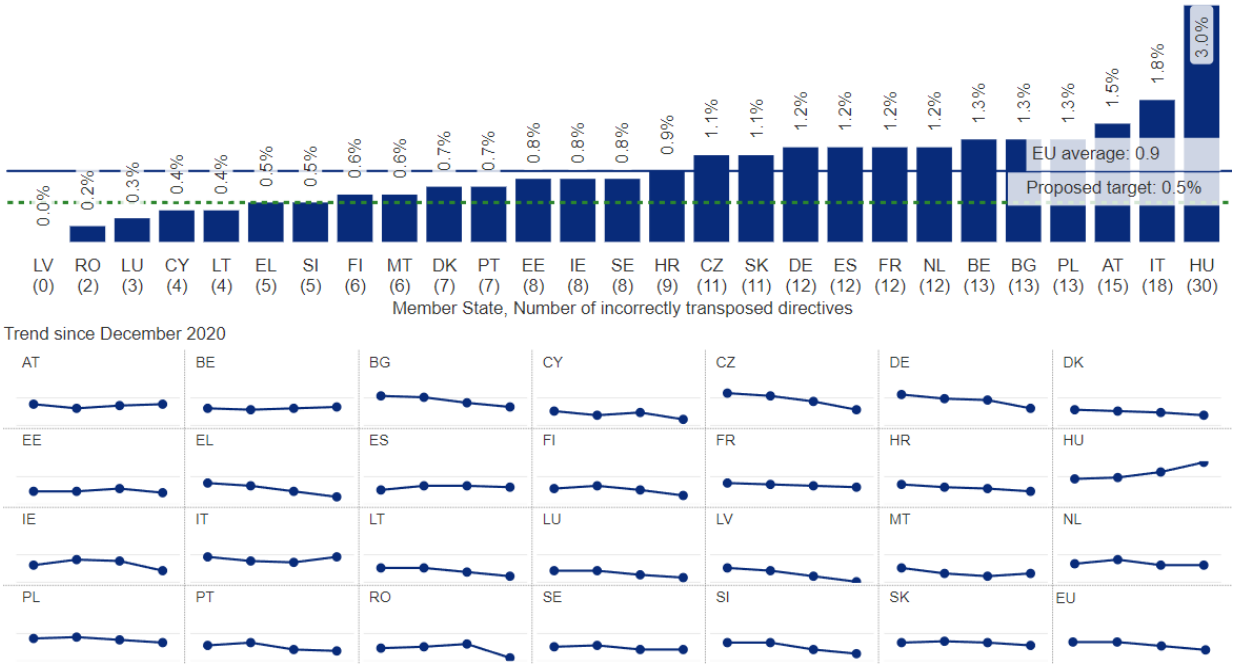
Transposing directives within the transposition deadline is just one aspect of implementation. They also need to be correctly transposed and applied on the ground to be considered as fully implemented.

The conformity deficit measures the number of transposed Single Market directives for which the Commission has launched infringement proceedings for incorrect transposition. It is expressed as a percentage of the number of Single Market directives notified to the Commission as 'transposed' or 'not requiring any further implementation measures'. Only the Court of Justice can rule definitively that a directive has not been transposed correctly, and the Commission is still working on the conformity assessment of several notified national measures. This should be kept in mind when interpreting the conformity deficit statistics.

There is still a high number of ongoing infringement cases that need to be resolved (192 cases on 80 different Single Market directives). Nevertheless, there has been progress compared to previous years (253 cases in 2023 and 292 cases in 2022).

The average conformity of Single Market directives has fallen below the symbolic 1% threshold, for the first time since December 2018. It however remains above the EU proposed 0.5% target[1].

Figure 3: Conformity deficit (incorrectly transposed directives, % share of total number of directives notified, by Member State)



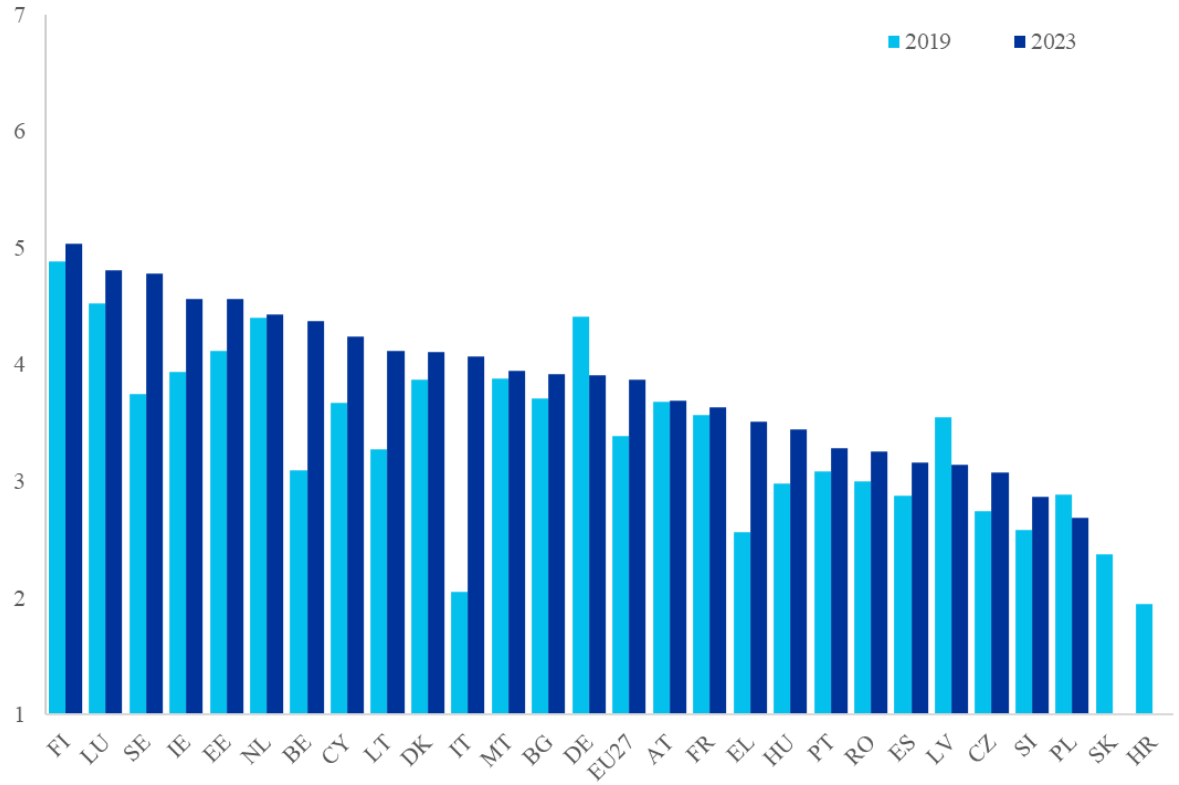
[1] April 2011 "Single Market Act" and March 2023 Communication "The Single Market at 30".

KPI 4: Ease of regulatory compliance

This indicator is measured by tracking the results of replies to the following survey question: 'In your country, how easy is it for companies to comply with government regulation and administrative requirements (e.g. permits, reporting, legislation) (1 = Overly complex; 7 = Extremely easy)?' Higher values indicate a better performance, i.e. having less burdensome regulation.

In 2023, stakeholders' perception of the regulatory burden in the EU was on average 3.87, up from 3.80 in 2021, indicating a slightly improving, but broadly stable trend.

Figure 4: Ease of regulatory compliance (on a scale from 1= Overly complex to 7= Extremely easy)



Source: Survey for the Global Competitiveness Index of the World Economic Forum (2019 and 2023 data).

3. Closing the innovation gap

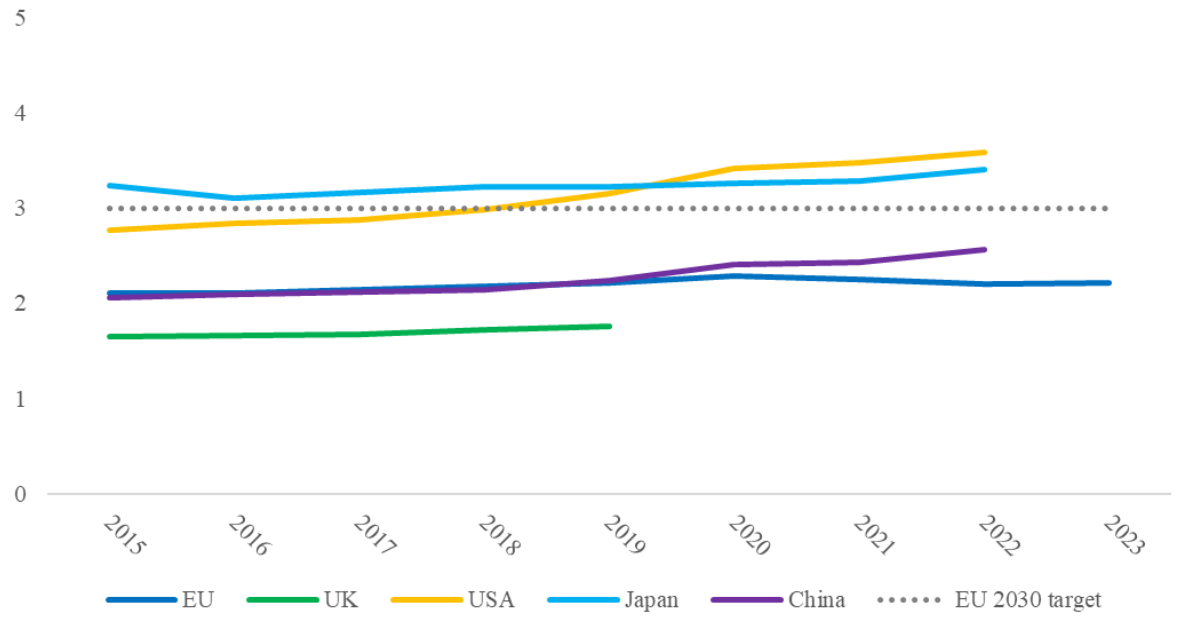
3.1. Research and innovation

KPI 5: R&D expenditure

Figure 5 shows the trend in annual research and development (R&D) expenditure as a percentage of GDP for the EU, China, Japan, the UK and the USA.

EU R&D intensity grew from 2.12% of GDP in 2015 to 2.22% in 2023. However, it remains below that of the USA (3.59%), Japan (3.41%) and China (2.56%). With a gap of 0.78 percentage points, the EU remains some distance from its ambition to raise R&D intensity to 3% by 2030.

Figure 5: R&D expenditure (% of GDP)



Source: Eurostat for EU; World bank for global peers. Note that data is missing from UK after 2019.

National data (2022)

BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV
3.35	0.75	1.89	2.87	3.13	1.78	2.17	1.49	1.44	2.22	1.4	1.39	0.75	0.76
LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	**EU**
1.05	1.05	1.39	0.6	2.18	3.18	1.45	1.7	0.46	2.11	0.98	2.96	3.47	**2.22**

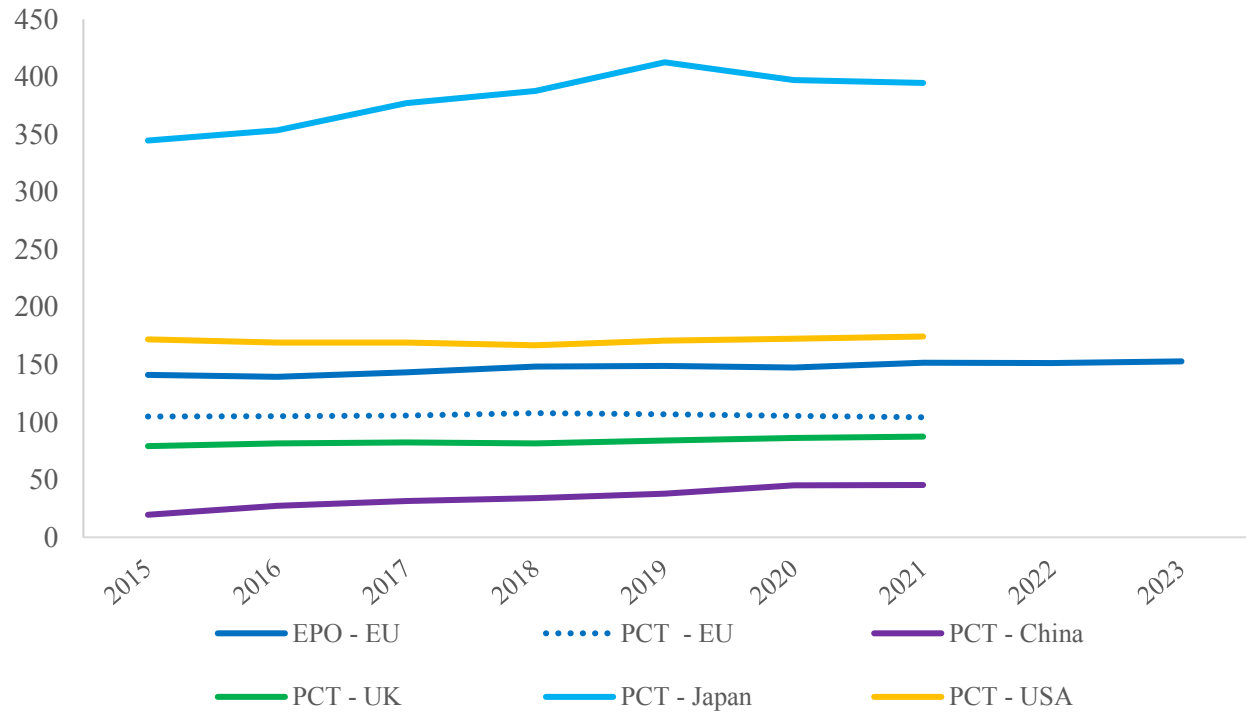
KPI 6: Patent applications

Figure 6 shows i) the number of patent applications to the European Patent Office (EPO) by EU applicants per million population; and ii) the number of patents filed under the Patent Cooperation Treaty (PCT) per million population by applicants' country of residence.

A patent application to the EPO can provide protection in up to 44 countries, including all EU countries, whereas a PCT patent application can provide protection in the 157 contracting states to the PCT. The number of EPO patent applications and PCT patent applications should not be directly compared because each system provides a different geographical scope of protection.

The number of PCT patent applications filed by EU applicants has remained relatively stable at around 105 per million inhabitants. This figure is significantly lower than the number of PCT patent applications filed by applicants residing in Japan (395 per million inhabitants in 2021) and the USA (174) but higher than in China (45) and the UK (87).

Figure 6: Number of patent applications per million inhabitants



Source: Eurostat (EPO patents), OECD (PCT patents), World Bank (population). Note that PCT data is only available until 2021.

National data (2023)

BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV
217	6	22	438	296	52	201	15	44	159	13	86	58	14
LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	**EU**
45	583	11	109	395	259	18	31	2	72	10	420	488	**153**

KPI 7: Venture capital investment

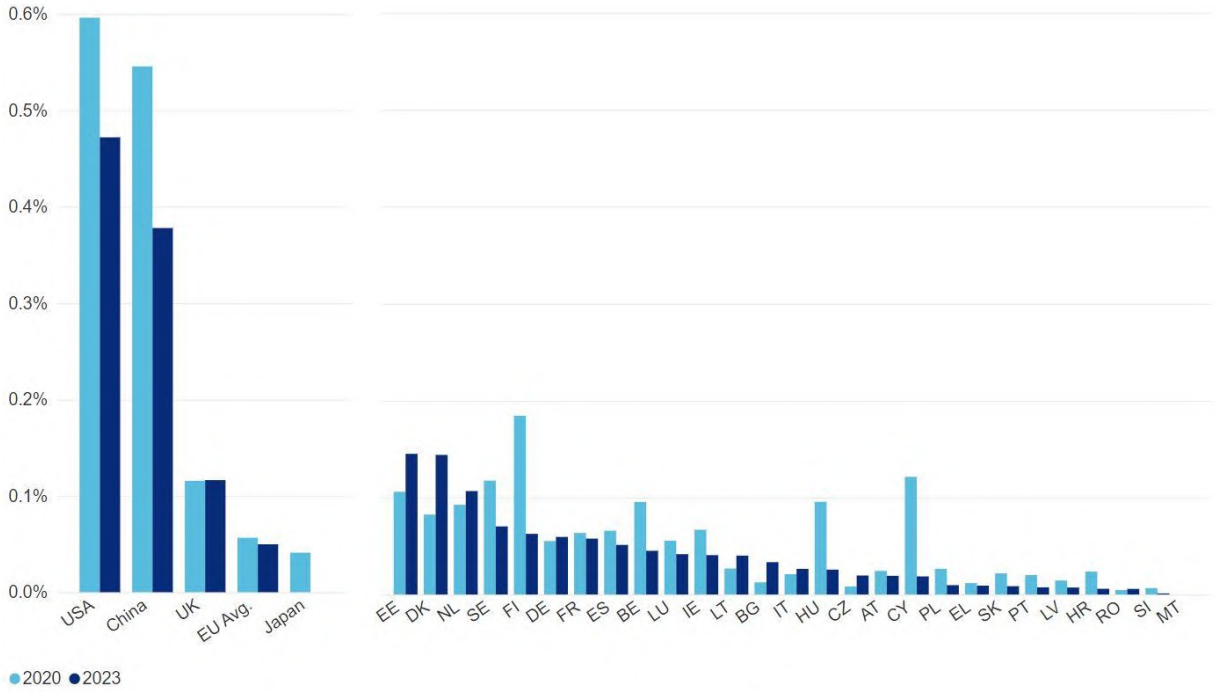
Venture capital is a form of equity financing that is particularly relevant for young companies with innovation and growth potential but untested business models and no track record. It replaces and/or complements traditional bank financing.

The indicator shows venture capital investment in a Member State as a percentage of its GDP in 2020 and 2023.

Member States with the highest values are more effective in attracting venture capital investment.

The ratio between EU average venture capital investment and GDP fell slightly in 2023 compared with 2020. In comparison to the EU average, the corresponding figures for the US and China are about 10 and 8 times higher, respectively, while the UK's figure is twice as high and Japan's is somewhat lower, illustrating the scale of the EU's venture capital investment gap.

Figure 7: Venture capital % of GDP)



Source: Invest Europe, Eurostat, OECD, Statista.

National data, Venture capital investments, % of GDP in 2023.

BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV
0.045	0.033	0.02	0.144	0.059	0.145	0.041	0.009	0.051	0.058	0.006	0.026	0.019	0.007
LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	**EU27**
0.040	0.042	0.026	0.000	0.107	0.019	0.010	0.007	0.006	0.001	0.009	0.063	0.070	**0.05**

3.2. Digitalisation

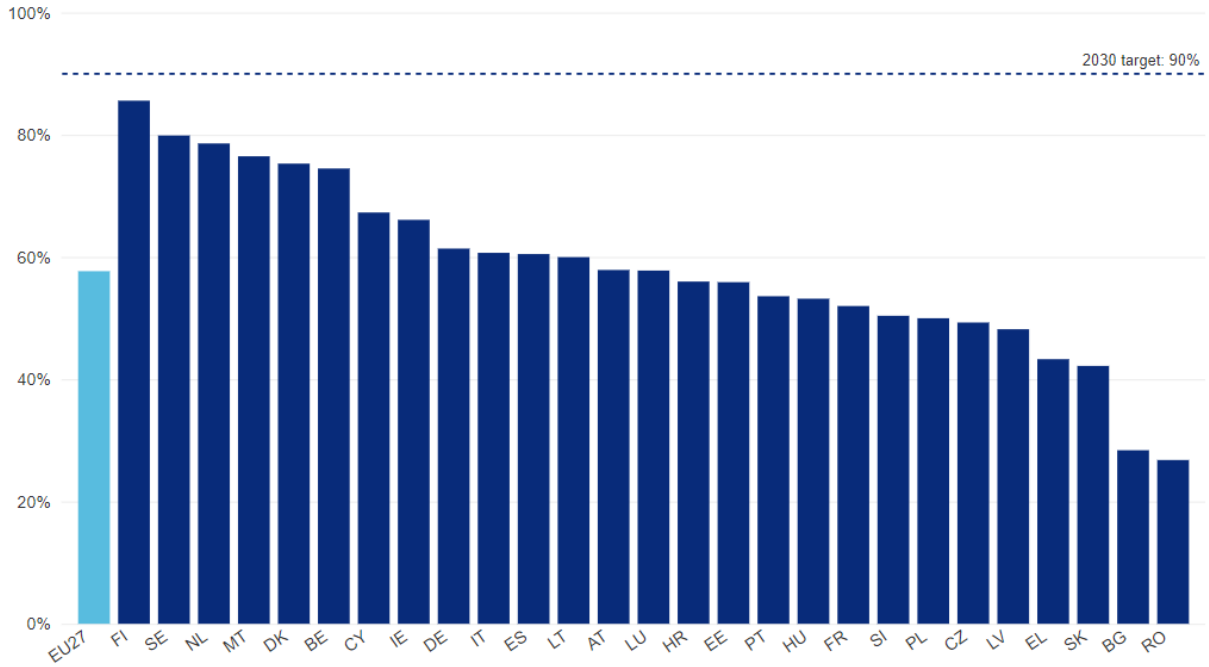
KPI 8: Digital intensity in SMEs

This indicator measures the share of small to medium-sized enterprises (SMEs) with at least a basic level of digital intensity.

The digital intensity score is based on counting how many out of 12 selected technologies are used by businesses. A basic level requires a business to use at least four technologies. The set of technologies considered by the indicator can vary between different survey years, depending on the questions included in the survey.

In 2023, the share of SMEs with at least a basic level of digital intensity ranged between 27% and 86%, with an EU average of 58%. The current EU average is still far from the 2030 EU target of 90%, which is set in the Digital Decade policy programme.

Figure 8: Digital intensity in SMEs: share (%) with at least a basic level of uptake of digital services



Source: The Digital Economy and Society Index (DESI).

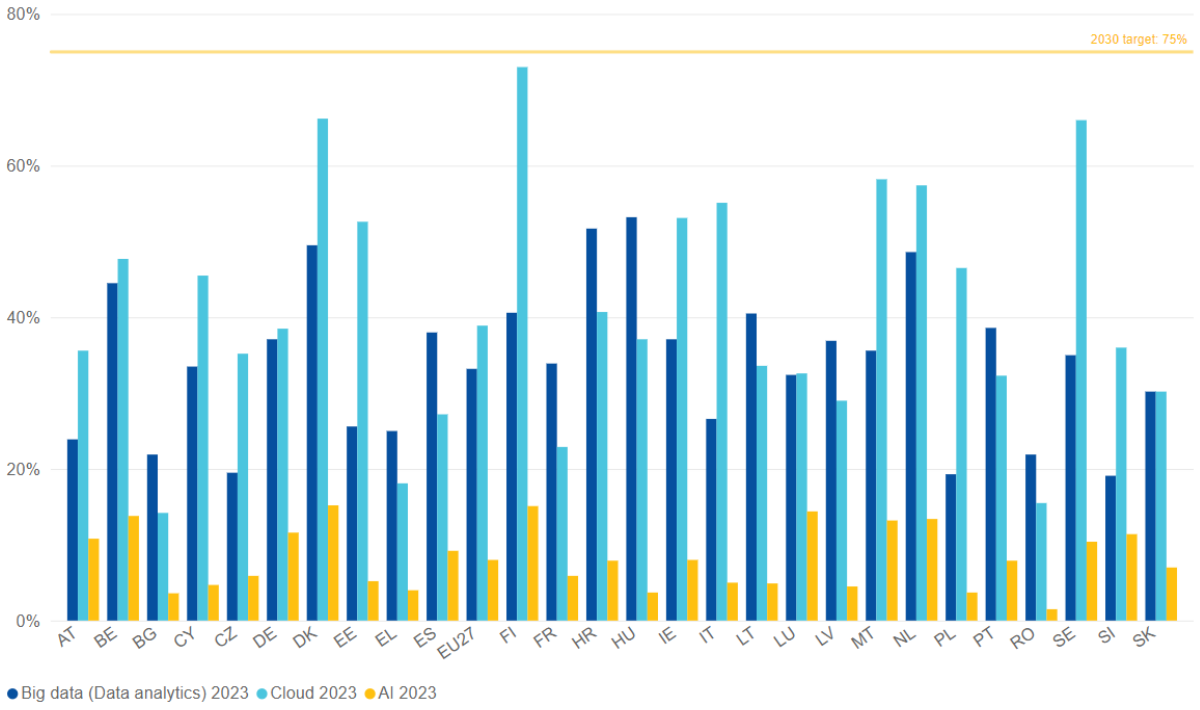
KPI 9: Digital technology adoption by companies

This indicator measures the degree of companies' adoption of digital technologies: data analytics, cloud and artificial intelligence (AI).

The data analytics series shows the percentage of businesses using data analytics tools. The cloud series measures the percentage of businesses purchasing at least one of the following cloud computing services: database hosting, accounting software applications, customer relationship management software, computing power. The AI series measures the percentage of businesses, – employing 10 or more people, – using at least one AI technology. The indicator is calculated for all businesses in manufacturing and service sectors, excluding the financial sector.

The share of EU businesses that have adopted digital technologies in 2023 was 33% for data analytics, 39% for cloud and 8% for AI.

Figure 9: Share (%) of companies using select digital technologies



Source: Eurostat

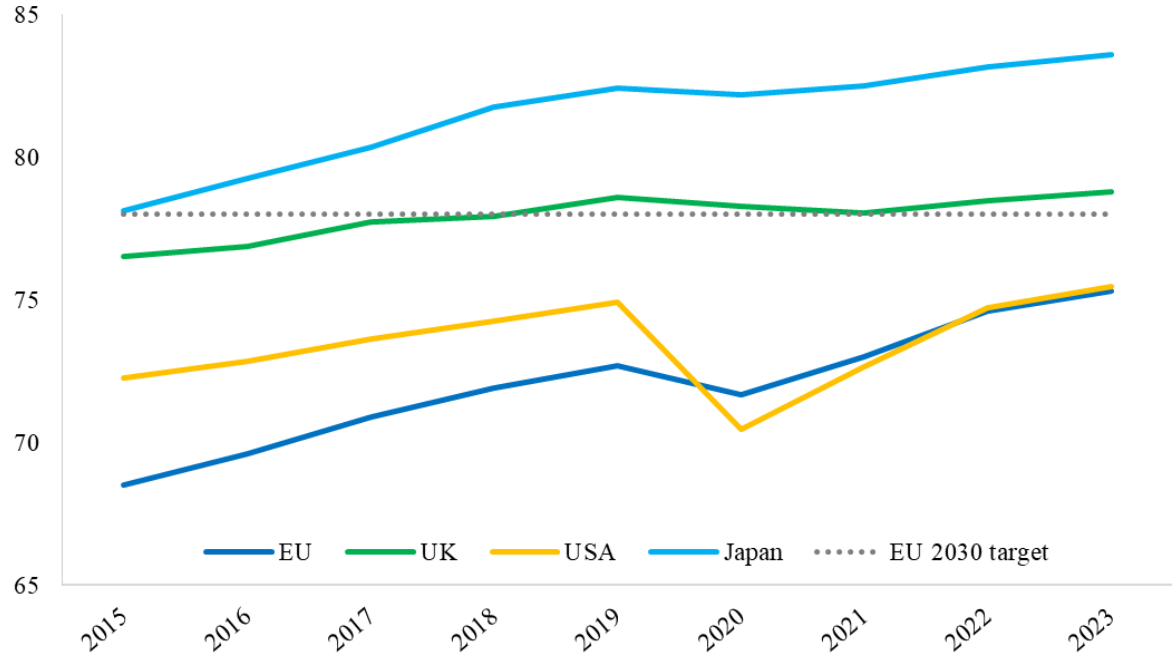
3.3. Education and skills

KPI 10: Employment rate

This indicator shows the trends in employment rates of people aged 20 to 64 in the EU, the UK, Japan and the USA.

Employment rates in the EU and the USA followed a broadly similar pattern, while rates in the UK and Japan remained higher.

Figure 10: Employment rate (%)



Sources: EU: Eurostat, Labour Force Survey / Japan, UK, USA: OECD, Labour Force Survey.

National data, employment rate (%), 2023

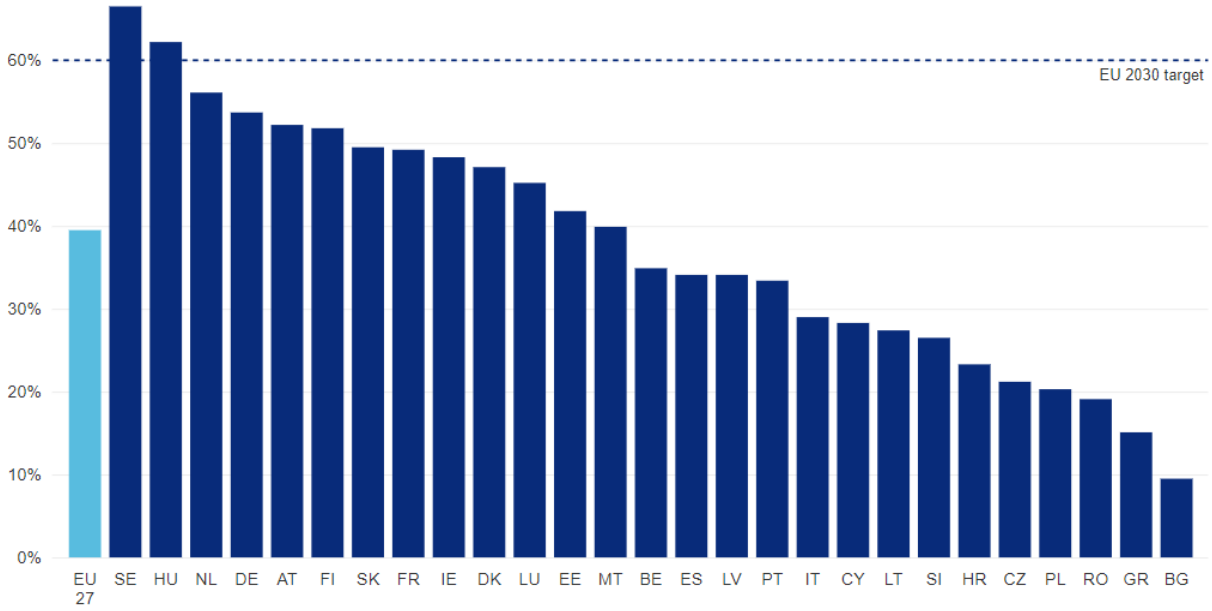
BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV
72.1	76.2	81.7	79.8	81.1	82.1	79.1	67.4	70.5	74.4	70.8	66.3	79.5	77.5
LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	**EU**
78.5	74.8	80.7	81.3	83.5	77.2	77.9	78.0	68.7	77.5	77.5	78.2	82.6	**75.3**

KPI 11: Adult participation in education and training

This indicator measures the share of adults (aged 25-64 years) who had taken part in an organised learning activity in the 12 months before a respective survey. These learning activities can encompass formal and non-formal education and training (excluding guided on-the-job training) in institutions or companies and training purchased on the market or provided by local authorities or other bodies.

The indicator shows a large difference in the adult participation rate across the EU Member States, with 6 countries displaying a rate above 50%, while 4 a rate around or below 20%. The EU average, shown by the light blue bar was 39.5% in 2022, while the dotted line shows the 60% EU2030 target rate, currently reached by only two Member States.

Figure 11: Share (%) of adults participating in education and training



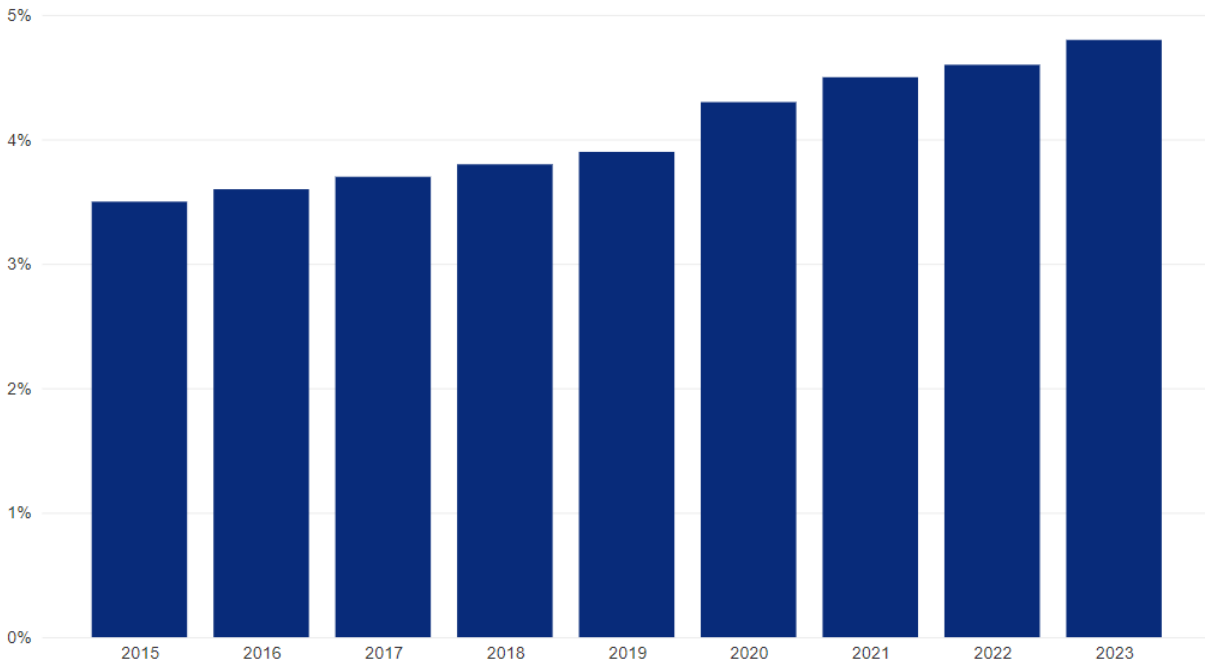
Source: Eurostat, 2022 EU Adult Education Survey.

KPI 12: ICT specialists

This indicator measures the share of employed ICT specialists as a proportion of all people employed. The definition of ICT specialist' is based on the International Standard Classification of Occupations (ISCO-08) and includes ICT service managers, ICT professionals, ICT technicians, and ICT installers and servicers.

In recent years, the indicator has shown a positive trend with constant growth, having reached in 2023 a share of around 4.8% of ICT specialists out of the EU workforce. However, the target for ICT specialists to make up 10% of the workforce by 2030 (20 million ICT specialists in absolute terms) seems unlikely to be met on current trends.

Figure 12: Proportion (%) of ICT specialists in EU workforce



Source: Eurostat

National data, 2023

BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV
5.4	4.3	4.3	5.9	4.9	6.7	6.2	2.4	4.4	4.7	4.3	4.1	5.4	4.4
LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	**EU**
4.9	8.0	4.2	4.7	6.9	5.3	4.3	4.5	2.6	3.8	4.2	7.6	8.7	**4.8**

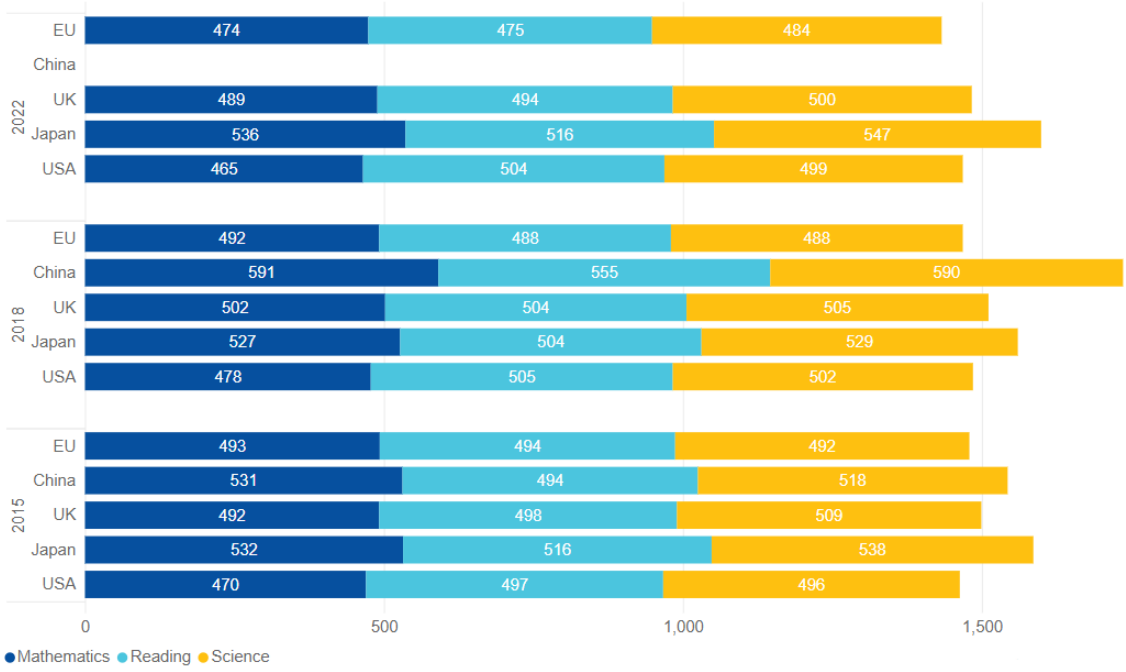
KPI 13: PISA score

This PISA score stems from the OECD's Programme for International Student Assessment (PISA) and measures 15-year-olds' ability in mathematics, reading and science.

The figure below shows the PISA scores for 2022, 2018 and 2015 for the EU, China, UK, Japan and the USA. The data for the EU are the average scores of the 27 Member States, weighted by the number of 15-year-olds enrolled in education.

Compared to 2015 and 2018, EU students performed worse in 2022 in all three disciplines, showing a declining performance trend.

Figure 13: Average test scores of 15-years-olds (PISA)



Source: OECD PISA database.

4. Decarbonisation of industry

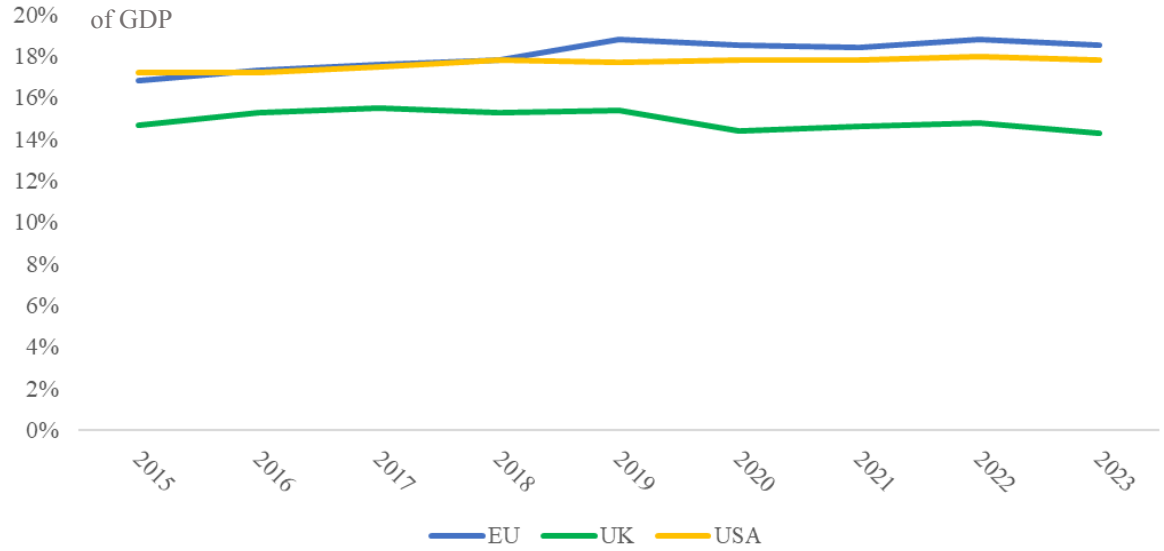
4.1. Access to private capital and investment

KPI 14: Private investment

Figure 14 shows the trend in private investment (gross fixed capital formation) as a share of annual GDP for the EU, the UK and the USA.

The data refer to the increase in the capital stock belonging to companies and individuals, including equipment, land, houses and other buildings, and intangibles like R&D. In 2023, private investment in the EU was around 19% of GDP, broadly stable over the past years, at pair with US and well ahead of levels in the UK.

Figure 14: Gross private investment (% of GDP)



Source: annual macroeconomic (AMECO) database

National data (2023)

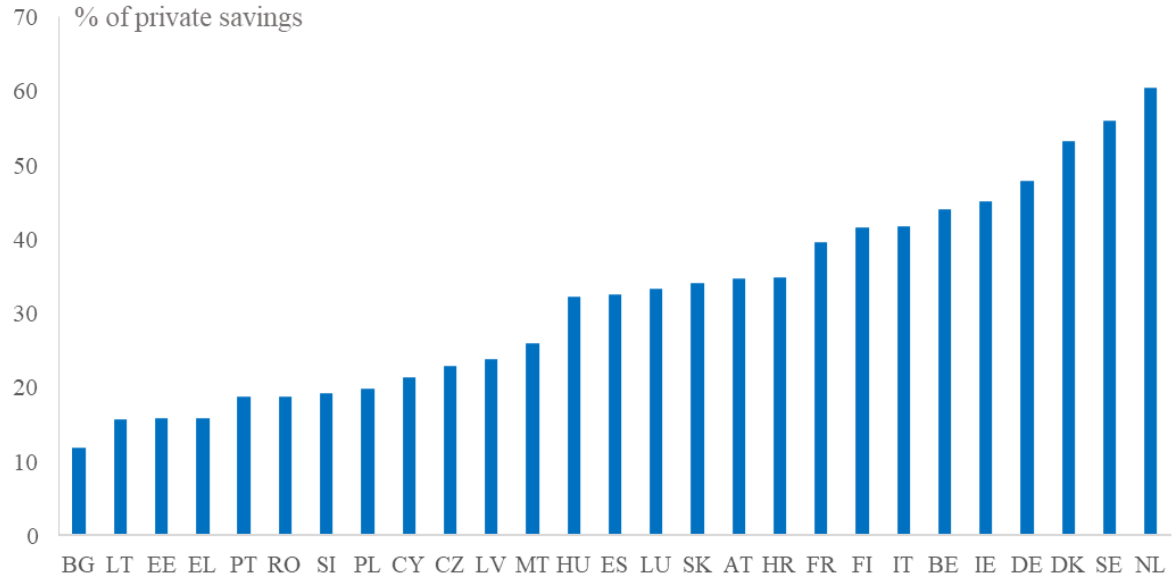
BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV
21.6	14.9	22.5	19.4	18.7	21.3	20.9	11.3	16.8	18.8	16.9	19.3	18.1	19.3
LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	**EU27**
19.5	13.4	20.9	15.2	17.0	21.2	12.7	17.5	21.6	16.1	18.8	19.1	19.8	**18.8**

KPI 15: Private savings invested in bonds, shares, investment funds and similar

This indicator measures the share of households' private savings that are invested in 1) bonds; 2) listed shares; 3) investment funds, 4) life insurances, and 5) pension funds, relative to the volumes of households' cash holdings and bank deposits. A value of 100% in figure 15 would indicate that the sum invested in such investment products is equal to the sum saved in bank accounts or held in cash. The indicator gives an idea of the share of savings activated to investments in the real economy, easing companies' access to finance.

As a benchmark, in the US, the ratio of private savings invested in such investment products to cash holdings and bank deposits is above 70%, which not even the best-performing EU Member States reach. The EU average ratio is well below this and stands at 43%.

Figure 15: Private savings invested in bonds, shares, investment funds and similar (%) relative to the sum of cash holdings and bank deposits.



Source: European Commission, DG FISMA.

4.2. Public investment and infrastructure

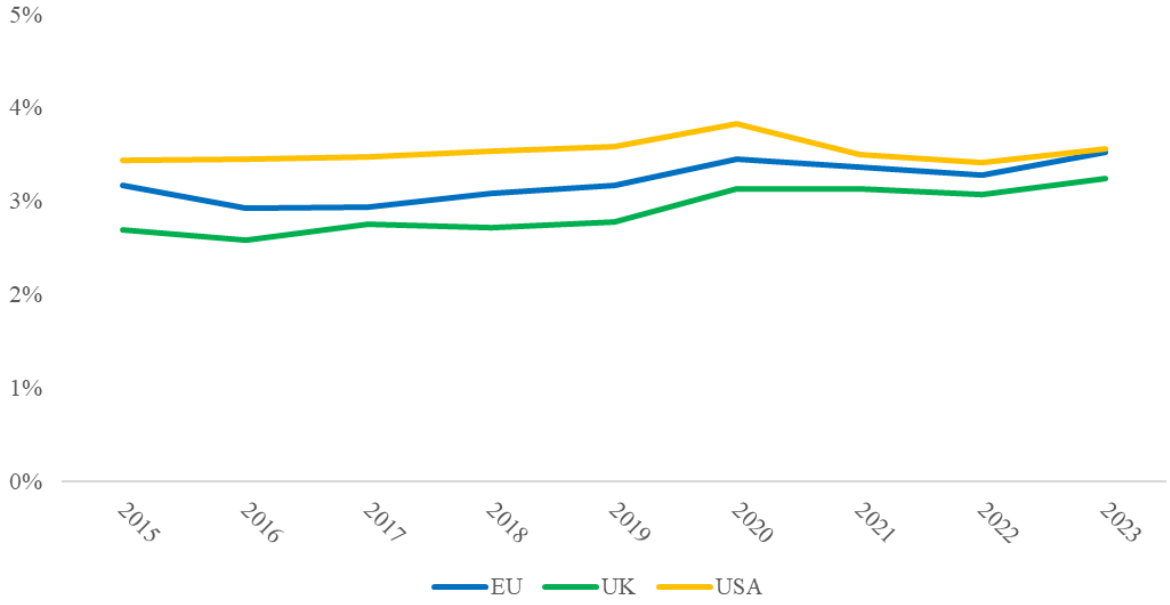
KPI 16: Public investment

Figure 16 shows the trend in public investment (gross fixed capital formation) as a share of annual GDP for the EU, the UK and the USA.

Public investment is a measure of how much money a country spends to increase the value of fixed assets (for example, road infrastructure, buildings, equipment). It should be noted that it does usually not cover capital transfers to public enterprises nor household spending on equipment or vehicles, which are accounted for as durable consumption goods.

In 2023, data indicate a public investment share in the EU of around 3.49% of GDP, having caught up to the US level.

Figure 16: Gross public investment (%of GDP)



Source: European Commission, annual macroeconomic (AMECO) database.

National data

BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV
2.84	3.83	4.85	3.14	2.83	6.62	2.32	3.88	2.96	4.28	5.56	3.18	3.14	5.60
LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	**EU**
4.22	4.72	5.13	3.45	3.15	3.68	5.06	2.60	5.38	5.23	3.56	4.05	5.24	**3.49**

4.3. Energy

KPI 17: Electricity prices for non-households consumers

This indicator tracks non-household retail electricity prices in the EU, the UK, the USA and Japan. It gives an idea of energy costs and cost-competitiveness, especially for those industries where electricity prices make up a significant proportion of total energy costs.

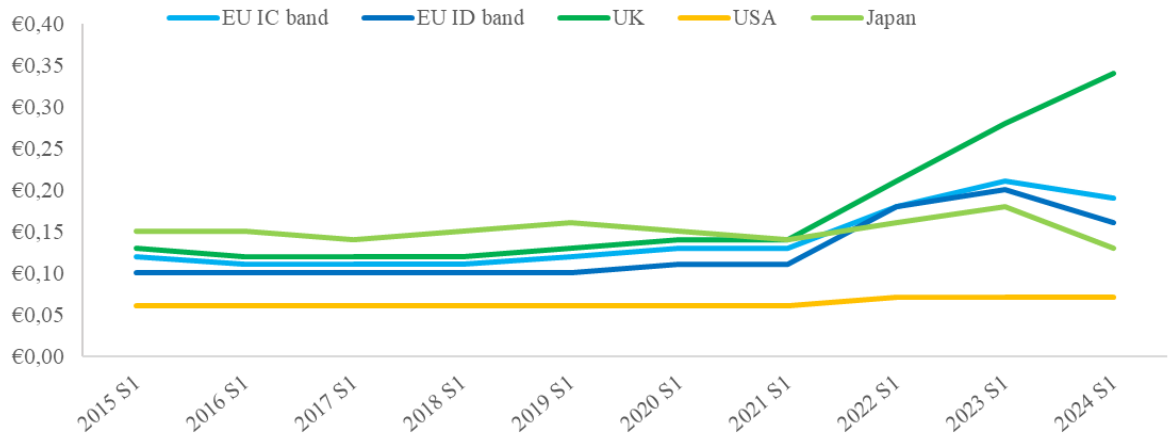
Non-household retail electricity prices in the EU are calculated using Eurostat data, broken down into two consumption bands. Prices are measured in EUR per kWh, excluding value added tax and other duties that companies can recover.

The IC consumption band refers to medium-sized consumers with an annual consumption of between 500 MWh and 2 000 MWh, i.e. the vast majority of small-sized enterprises in services and manufacturing sectors, and gives an insight into affordability.

The ID consumption band refers to large-sized consumers with an annual consumption of between 2 000 MWh and 20 000 MWh, such as in electricity-intensive manufacturing sectors, and gives an insight into international competitiveness.

The chart shows that non-household retail prices in the EU since 2022 are higher than in Japan and have for long been significantly higher than in the USA, only surpassed by the UK. The national data table also reveals stark differences amongst EU Member States.

Figure 17: Electricity prices for non-household consumers (EUR/kWh)



Source: Eurostat 'Electricity prices for non-household consumers'; US Energy Information Administration; UK Department for Energy Security and Net Zero; International Energy Agency.

National data (first half of 2024) in the EU ID price band

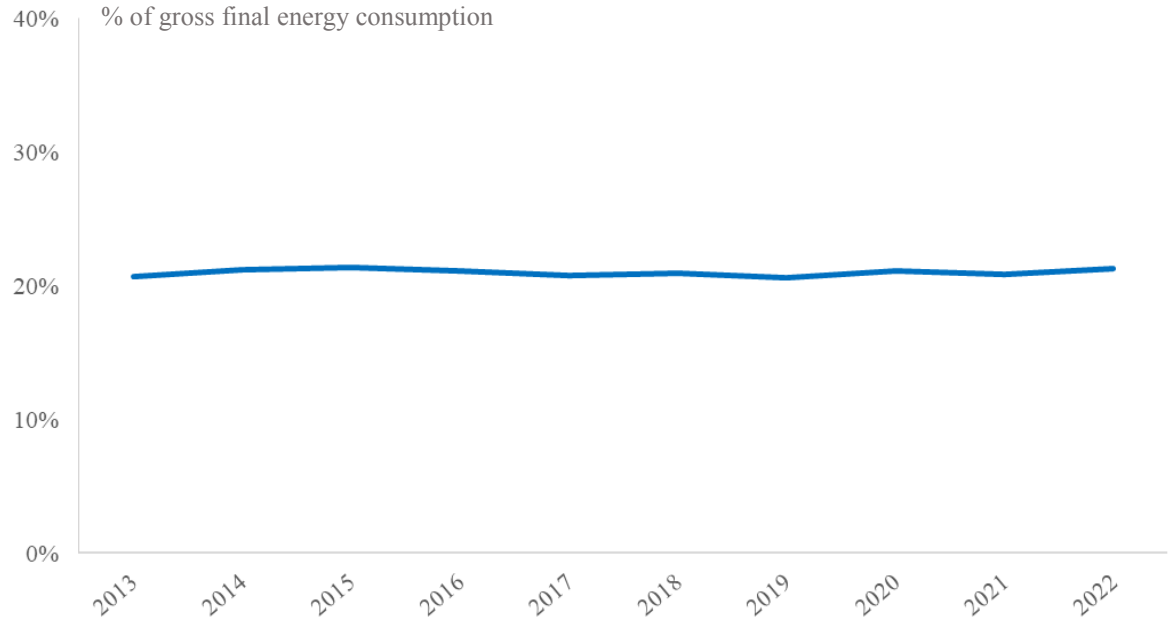
BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV
0.13	0.10	0.15	0.09	0.17	0.12	0.21	0.11	0.10	0.13	0.18	0.14	0.17	0.12
LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	**EU**
0.142	0.171	0.168	0.122	0.151	0.168	0.11	0.099	0.136	0.144	0.143	0.084	0.083	**0.16**

KPI 18: Electrification

This indicator shows the share of gross final energy consumption made up by electricity. The past decade has seen negligible improvement in this regard, with the degree of society's electrification remaining stable at around 20% of all energy consumed. However, it is expected that the share will progressively increase in view of increasingly strict emission rules and heavier carbon pricing, which will drive the electrification of industry, incentivise the use of heat pumps for heating and accelerate the uptake of electric vehicles.

The national data table shows significant differences amongst EU Member States, with the electricity share ranging between 14.3% and 38.4%, compared to the EU share of 21.3% in 2022.

Figure 18: Electricity share (%) of gross final energy consumption



Source: Eurostat

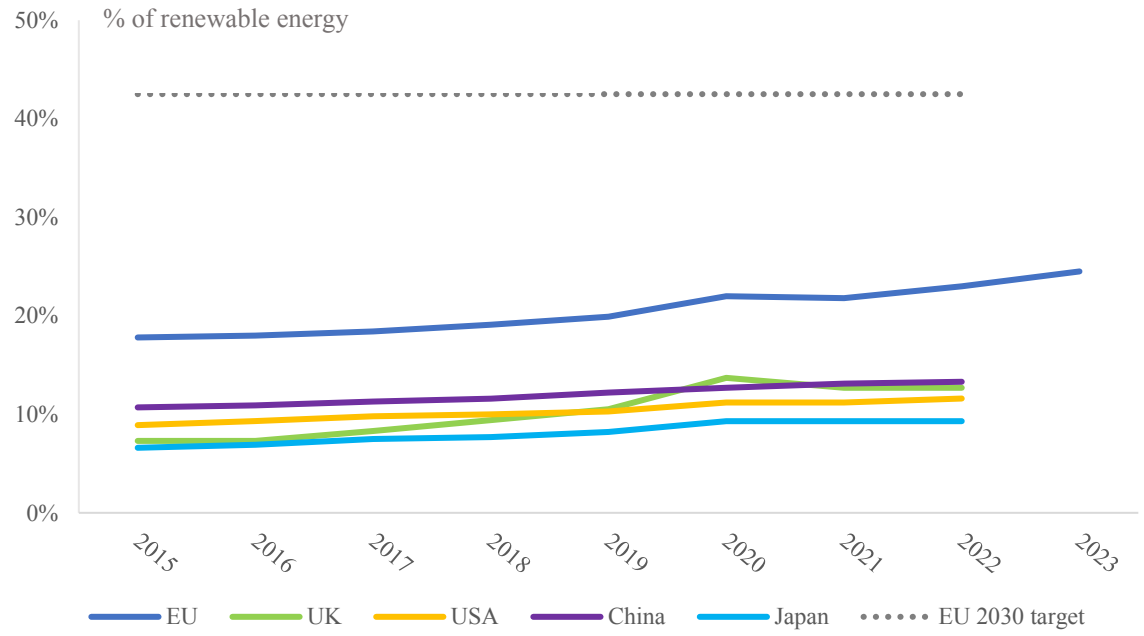
National data (2022)

BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV
18.1	25.1	18.6	19.6	19.5	21.5	23.2	26.3	23.4	25.1	20.2	22.0	25.1	14.3
LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	**EU**
15.2	17.3	18.3	38.4	18.0	20.6	15.9	24.4	15.1	23.1	17.8	27.1	32.5	**21.3**

KPI 19: Energy from renewable sources

This indicator measures the share of energy from renewable sources in gross final energy consumption. The revised Renewable Energy Directive sets a binding EU-wide target of 42.5% in 2030, with an indicative top-up of 2.5%. Renewable energy deployment has been steadily increasing in recent years and the EU has historically surpassed other major economies in this field. In 2022 energy from renewable sources represented 23% in gross final energy consumption, compared to shares of approximately 9-14% in China, the UK, USA and Japan.

Figure 19: Share (%) of renewable energy



Source: values for the EU are taken from Eurostat, those for the UK, USA, China and Japan have been provided by the European Commission's Joint Research Centre.

National data (2023)

BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	HR	IT	CY	LV
14.7	22.6	18.6	44.9	21.5	40.9	15.25	25.3	24.9	22.3	28.0	19.6	20.2	43.2
LT	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	**EU**
31.9	11.6	17.4	15.0	17.2	40.8	16.5	35.2	25.8	25.0	16.9	50.6	66.4	**24.5**

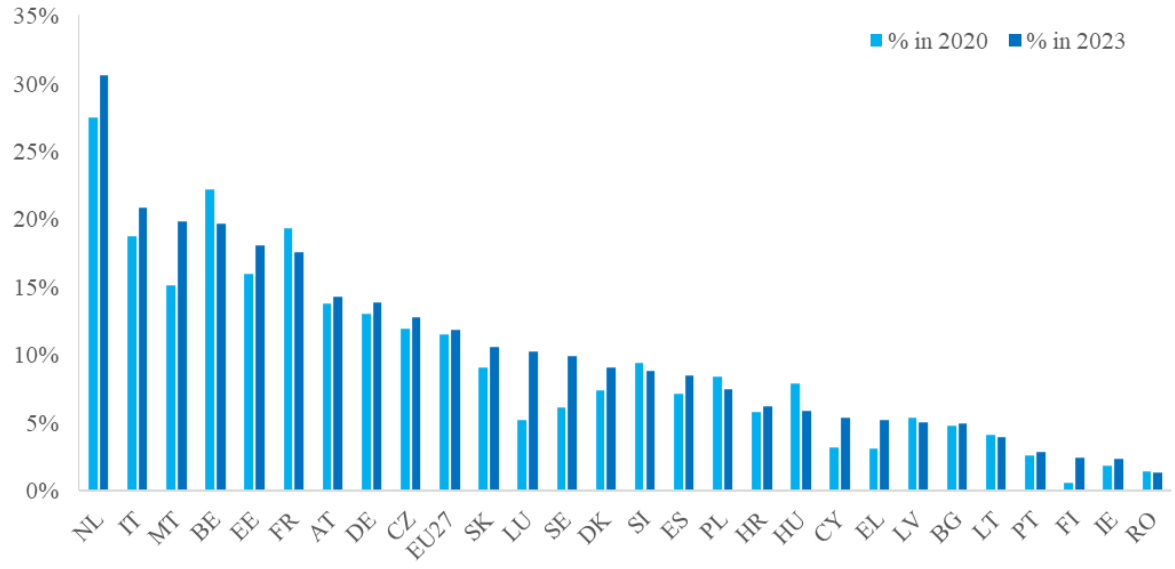
4.4. Circular Economy

KPI 20: Circular material use rate

This indicator measures the degree of the economy's circularity by looking at the rate of use of secondary materials on overall material demand. Secondary raw materials, replacing primary materials in the economy, reduce pressures on primary resources and limit waste. A higher rate indicates a higher degree of circularity.

Secondary raw materials accounted for only 11.8% of all materials used in the EU economy, slightly increasing between 2020 and 2023. This suggests that the linear model (no reuse of material) still prevails, and the EU is far from reaching the aspirational target of 23.4%, which requires doubling the circular material use rate by 2030.

Figure 20: Rate (%) of use of secondary materials



Source: Eurostat

5. Increasing security and reducing dependencies

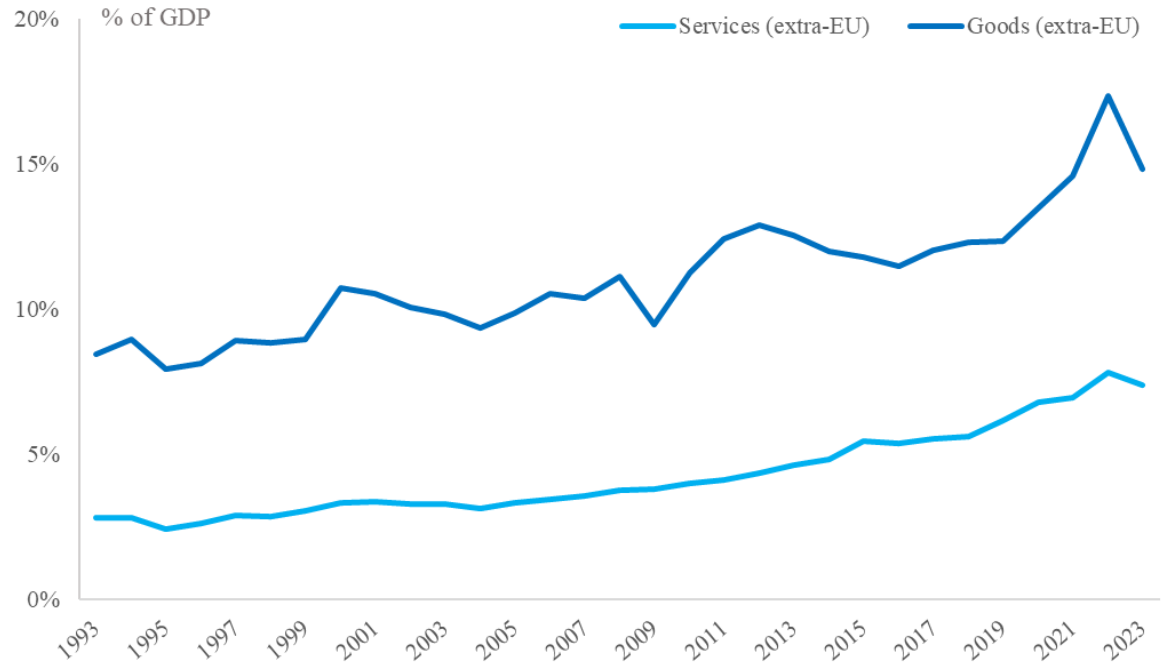
5.1. Trade and strategic dependencies

KPI 21: Trade with the rest of the world

This indicator tracks the trends in the EU's trade flows in goods and services with the rest of the world as a share of total EU GDP. Trade is measured by the average of imports and exports.

The figure shows that EU trade in services with the rest of the world has more than doubled since 1993, while trade in goods has almost doubled.

Figure 21: Trade with the rest of the world as a share (%) of GDP.



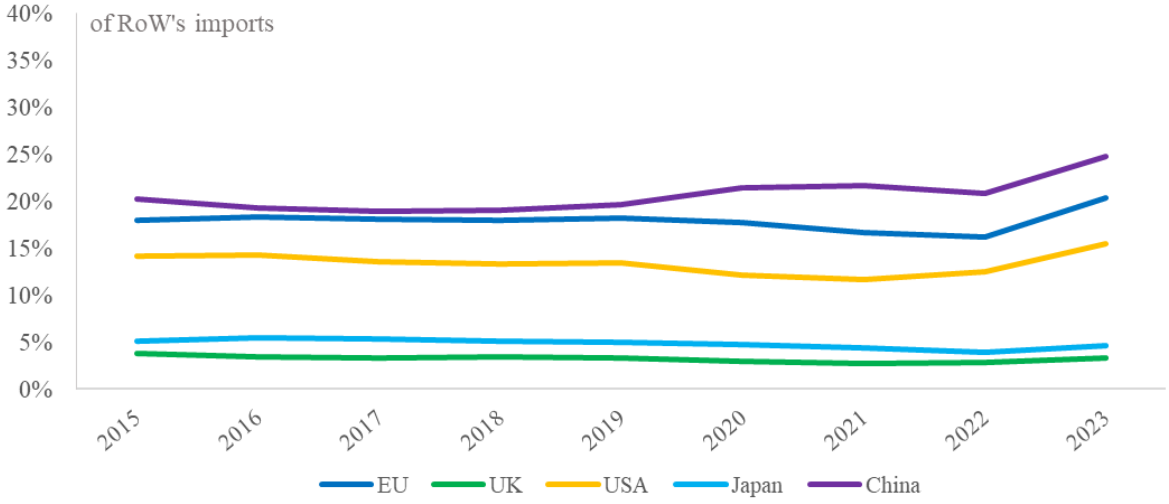
Source: Eurostat

KPI 22: Exports of goods and services

Figures 22a and 22b show the exports of goods and services of the EU, the UK, USA, Japan, and China as shares of the rest of the world's imports from 2015 to 2023. This helps evaluate the relative size of exports from the EU and those four countries in the global market. A higher percentage indicates a more significant role in the global economy, and a lower percentage suggests a smaller presence.

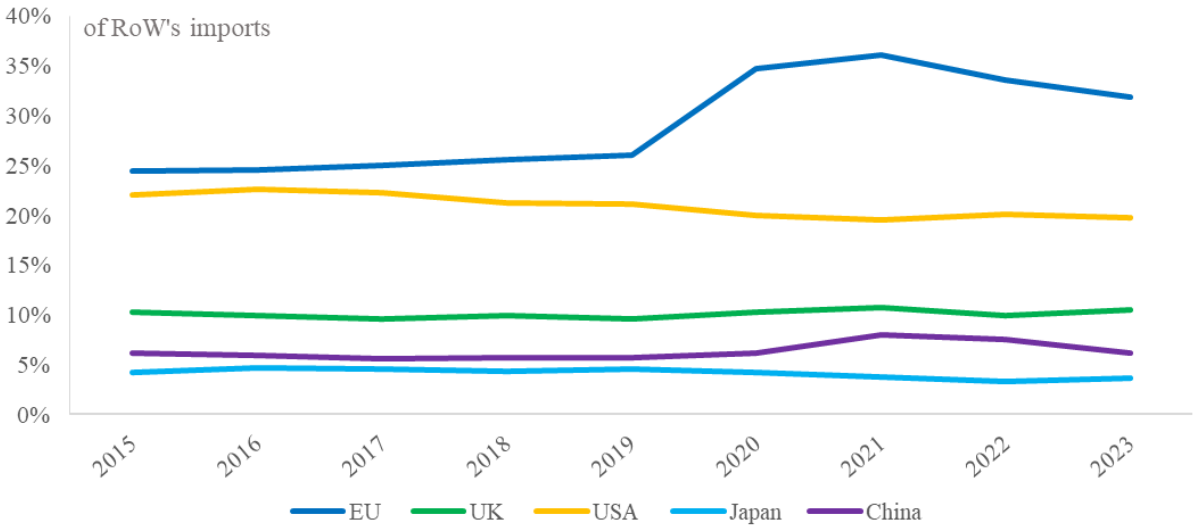
In 2023, China had the lead in the exports of goods with a share of about 25%, ahead of the EU (20%), the USA (15%), Japan (5%), and the UK (3%). The EU had the lead for services with a share of 32%, ahead of the USA (20%), the UK (11%), China (6%) and Japan (4%).

Figure 22a: Exports of goods as a share (%) of the rest of the world's imports.



Sources: UN Comtrade, World Bank, Eurostat

Figure 22b: Exports of services as a share (%) of the rest of the world's imports.



Sources: UN Comtrade, World Bank, Eurostat.

II. External Vulnerability Index

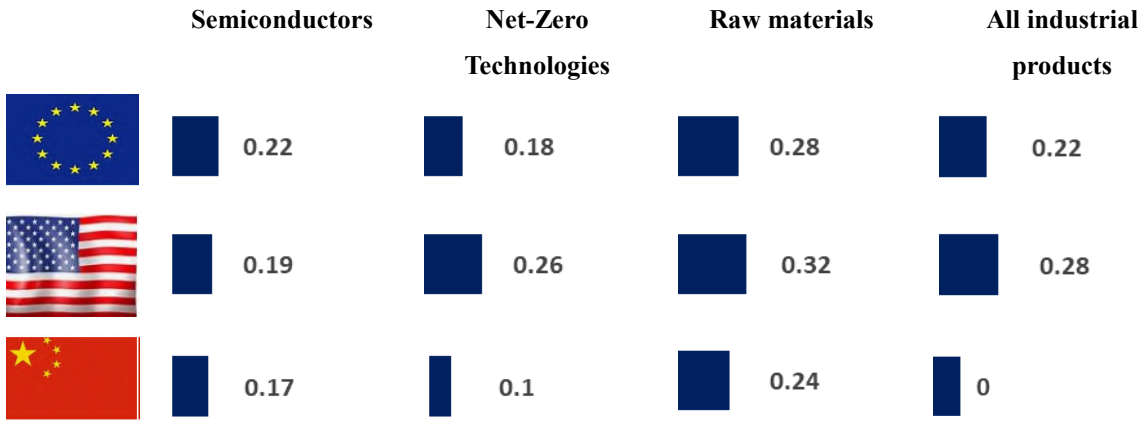
In today's interconnected global economy, understanding EU supply chains is paramount to inform policies that enhance economic efficiency and resilience. As one of the world's most open regions, the EU has reaped the benefits of global market access and well-integrated internal supply chains. However, this interconnectedness also exposes vulnerabilities that can significantly impact businesses, industries, and national economies, as evidenced by the far-reaching consequences of the COVID-19 pandemic, the energy crisis, and escalating geopolitical tensions.

A data-driven approach to monitor vulnerabilities is essential to support the effective risk management of EU supply chains. By tracking vulnerabilities, policymakers can develop timely, agile and responsive strategies, and navigate the complexities of a rapidly changing global market.

This Annex introduces the **External Vulnerability Index (EXVI)**[2], a monitoring tool that leverages trade data to identify and measure external vulnerabilities across various segments of the EU economy. As a composite indicator, the EXVI evaluates the vulnerability of products, sectors, and economies within the global trade system, analyzing trade dependencies and competitive positions, and quantifying economic susceptibility to external shocks. It provides a framework to monitor supply chain risks, enabling policymakers to make informed, targeted and timely decisions to strengthen resilience.

Based on the latest available data, findings from the EXVI indicator reveal that the EU is more exposed to external trade vulnerabilities than China, but less so than the United States. See Figure 1. A closer examination of critical areas such as raw materials, semiconductors, and net-zero technologies reveals that the EU is most vulnerable in raw materials. Furthermore, the indicator shows that the EU is more vulnerable than China in all three areas, while being more vulnerable than the United States only in the semiconductor supply chain.

Figure 23. External Vulnerability Index (EXVI) across strategic supply chains: EU, China and United States



Note: EXVI scores: 0= low vulnerability, 1=high vulnerability

Source: European Commission, based on the BACI database.

[2] More details on the EXVI methodology: Single Market Economic Papers - European Commission.

In terms of time dynamics, over the past decade, the EXVI indicator for the EU shows a slight decline in the vulnerability of critical raw materials, while vulnerabilities in the semiconductor and net-zero technology supply chains remained relatively stable. During the same period, China significantly improved its position in both the semiconductor and net-zero technology supply chains, except for raw materials. In contrast, the US strengthened its position in semiconductors but saw a decline in net-zero technologies and remained mostly stable in raw materials.

EXVI is based on two key pillars, and designed to evaluate the external vulnerability of products, sectors, and countries within the global trade framework. It quantifies economic vulnerabilities to external shocks by analysing trade dependencies and trade competitive positions. High scores, with a maximum of 1, signal high risks of foreign vulnerability, while low scores, with a minimum of 0, indicate lower risks of external vulnerability.

The **first pillar** focuses on understanding how much a country depends on foreign imports and how concentrated those imports are. Countries that rely heavily on imports from just a few trading partners are more vulnerable to risks such as supply chain disruptions or new trade barriers. There are two key indicators used to measure this risk:

- A measure of how diversified a country's imports are, by examining the number of trading partners. This builds on the Herfindahl-Hirschman Index (HHI). A higher HHI means that the country depends on fewer countries, making it more vulnerable to external disruptions.
- The size of a country's imports compared to its exports, as captured by the Trade Ratio (TR). A ratio higher than 1 means the country is importing more than it exports (it runs a trade deficit), while a ratio lower than 1 means the country exports more than it imports (it has a trade surplus).

The two indicators in pillar 1 permit to classify products into four categories, based on the combination of the risk levels (higher or lower) of each indicator. See Figure 2 (left panel). The most concerning situation occurs when a country relies heavily on foreign markets for a product and has fewer options for diversifying its suppliers. Other categories show varying levels of risk, from products with potential for diversification to those with low trade dependence overall.

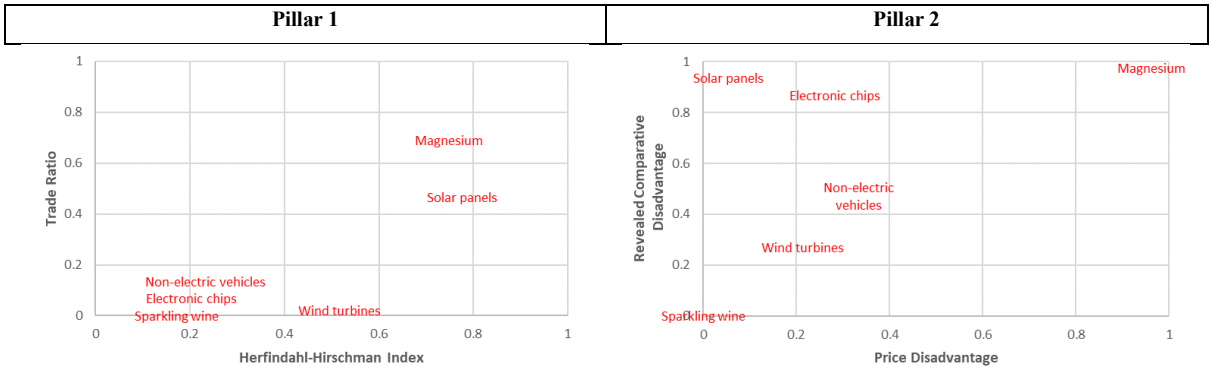
The **second pillar** examines the risks that a country faces in global trade markets, drawing on two key indicators:

- How non-competitive a country is in exporting a specific product compared to others, as measured by its Revealed Comparative Disadvantage (RCD). A higher value means the country is less competitive, driven by a comparative disadvantage in that product. On the other hand, lower values show the country is more specialised in exporting that product.
- How the prices of a country's exports compare to its imports, as measured through the Price Competitiveness Index (PCI). A higher price for exports compared to imports may point towards prices disadvantage, making the country more vulnerable in foreign markets. However, higher prices can also reflect higher quality, which is not necessarily a weakness. To assess risk, the PCI needs thus to be used in combination with the RCD indicator above.

The risk positions on these two indicators (higher, lower) are used to classify products into four groups based on vulnerability, due to a weak global position. The highest risk occurs when a country's products are both more expensive and less competitive globally. See Figure 2 (right panel). Other categories indicate lower vulnerability, such as products that are competitively priced but lack strong export specialisation, products that have both strong export specialisation and competitive prices, or products with high prices but a strong global comparative advantage.

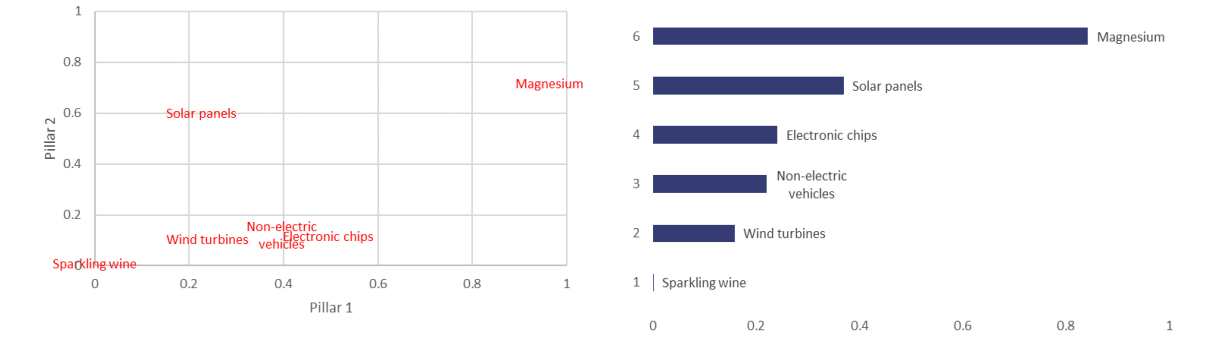
Finally, to ensure consistency, the methodology normalises the indicators within the 0-1 range. It permits to aggregate the indicators under each pillar, treating them equally and ensuring that both are important in measuring risk. This also allows to aggregate the two pillars into the EXVI. Figure 3 provides an example of Pillar 1 and 2 scores and the EXVI for selected products. Both individual products and product groups can be compared across the EU, US, and China, as well as over time.

Figure 24. ***Examples of product scores in Pillar 1 and Pillar 2***



Source: European Commission, based on the BACI database.

Figure 25. ***Selected products: EXVI scores for the two pillars, and absolute scores***



Source: European Commission, based on the BACI database.

Annex 2

Overview of resilience measures by selected global players

I. Introduction

Recent crises such as the COVID-19 pandemic and Russia's war of aggression against Ukraine have highlighted the increasing vulnerability of global value chains to a diverse number of disruptions, drawing attention to the importance of strengthening the resilience of strategic supply chains and reducing dependencies. To this end, governments all over the world are increasingly adopting measures to secure their supply chains and preserve the competitiveness of their industries.

To increase our understanding of today's emerging context of 'geopolitics of supply chains', this Annex aims to give a non-exhaustive **picture**[2] **of the main measures** taken by some of the EU's main international partners to reduce their strategic dependencies, particularly on critical raw materials, and make their supply chains more resilient, especially in view of the digital and green transitions.

Gaining a better understanding of the means employed by these selected international players to strengthen their supply chains can help the EU to safeguard its critical supply chains and strengthen its open strategic autonomy as well as bolster the competitiveness of its industries in strategic areas. Moreover, it sheds light on measures that could also potentially expose EU supply chains to risks by, for example, encouraging delocalisation and future disinvestment decisions.

With a strong focus on measures adopted **since the COVID-19 pandemic** (mostly since 2020) – considered as a pivotal shift for countries' efforts in this direction – the inventory below lists the main resilience measures undertaken by some of the EU's main trading partners (the **US**, the **UK**, **Canada**, **Japan**, **China, Singapore**, the **Republic of Korea**, **India**, **Australia**, and **Taiwan**) that the Commission is aware of at the time of adoption of this document and depending on the level of information for each country. Therefore, **the actual number of resilience measures adopted by international partners could be far greater.**

After examining the collected data, the measures taken by these non-EU countries have been classified into six specific categories and a more detailed description is provided for the most recently adopted measures. Within each category and for each international partner, measures have been listed and grouped thematically whenever possible – from broader, usually cross-sectoral measures to sector- or product-specific ones.

1. Monitoring, gathering and forecasting of key supply chain information from public authorities and industry.
2. Financial and fiscal support for investment, R&D, etc. in strategic sectors / value chains.
3. Prioritisation mechanisms of domestic supply of goods and services in strategic sectors.
4. Stockpiling of critical inputs.
5. Trade and investment measures: tariffs, export restrictions, anti-coercion measures, foreign direct investment control, etc.
6. International partnerships.

These categories have been chosen as they mirror policy instruments that have been employed internally and externally by the EU to make supply chains more resilient and diverse and to

anticipate, prepare for and respond to disruptions. Their scope is deliberately granular to easily classify and regroup together non-EU countries' measures according to each policy's rationale and objectives.

II. Overview of resilience measures by category and by countries

1. Monitoring, gathering and forecasting of key supply chain information from public authorities and industry

1.1 United States

- On 14 June **2024**, President Biden issued an **Executive Order on White House Council on Supply Chain Resilience**, to bolster US supply chain resilience and foster 'resilient, diverse, and secure supply chains. The Order encourages collaboration with allies and partners to promote collectively economic and national security, encourage innovation and strengthen the capacity to respond to and recover from international disasters and emergencies. It supplements Executive Order 14017 on America's Supply Chains dated 24 February 2021 by formalising the **White House Council on Supply Chain Resilience**, which consists of 30 Cabinet-level members and senior administration officials. Its objectives include: (i) recommending procedures and best practices for inter-agency cooperation and data collection and analysis; (ii) identifying budgetary and other resources necessary to support supply chain resilience and mitigate risks, shocks and disruptions; (iii) recommending administrative actions to further supply chain resilience; (iv) coordinating with other inter-agency bodies managing policy areas that affect the integrity of supply chains; and (v) ensuring that operations related to building critical supply chain resilience promote a fair, open and competitive marketplace. The Order also requires the White House Council on Supply Chain Resilience to conduct a **quadrennial supply chain review of industries critical to national or economy security**.
- In **2023**, the Department of Commerce created a **Supply Chain Center (SCC)**, which is: (i) integrating industry expertise and data analytics to develop innovative supply chain risk assessment tools; (ii) coordinating case studies on selected critical supply chains; and (iii) collaborating with international partners on mutual supply chain priorities. The SCC has developed a diagnostic supply chain risk assessment tool (**SCALE**) to improve the US government's analytical capacity to understand and address structural supply chain risks across the US economy. It compares risks across industries and provides an in-depth assessment of these risks' drivers. In addition to this, the Department of Commerce announced that the US government will engage in different ways with industry and stakeholders to discuss supply chains risks linked to sectors such as artificial-intelligence data centres, the chemicals industry and emerging technology.
- **Executive Orders 13953 (Addressing the Threat to the Domestic Supply Chain from Reliance on Critical Minerals From Foreign Adversaries and Supporting the Domestic Mining and Processing Industries)** of 30 September 2020 and **13817 (A Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals)** of 20 December 2017. EO13953 entrusted the Secretary of the Interior with the task of producing every 180 days a report on critical mineral supplies and potential risks from foreign powers. EO13817 launched an in-depth review of critical mineral supply chains necessary for the US economy and national defence and investigated expanding mining production in the US.

- The Trade Expansion Act of **1962**, as amended, gives the Department of Commerce the authority to conduct **Section 232 investigations**. These investigations aim to determine the potential **impact of imports on the national security** of the US. Under the first Trump Administration, 'Section 232 investigations' served to collect market information from companies and stakeholders on aluminium and steel, on the dominant role of China in the supply chain, and on the risks associated with the US's import dependency on China, especially for sintered magnets (100%).
- The **Defense Production Act (DPA)** (**1950**) allows the US government to obtain information from industry for national security purposes. Since 1950, it has been reauthorised over 50 times by the US Congress, but the majority of its authorities will expire on 30 September 2025, unless reauthorised. Under Section 705 of the DPA, agency heads with delegated authority are empowered to obtain information from industry as needed to effectively administer the DPA. This includes two primary mechanisms: (i) industry studies – agency heads can conduct industry studies to evaluate the capabilities of the US industrial base in supporting national defence; and (b) subpoenas – agency heads can issue subpoenas to obtain necessary information from industry.

1.2 United Kingdom

- The UK **Critical Imports and Supply Chains Strategy,** adopted in **January 2024**, sets out how the UK government intends to help businesses build secure and reliable supply chains in areas that are vital to the UK's economic prosperity, national security, and the delivery of essential services. It supplements the **Advanced Manufacturing Plan**, adopted in November 2023 (see Section 2), and it builds on and expands the existing sectoral strategies, namely the **Critical Minerals Strategy (2022)** and the **Semiconductor Strategy (2022)**. It aims to ensure the resilience and security of the UK's supply chains for a wider range of critical imports, including medicines, minerals, and semiconductors. The critical sectors identified are chemicals, civil nuclear, communications, defence, emergency services, energy, finance, food, government, health, space, transport, and water. Moreover, the growth sectors identified are digital technology, green industries, life sciences, advanced manufacturing and creative industries. In order to reduce dependency on single sources for critical imports, the strategy promotes **diversifying supply chains by establishing new trade partnerships and investing in domestic production capabilities**. This approach is supplemented by the creation of **strategic reserves** of critical materials, providing a buffer against potential supply chain disruptions (see Section 4). Transparency and traceability are also key components of the strategy. Additionally, it supports innovation, R&D and international cooperation. Following the July 2024 election, on **14 October 2024**, the new UK government published a green paper setting out new plans to deliver 'Invest 2035: The UK's Modern Industrial Strategy'.
- Building on the 2021 Integrated Review, which included a supply chain resilience framework based on five areas (i.e. diversification, international partnerships, stockpiling and surge capacity, onshoring, and demand management), **the 2023 Integrated Review Refresh** outlines how the UK government needs to respond to the deteriorating global security environment. It identifies energy security, economic security, and democratic and wider societal resilience as priority areas to address the UK's vulnerabilities. The 2023 Refresh emphasises economic security, whereas the 2021 Review aimed to identify whether it may be beneficial to manage the demand for components or goods considering substitutes and alternatives, innovation, and circularity.

- In October **2024**, the UK government introduced an interim Advisory Council, ahead of setting up the **Industrial Strategy Council** (announced in the King's Speech – July 2024) on a statutory footing, hence permanently and independently. The council will inform the development of the UK's industrial policy through its expertise and latest evidence, working with business, trade unions, devolved governments, local leaders, academia and stakeholders.
- In October **2024**, the UK government announced the set-up of a **new supply chain task force** that will work to assess where supply chains critical to the UK's economic security and resilience –could be vulnerable to disruption. The task force will ensure that government works with business to address these risks, building the conditions required to deliver secure growth.
- In its **2023** Integrated Review, the UK announced the set-up of a **Task and Finish Group on Critical Minerals Resilience** for UK industry, to investigate vulnerabilities and resilience opportunities across value chains. In December 2023, the group issued a report containing an analysis of critical minerals' sector risks and recommendations for the UK's supply chain resilience. The report identifies as a key area of strength for the UK the midstream of critical raw material value chains, as well as the opportunity to increase material circularity. It also identifies three areas that can further improve the UK's resilience: research and innovation, supply chain transparency, and applying circularity principles.
- In July **2022,** the UK set up its first **Critical Minerals Intelligence Centre**, which provides continuous intelligence on the supply of and demand for critical minerals. The centre advises the government on economic, environmental, ethical, and geopolitical issues linked to supplies of critical mineral resources. The centre has already published reports on the UK's future demand for critical raw materials for electric-vehicle batteries, and on the UK's dependency on 26 critical materials.

1.3 Japan

- The five chapters of **Economic Security Promotion Act (ESPA**), an umbrella instrument adopted in May 2022, and intended for full implementation within the following 2 years, are: (I) General Provisions Including the Formulation of a Basic Policy; (II) Systems for Ensuring Stable Supply of Critical Products; (III) Systems for ensuring Stable Provision of Essential Infrastructure Services; (IV) System for Enhancing Development of Specified Critical Technologies; (V) System for Non-Disclosure of Selected Patent Application. As part of the ESPA, the Japanese government selected 11 materials as **'specified critical materials (SCMs)'** which are strategically important for the country. Measures to ensure a stable supply of these products were included in the comprehensive economic stimulus package in 2022. The list covers 11 sectors and 4 ministries (list below). For each of these critical products, the ministries have published **sectoral policy guidelines** that: (i) analyse their importance for Japan's economic security, external dependencies and supply chains; (ii) lists all existing sectoral policies and measures; and (iii) explains why supplementary measures are necessary on economic security grounds. In November 2023, the government announced its intention to designate additional critical commodities. The list of critical products is evolving with the upcoming decisions to designate **new critical products such as uranium** (as one of the critical minerals) and **multilayer ceramic capacitors** (MLCCs) by the end of 2023.

- **Ministry of Economy, Trade and Industry (METI) (8)**: **semiconductors, cloud computing, storage batteries,** permanent magnets**, critical minerals,** machine tools and industrial robots**,** aircraft **part materials and LNG**.
- **Ministry of Land, Infrastructure, Transport and Tourism (MLIT) (1)**: maritime transport / shipping equipment (engines, propellers, navigational equipment (sonar) etc.); to support maritime transport.
- **Ministry of Agriculture, Forestry and Fisheries (MAFF) (1)**: **fertiliser raw materials.** The establishment of a stockpiling system and state support on storage fees for fertilisers held by private companies (e.g. fertiliser manufacturers) will be considered.
- **Ministry of Healthy, Labour and Welfare (MHLW) (1):** antimicrobials.
- Under the **Economic Security Promotion Act** (**ESPA) (2022)**, when business operators (including foreign operators) engaged in the production, import or sale of 'designated critical commodities' apply to the governmental support programme (including for financial support), the operators are required to report data on the production, import, sale, procurement or storage of such commodities or related raw materials, and may be subject to on-site inspections. Additionally, the government will screen 'critical equipment' owned by 'designated core infrastructure operators' in 14 'core infrastructure sectors': (i) electricity; (ii) gas, ; (iii) oil; (iv) wate; (v) telecoms; (vi) broadcasting ; (vii) post; (viii) finance; (ix) credit cards; (x) railways; (xi) land freight; (xii) sea freight; (xiii) aviation; and (xiv) airports.
- **In June 2024**, following a reorganisation, METI created a new **Economic Security and Cooperation Bureau, which will be responsible for the overall coordination of economic security work** within the Ministry. The new structure will work closely with other offices across METI, including the Manufacturing Industries Bureau which covers a number of strategic industrial sectors including semiconductors, digital, automotive or space & defence.
- In October **2022**, METI (the Ministry of Economy, Trade, and Industry) launched a new **Resource Autonomous Economy Strategy Planning Office** and new **study group** to design a pro-growth economy with circular economy and resource autonomy. The study group will explore ways to encourage industries to use circular resources against the backdrop of limited domestic resources, increasing global demand for critical **raw materials, unexpected supply disruptions and economic fallout from the weakening yen.**

1.4 Australia

- The **2022** Security Legislation Amendment (Critical Infrastructure Protection) Act amends the 2018 Security of Critical Infrastructure Act (the 'SOCI Act') to build on the existing framework and uplift the security and resilience of Australia's critical infrastructure. The SOCI Act contains definitions that outline each of the 11 critical infrastructure sectors. Definitions were developed in consultation with industry to ensure clear articulation of what constitutes a critical infrastructure asset within each sector.
- In **2021**, the Australian government created the Office of Supply Chain Resilience under the Prime Minister. The office is dedicated to monitoring Australian supply chains' resilience. Its tasks cover health, safety and wellbeing, economic stability and viability, national security, and international partners. The office advises the Australian government on supply chain risks and potential measures to improve resilience.

1.5 Republic of Korea

- The Republic of Korea's **Framework Act on Supply Chain Stabilization Support for Economic Security** took effect on 27 June **2024**. The Act focuses on institutionalising the entire supply chain process, including risk detection, prevention, and management. The Act requires: (i) the set-up of a national basic scheme for supply chain management and an integrated early warning system; (ii) the creation of a state fund for business support; and (iii) the set-up of a pan-governmental Supply Chain Stabilization Committee that will ensure policy coordination on critical industrial supply. Furthermore, the Act requires the government and the Bank of Korea to create a Supply Chain Stabilization Fund to be managed by KEXIM Bank.
- Since **2022**, advance warnings on supply chain and economic security issues are provided by: (i) the **Economic Security Centre managed by the Ministry of Foreign Affairs**; (ii) the Global Supply Chain Analysis Center managed by the Ministry of Trade, Industry and Energy; and (iii) the Office of Economic Security managed by the Office of the President. Since 2021, the Republic of Korea has had an early warning system in place to monitor 20 key raw materials to ensure stable supplies.

1.6 Singapore

- To oversee the longer-term work of responding to the structural shifts in Singapore's economy, the **Emerging Stronger Taskforce (EST)** was set up in May 2020 under the Future Economy Council. Chaired by the Minister for National Development, the EST comprised business leaders with experience in areas such as digitalisation and connectivity, and with perspectives on the global economy. Under the EST, nine industry-led coalitions ('Alliances for Action') were formed to work in partnership with the government to prototype ideas in areas of opportunity for Singapore and to address common challenges.
- In **2009**, the **Centre for Strategic Futures** was set up within the Prime Minister's Office as a foresight department whose mission is to position the Singaporean government so that it can navigate emerging strategic challenges and harness potential opportunities. In March 2023, the **Future Economy Planning Office** was instead set up within the Ministry of Trade and Industry. The office's key roles include developing industry transformation maps to secure Singapore's economy resilience.

1.7 India

- In June 2023, the Ministry of Mines published a **report** on the identification of critical minerals. It identified a comprehensive list of **30** critical minerals, taking into account the needs of sectors such as defence, agriculture, energy, pharmaceuticals and telecoms. The report recommended the creation of a Centre of Excellence for Critical Minerals (CECM) in the Ministry of Mines, charged with the tasks of updating every three years the list of critical minerals for India as well as identifying more efficient ways for discovering next generation critical mineral deposits. The identification of minerals that are critical for India's manufacturing industries (electronics, technology, telecoms, white goods, solar, automobiles, batteries) is relevant for the ongoing implementation of the production-linked

incentives (PLI) scheme (see section 2 below) that supports the Aatmanirbhar Bharat Abhiyan ("Self-sufficient India") initiative.

2. Financial and fiscal support to investments, R&D etc., in strategic sectors/values chains

2.1 United States

- The Biden Administration passed three major laws that all aim to provide strategic sectors with funding/subsidies, tax incentives, support for investment, R&D, etc.
    - **Inflation Reduction Act (IRA):** approx. USD 818 billion (EUR 777 billion). The IRA directs nearly USD 400 billion (EUR 378 billion) in federal funding to clean energy, with the goal of substantially lowering the nation's carbon emissions by the end of this decade. The funds will be delivered through a mix of tax incentives, grants, and loan guarantees. Clean electricity and transmission command the biggest slice, followed by clean transportation, including electric-vehicle incentives. Under the IRA, energy projects that meet the domestic content requirements may be eligible for bonus points on their production tax credit (PTC) or investment tax credit (ITC).. This results in a 2-10% increase in their PTC/ITC, depending on the specific project. The additional tax credits can be substantial, potentially amounting to tens of millions of dollars. The IRA stipulates that a 10% bonus credit is available for a 'qualified facility' if the taxpayer can provide certification that any steel, iron, or manufactured components of the facility were produced in the US. The IRA significantly revised the existing Section 30D credit for consumers purchasing clean energy vehicles. The credit bonus can be worth up to USD 7 500 (EUR 7 091).
    - **Bipartisan Infrastructure Law**: approx. USD 1.2 trillion (EUR 1.13 trillion) over 10 years. This includes USD 550 billion (EUR 520 billion) in new spending during the next 5 years to improve the surface-transportation network (USD 284 billion (EUR 268 billion)) and society's core infrastructure (USD 266 billion (EUR 251 billion)).
    - **CHIPS and Science Act**: approx. USD 280 billion (EUR 265 billion) until 2032. The majority – USD 200 billion (EUR 189 billion) – is for scientific R&D and commercialisation. Some USD 52.7 billion (EUR 50 billion) is for semiconductor manufacturing, R&D, and workforce development, with another USD 24 billion (EUR 23 billion) worth of tax credits for chip production. There is USD 3 billion (EUR 2.8 billion) slated for programmes aimed at leading-edge technology and wireless supply chains.
- Together, the IRA, the Bipartisan Infrastructure Law, and the CHIPS and Science Act are projected to inject more than USD 2 trillion (EUR 1.9 trillion) into the US economy.

- In April **2022**, the US **Export-Import Bank** launched the **Make More in America Initiative** to support 'export-oriented domestic manufacturing projects', following the White House recommendations contained in one of the reports per Executive Order 14017 'America's Supply Chains' – now replaced by the Executive Order on White House Council

on Supply Chain Resilience (see Section 1). Under the initiative, the Export-Import Bank is to make medium- and long-term loans, loan guarantees and insurance available for export-oriented domestic manufacturing projects, with a particular focus on sectors such as semiconductors, biotech and biomedical products, renewable energy, and energy storage.

- In March **2024**, the US Department of Agriculture released a plan that will boost **biomass supply chain resiliency** for domestic biobased product manufacturing, while also advancing environmental sustainability and market opportunities for small and mid-sized producers. This plan is one of the key deliverables of **Executive Order 14081**, issued in 2022, setting goals and priorities to catalyse action inside and outside of government to advance America's domestic bioeconomy.

2.2 Canada

- The 2023 federal budget presented in March **2023** earmarks **CAD 80 billion (EUR 54 billion) worth of tax credits and infrastructural investment over 11 years** to encourage investment in low-carbon electricity, manufacturing, and other green industrial activity (the **'Made in Canada plan'**). The combined value of the tax credits, which are set out below, is CAD 65 billion (EUR 44 billion).
    - The **clean electricity investment tax credit**, with a total cost of CAD 25.7 billion (EUR 17.4 billion) over 11 years. This 15% credit targets investment in non-emitting electricity generation systems (including large-scale hydro- and nuclear facilities), abated natural gas-fired electricity generation, stationary, fossil fuel-free storage systems, as well as electricity transmission equipment.
    - The **clean technology investment tax credit.** Announced in the 2022 Fall Economic Statement, this 30% tax credit will promote investment in areas like wind, solar, small modular nuclear reactors, and geothermal energy. Its 5-year cost is estimated at CAD 6.7 billion (EUR 4.3 billion). Companies cannot draw on both the clean electricity investment tax credit and the clean technology investment tax credit for the same project.
    - The **investment tax credit for clean hydrogen**. Announced in the 2022 Fall Economic Statement, the credit will vary between 15% and 40% of project capital costs, depending on the lifecycle carbon intensity of the produced hydrogen. This credit is expected to cost CAD 5.6 billion (EUR 3.8 billion) over the next 5 years, and another CAD 12.1 billion (EUR 8.2 billion) between 2028-2029 and 2034-2035.
    - The **carbon capture, utilisation and storage investment tax credit** has been extended. Announced in the 2022 budget, this update will add CAD 516 million (EUR 349 million) to the credit's CAD 4.1 billion (EUR 2.8 billion) total over the next 5 years.
- The tax credits are supplemented by a CAD 15 billion (EUR 10.1 billion) **Canada Growth Fund**. To de-risk private investment, the fund uses 'contracts for difference', which provide a governmental guarantee for the future price of, for example, carbon or hydrogen. The fund started investing in October 2023.
- In addition, the budget launches:
    - an **extension of the reduced tax rates** for zero-emission technology manufacturers; and

- a **CAD 500 million (EUR 338 million) top-up for the Strategic Innovation Fund** to support the development and application of clean technologies in Canada.

- On 24 March **2023**, Canada presented the **Critical Minerals Infrastructure Fund** – a new fund announced in the 2022 budget that will allocate CAD 1.5 billion (EUR 1 billion) for energy and transportation projects needed to unlock priority mineral deposits. The new fund will supplement other clean energy and transportation support initiatives, such as the Canada Infrastructure Bank and the National Trade Corridors Fund, as well as other federal programmes that invest in critical mineral projects, such as the Strategic Innovation Fund.

2.3 United Kingdom

- As anticipated in the consultation/green paper '**Invest 2035**' published in October **2024**, the UK's Modern Industrial Strategy to be launched in spring 2025 will focus on stimulating investment and activity in eight key sectors, which 'offer the highest growth opportunity for the economy and business' (i.e. advanced manufacturing, clean energy industries, creative industries, defence, digital and technologies, financial services, life sciences, and professional and business services). These will get bespoke sector plans, which will also identify key subsectors and cross-cutting enablers.
- At the international summit held on 14 October **2024**, the creation of a **National Wealth Fund** was announced, building on the existing UK Infrastructure Bank to spur investment in the UK's green and growth industries. It will manage GBP 27.8 billion (EUR 33.4 billion) in public investment in total.
- As part of the UK government's commitment to decarbonising the power sector by 2030, the **Great British Energy Bill** (**2024**) is to enable the Secretary of State for Energy Security and Net Zero to designate a company as **Great British Energy (GBE).** According to the explanatory notes to the Bill, the Secretary of State will provide GBE with GBP 8.3 billion (EUR 10.0 billion) over the course of this Parliament (2024-2029); this will be funded from an increased windfall tax on oil and gas companies for up to GBP 1.2 billion (EUR 1.4 billion) and through borrowing. GBE will be a company wholly owned by the government whose objects will be to facilitate, encourage and participate in: (i) the production, distribution, storage, and supply of clean energy; (ii) the reduction of greenhouse gas emissions from energy produced from fossil fuels; (iii) improvements in energy efficiency; and (iv) measures for ensuring energy security. GBE would achieve these objectives by partnering and co-investing with the private sector, e.g. in mature technologies such as wind, solar and nuclear energy.
- As part of the Autumn Statement of 2023, the **Advanced Manufacturing Plan** was adopted in November **2023**. It is based on three priorities: (i) investing in the long-term future of manufacturing; (ii) cooperating internationally and building supply chain resilience; and (iii) reducing costs and removing barriers to boost competitiveness. The UK government made available GBP 2 billion (EUR 2.4 billion) of new capital and R&D funding for the automotive sector via the Auto2030 programme, building on the Automotive Transformation Fund and the Advanced Propulsion Centre R&D programme. To deliver net zero, the UK estimates that additional capital investment averaging GBP 50-60 billion (EUR 60-72 billion) per year is needed through the late-2020s and the 2030s across the economy. The majority of this investment will come from the private sector.

- On 26 November **2023**, the UK published its first-ever **Battery Strategy**, which recognises that the UK is heavily dependent on imports for batteries and their materials. The strategy is based on a 'design-build-sustain' approach. The GBP 60 million (EUR 72 million) of new funding is being allocated to support a three-pronged strategy covering: (i) designing new technologies; (ii) building out supply chains and manufacturing capacity; and (iii) sustaining future growth through skills planning and collaboration. According to the strategy, the UK government expects to leverage GBP 5 of private investment for every GBP 1 of spending from public sources. The strategy announced changes to the tax relief system for research-intensive SMEs that entered into force on 1 April 2024. SMEs can claim a higher rate of relief, even if they allocate only 30% of their investment to R&D.
- In May **2023,** the UK unveiled its **national semiconductor strategy**, which includes a plan to redouble efforts in design, research, and advanced chip leadership. To do this, the government will invest up to GBP 1 billion (EUR 1.2 billion) in the next decade to improve access to infrastructure, power more R&D, and facilitate greater international cooperation, with up to GBP 200 million (EUR 240 million) over the years 2023-2025.
- In March **2023**, the UK reformed the **UK Infrastructure Bank** and its governance. The bank was created in 2021 with a capital of GBP 22 billion (EUR 26 billion) to mobilise investment, including in climate-related technologies, to ensure the UK reaches its 2050 climate targets.
- In February **2023**, the UK government launched **'CleanTech for UK'**, a coalition of leading clean tech entrepreneurs, investors and venture builders with combined funds of over GBP 4 billion (EUR 4.8 billion), focusing on the UK's green economy and innovation for a net-zero emissions future.
- The **British Industry Supercharger**, announced in **February 2023** and launched in **April 2024**, is designed to reduce industrial electricity prices for eligible energy-intensive industries in Great Britain. It aims, among other things, to bring the energy costs for Britain's key strategic energy-intensive industries in line with other major economies around the world. The annual value of the scheme is estimated between around GBP 320 million to GBP 410 million per year, from which about 300 businesses in sectors including steel, metals, chemicals, and paper will benefit.

  The **Critical Minerals Strategy**, adopted in **July 2022**, sets out the government's plans for improving the resilience of critical mineral supply chains and increasing the UK's security of supply. Through this strategy, the UK intends to accelerate growth of the UK's domestic capabilities, collaborate with international partners, and strengthen international markets to make them more responsive, transparent, and responsible.

2.4 Australia

- Launched in **2021**, Australia's **Supply Chain Resilience Initiative** (SCRI) provides businesses up to AUD 2 million (EUR 1.2 million) to develop or scale up a manufacturing capability or a related activity to address supply chain vulnerabilities for a critical product or input identified in the Sovereign Manufacturing Capability Plan. The main new policy tool is the SCRI grant (AUD 50 million (EUR 30.7 million)) to improve access to critical products in times of crisis.
- In **2020**, the Australian government launched its **Modern Manufacturing strategy with a budget of AUD 1.5 billion (EUR 0.9 billion)**. The strategy is a key feature of the plan to harness Australian manufacturing capability and to drive Australia's economic recovery and

future resilience. The strategy is implemented by the National Manufacturing Priority Roadmaps, developed with industry through task forces, in six areas identified as of comparative advantage and strategic imperative: medical products; space; resources technology and critical mineral processing; food and beverage; defence; and recycling and clean energy.

- The Australian government is incentivising investment in critical mineral projects through a range of programmes, including the USD 4 billion (EUR 3.8 billion) **Critical Minerals Facility** and the recently announced (July 2024) USD 7 billion (EUR 6.6 billion) Critical Minerals Production Tax Incentive. Already on 25 October **2023**, Australia announced a **AUD 2 billion (EUR 1.2 billion) expansion in critical mineral financing**, with the aim, among other things, of solidifying Australia's position as a world-leading provider and helping the transition to net zero. This significant commitment doubles the capacity of the Critical Minerals Facility to finance Australian critical mineral mining and processing projects and takes the government's value-adding investment in Australian resources to AUD 6 billion (EUR 3.7 billion).
- On 5 September **2024**, the Australian government launched a **new digital Australian Critical Minerals Prospectus**, displaying through an interactive online map more than 55 investment-ready projects to potential investors and buyers from around the world. This new online tool can be customised to navigate Australia's rich and diverse mineral endowment, including critical minerals needed to build essential components for products like electric vehicles, solar panels, hydrogen technology and batteries.

2.5 India

- The **Production Linked Incentive (PLI) scheme (2020)**, managed by the Ministry of Heavy Industries, is designed to help develop local supply chains. The scheme not only invites foreign companies to set up units in India, but it also aims to encourage local companies to set up or expand existing manufacturing units and reduce the country's reliance on imports from other countries. Benefiting industries include the battery ecosystem (under the **national programme on advanced chemistry cell battery storage**), with USD 2.49 billion (EUR 2.36 billion) in subsidies over 5 years to develop 50 GWh of battery capacity in India. Beneficiaries must ensure a 60% increase in domestic value added within 5 years. An additional PLI scheme was launched to boost solar panel production in India, with a budget of USD 600 million (EUR 568 million) and the goal of attracting USD 2.30 billion (EUR 2.18 billion) in private financing and reaching an additional 10 000 MW of solar electricity production capacity in India. Other schemes have been designed, including the Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS), and more recently, in 2023, the PLI IT Hardware, which aims to promote the localisation of components and sub-assemblies of semiconductor design, ICT manufacturing, laptops, tablets and packaging. From its inception until November 2023, the PLI scheme resulted in INR 1.03 trillion (EUR 10 billion) of investments, more than INR 3.20 trillion (EUR 40 billion) of exports and INR 8.61 trillion (EUR 100 trillion) of production spend, generating also direct and indirect employment. Of the 14 sectors in which PLI was introduced, the most successful ones are electronics manufacturing, pharmaceuticals, and medical devices.
- The **2024** Union budget introduced a range of policy measures, including the **Critical Minerals Mission**, to promote domestic mineral exploration, mining and production. The mission focuses on developing domestic mining capabilities and fostering circularity and

innovation. The Indian government is also designing a PLI scheme to encourage the recycling of critical minerals in the country through targeting e-waste recycling, incentivising the production of recycled critical minerals, and promoting investment in advanced recycling technologies.

- In May **2023**, the Ministry of Electronics and Information Technology launched an **'India Semiconductor Mission'** to act as the central entity coordinating all semiconductor-related policies of the Indian government and ensure their smooth implementation. Some initiatives in place include **the Semicon India programme**, which provides USD 10 billion (EUR 9.5 billion) to 100 Indian companies in the field of electronics. Since 2022, the amended **programme for semiconductors and display fab ecosystems** provides fiscal support of 50% of project cost for all technology nodes for semiconductor fabs, fiscal support of 50% of project cost for display fabs, and fiscal support of 50% of capital expenditure for compound semiconductors, silicon photonics, sensor fab and semiconductor facilities. The **Digital India campaign** also aims to develop the electronics sector by making it worth USD 300 billion (EUR 384 billion) by 2026, particularly in semiconductor and design, smartphones, IT hardware, and components. In September 2024, India hosted a major conference **Semicon India 2024** with the aim of positioning India as a leading partner in the global semiconductor supply chain.
- In August **2021**, the Ministry of New and Renewable Energy launched the **National Hydrogen Mission** as a blueprint for India's transition to a hydrogen-based economy, with the goal of reaching a production of 5 million tonnes of green hydrogen by 2030. As part of the mission, the Indian government is offering special manufacturing zones to produce hydrogen, with free energy transmission across state lines and priority connection to the grid. In February 2023, the Indian government also announced a INR 350 billion (EUR 4 billion) fund to invest in energy security and green transition (with a focus on solar power and green hydrogen production) with the aim of reaching net-zero emissions by 2070. At state level, green hydrogen production targets exceed federal goals. Uttar Pradesh has pledged up to 40% capital subsidy for green hydrogen projects, while Gujarat aims for 3 million tonnes of production, over 40% of the cumulative state target. Together, these initiatives aim to help India exceed its 2030 target, with state projections amounting to 7 million tonnes – well beyond the federal goal of 5 million tonnes.

2.6 China

- **The 14th Five-Year Plan (2021)** included an entire chapter devoted to boosting the digital sector's added value to 10% of GDP by 2025. This notably includes targeted investment in 6G and in cloud services. According to the 2015 Classified Catalogue of Telecommunications Services Law, which was updated in 2019, only Chinese companies can be licensed to operate cloud services for security reasons and guaranteeing a protected market for Chinese companies.
- The government directly or indirectly funnels credits and investment into 'strategic sectors', e.g. through '**government guidance funds**' that combine public and private investment and through lending by state-owned banks. These funds include the National Integrated Circuit Industry Investment Fund (the 'Big Fund', set up in 2014 to bolster the Chinese semiconductor industry), the National Manufacturing Transformation and Upgrading Fund, the National SME Development Fund, the National Emerging Industry Venture Capital Fund and the National Science and Technology Achievement Transformation Guidance Fund. As of 2021, the established industry funds mainly focused on 'Made in China 2025'

and seven strategic emerging industries, including energy conservation and environmental protection, information technology, biological industry, new energy, new-energy vehicles, high-end equipment manufacturing industry, and new materials.

- In **June 2024**, the Ministry of Industry and Information Technology and the Ministry of Finance issued a circular to further support '**Little Giants**' in advancing new technologies and making China's industrial supply chains more resilient. The central government will allocate funds to more than 1 000 SMEs and start-ups for 2024-2026, essentially in the form of direct grants. The additional subsidy will be up to CNY 6 million per business, i.e. over CNY 6 billion (some EUR 800 million) in total, on top of the existing support for 'Little Giants' (CNY 10 billion in grants (EUR 1.3 billion), plus preferential access to finance and other measures). The focus of this new scheme is on strategic emerging industries and future industries, as part of China's broader efforts to develop 'new quality productive forces'.
- The **dual circulation strategy (2020)** includes tax breaks, lower utility rates, low-interest loans and free or discounted land for **chipmakers** to: (i) meet higher technical standards; (ii) advance technology development; and (iii) incentivise reshoring and development of local capacity. Even though foreign investing companies are in principle eligible for these breaks, the goal is to achieve self-reliant economic development to have complete supply chains under Chinese control.
- The **Eastern Data, Western Computing plan (2022)** aims to develop the digital industry in China by constructing eight computing hubs and 10 data centre clusters in key areas in eastern and western China. The plan is led by the Ministry of Industry and Information Technology with the goal of creating the required infrastructure to enable the development of Chinese industries in the fields of internet of things, artificial intelligence, big data, and cloud computing while relying on Chinese infrastructure.
- The **implementation plan for the development of new energy storage technologies** during the 14th Five-Year Plan period contains several investment measures to develop energy production and storage in emerging fields such as compressed air, hydrogen, batteries, and thermal energy, with the goal of reaching self-reliance in these fields. More specifically, the goal is to reach 100 GW of battery storage capacity by 2030; by mid-2024, China had installed 44 GW of capacity.
- In **May 2024**, China's Ministry of Commerce and SINOSURE, an export credit and investment insurer with a portfolio of nearly USD 1 trillion (EUR 0.95 trillion) (fully state-owned entity), issued a **joint notice** entitled 'Maximizing the Role of **Export Credit Insurance** in Steadily Promoting the High-Quality Development of Trade to Accelerate the Construction of a Strong Trading Nation'. The notice aims to guide local authorities responsible for commerce and the branches of SINOSURE so they can fully and effectively use the policy tools of export credit insurance. Compared to similar previous documents published in 2020-2022, more emphasis is placed on, among other things, overseas investment insurance (particularly in the green, digital, new energy, and automotive sectors) and domestic trade credit insurance. Explicit references are made to supply chain resilience, in particular as regards imports of advanced equipment, critical components and resources, including minerals. Particularly, SINOSURE supports China's trade and investment policy by offering export credit and investment insurance on below-market terms.
- China temporarily exempts new-energy vehicles (**NEVs**) from purchase tax (10%). In **2024-2025**, the tax exemption is capped at CNY 30 000 (EUR 3 900). This will decrease to CNY 15 000 (EUR 1 950) in 2026-2027; during these last 2 years, purchase tax will be levied at half the normal rate. All products are eligible for purchase tax exemption, regardless of whether they are imported or manufactured locally. From 2024, models

applying for inclusion in the catalogue of NEV models with vehicle purchase tax reduction of China's Ministry of Industry and Information Technology need to meet new technical requirements: for pure electric models, the 30-minute maximum speed needs to be no less than 100 km/h, the range no less than 200 kilometres, and the battery energy density no less than 125 Wh/kg. Furthermore, as part of the economic stimulus measures, China currently provides additional subsidies to consumers who trade in their old NEV or internal combustion engine cars for a new NEV.

- **China's New Infrastructure Plan (2020)** aims to make available USD 1.4 trillion (EUR 1.3 trillion) through a digital infrastructure public spending programme in the sectors of 5G networks, industrial internet, intercity transportation and rail systems, data centres, artificial intelligence, ultra-high voltage power transmission, and NEV charging stations. The goal is to stimulate the development of strategic sectors for the Chinese economy and help the rise of Chinese 'champions' in these industries. This effort has been supplemented by similar infrastructure plans developed by 25 of China's provinces.
- In **2020**, the central government made available up to CNY 1.7 billion (EUR 230 million) of funding for **fuel-cell vehicles** (FCVs) to local governments that meet specific targets. Local governments will also promote the roll-out of FCVs, with the provinces of Beijing, Shanghai, Hebei, Inner Mongolia, and Shandong each aiming to have 10 000 FCVs on their streets by 2025.
- In **2022**, the government called on public and private institutions to work towards technological innovation in strategic areas. State funds support public universities and research institutes to conduct research, while state-owned and private enterprises pursue R&D in high-priority areas. This is often done through **national key R&D programmes** (NKPs). Since 2016, the government has announced 66 NKP projects focusing on hydrogen technologies, with a total estimated value of between CNY 1.75 and 5 billion (between EUR 240 and 680 million). Of these, 14 NKPs have an explicit focus on green hydrogen, with a combined estimated value of between CNY 400 million and CNY 1.25 billion (between EUR 54 and 170 million).

2.7 Taiwan

- The **Five Trusted Industry Sectors Plan** (**2024**) aims to strengthen Taiwan's position as a trusted global tech partner while strengthening national security and resilience, focusing on semiconductors, artificial intelligence (AI), military self-reliance, data security, and next-generation communication technologies such as 6G as pivotal future growth industries. The Ministry of Economic Affairs, the National Science and Technology Council, and other relevant agencies are intensifying collaboration with industries in semiconductors, AI, and drone technology. Their objectives include advancing sovereign AI capabilities, finalising pertinent legislation, and boosting R&D in drone technology, alongside strengthening technology transfer processes.
- Last amended in June **2023**, the **Statute of Industrial Innovation,** representing Taiwan's largest investment tax reduction incentive in history, states that companies with a critical position in the global supply chain (including those with technological innovations in semiconductors, electric vehicles and 5G) may claim an investment tax credit ('ITC') of 25% on R&D expenditure and 5% on procurement of machinery/equipment for advanced processes. The applicable period for utilising such ITCs spans 7 years, running from 1 January 2023 to 31 December 2029 (the expiry date of the Statute).

- To tackle the outflow of Taiwanese semiconductor talent to China, the Ministry of Labour implemented two distinct rules in 2021 **prohibiting advisory and intermediary services for recruitment of Taiwanese individuals to work in China**. The rules are not exclusive to engineers but apply to all sectors. The first announcement, in April 2021, prohibits labour agencies from assisting in advertising recruitment or acting as an intermediary helping personnel to go work in China. Violations of this rule can result in fines. The Ministry of Labour further specified regulations, prohibiting domestic advertising of recruitment or acting as an intermediary helping personnel to go to work in mainland China unless this is done by a Taiwanese company permitted by the Ministry of Economic Affairs to invest in mainland China and with actual business operations there. Different penalty amounts exist for first-time and repeated offences.

2.8 Japan

- Under the **Economic Security Promotion Act (ESPA) (May 2022)**, specific companies supplying designated critical commodities can receive financial and fiscal support over the medium to long term. Subsidies under the ESPA aim to reduce the risk for private operators and encourage them to enter currently low-margin/high-risk businesses and R&D. Examples of measures under the ESPA are set out below.
    - A package worth approx. JPY 800 billion (EUR 6.15 billion) to support the domestic **semiconductor industry,** including the construction of a chip plant in the Kumamoto prefecture by a joint venture of Taiwan Semiconductor Manufacturing Co., Sony and Denso. Already in **2022**, a corporation in which Japan's major chips manufacturers are participating was set up to develop mass production of next-generation semiconductors (i.e. RAPIDUS).
    - A **new economic stimulus package** to support the development of production infrastructure, diversification of supply sources and development of alternative commodities. In April/August 2023, the Japanese government designated 20 critical and emerging technologies (maritime, aerospace, cyberspace, biotechnology, semiconductors, robotics and quantum, hypersonic, cybersecurity utilising artificial intelligence, drones and unmanned aerial vehicles, next-generation furnaces and fusion furnaces). Under this package, already JPY 500 billion (EUR 3.2 billion) has been allocated to the key technologies for economic security.
    - **Re-introduction of secret patents**. The recent Basic Policy Guidelines identified 25 technologies to be covered, including technologies related to aircraft, unmanned aerial vehicles, guided weapons, jet engines, solid fuel rocket engines, weapons with electromagnetic launchers, laser weapons, electromagnetic pulse munitions, defence against aircraft and guided missiles, telecommunications jamming, uranium and plutonium isotope separation, decomposition and reprocessing of nuclear fuel, nuclear devices, etc. Implementation started in May 2024.
- The **green transformation (GX) basic policy (May 2023)** is an investment roadmap for JPY 150 trillion (EUR 0.9 trillion) of public-private financing over the next 10 years. It is comprised of two main parts: (i) measures for stable energy supply (energy efficiency, renewables, nuclear, other energy sources like hydrogen, ammonia, liquefied natural gas, batteries, carbon recycling); and (ii) 'growth-oriented' carbon pricing schemes. It will introduce a carbon tax by 2028, starting with a voluntary emissions trading scheme

introduced in 2026. The GX plan will drive forward investment in renewables, grid flexibility, energy efficiency and the circular economy, supported by an upcoming sovereign bond to stimulate private-sector investment. This GX Promotion Strategy will be revised by the **GX 2040 vision**, the new national strategy to be formulated by March 2025, which aims to encourage investment and strengthen industrial competitiveness by combining decarbonisation, stable supply of energy, and economic growth.

- In response to the global acceleration of decarbonisation efforts towards achieving the 2050 carbon-neutrality target, and in line with the decision taken at COP28 to double the global average energy efficiency improvement rate by 2030, Japan formulated **the Energy Conservation and Non-Fossil Energy Conversion Technology Strategy 2024** recognising the need for discontinuous technological innovation and social implementation through innovation, in addition to the energy-saving efforts accumulated thus far. It thus identifies key areas that need focused efforts to effectively promote the dissemination of technology development. This serves as a guideline for support through the New Energy and Industrial Technology Development Organization's grant projects and for planning and proposing R&D projects by companies and other entities, which should help promote technology development and its practical application.
- **Entered into force on 23rd October 2024, the Hydrogen Society Promotion Act promote the supply and utilisation of low-carbon hydrogen and its derivatives.** The Act stipulates special measures involving the following: formulating basic policies, setting up a scheme for approving business plans from both the demand and supply sides, providing support measures for businesses that have received approval for their business plans, granting special regulatory exemptions, and setting out the conduct standards to be addressed by hydrogen suppliers. The Act also provide subsidies to finance the supply of low-carbon hydrogen as well as for the development of hubs for low-carbon hydrogen.

- The **state-owned Japan Organization for Metals and Energy Security** (JOGMEC) supports exploration and technological development by Japanese companies through equity capital and liability guarantees. JOGMEC invests in rare-earth overseas projects to diversify supply involving Japanese companies. Its purpose, scope, structure and obligations are set out in the **JOGMEC Act.** Under the planned revision of the Act, JOGMEC is to strengthen financial support for Japanese businesses' rare-earth exploration and refining operations. The revised legislation is reported to: (i) increase the ceiling of JOGMEC's loan and investment ratio by expanding government support through JOGMEC from the current level of 50% to 75% of investment in projects; (ii) allow JOGMEC to invest in or grant debt guarantees to domestic mineral-refining operations (at present, JOGMEC can only support refining operations overseas, in practice in China); and (iii) allow JOGMEC to actively support overseas mining and projects involving Japanese companies (risk-money support).
- Japan has set a **target for its automakers to sell 12 million next-generation software-defined vehicles (SDVs) at home and abroad by 2030**, as part of a national strategy that will include collaboration among Japan's top automakers. **The Ministry of Economy, Trade and Industry announced a draft of its strategy for digital transformation in the auto industry on 20 May 2024.** It focuses on three pillars: (i) SDVs (standardising a platform linking software and systems); (ii) new means of transportation, such as driverless taxis and trucks; and (iii) utilisation of vehicle data from the fiscal year of 2025. The aim is to strengthen production of SDVs with the purpose of securing a 30% share of the global SDV market and increasing SDV sales to 19 million units by 2035.

2.9 Republic of Korea

- In June **2024**, the government launched a KRW 5 trillion (EUR 3.37 billion) **fund for supply chain management** to support leading companies in developing a robust and secure supply chain for essential **raw materials and products for which Korea heavily depends on imports**. The projects eligible for tax credits also include R&D projects focused on technologies that are crucial for maintaining a stable supply chain. The fund will provide loans at below-market rates to businesses that demonstrate significant progress in reducing their reliance on overseas sources for critical materials. The government will add 100 new items to the current list of 200 'economic security-related items' from industries closely intertwined with the daily lives of people in Korea. The targeted industries currently include manufacturing and defence. This will be expanded to include logistics and cybersecurity.
- In December **2023**, the Republic of Korea unveiled a KRW 38 trillion (EUR 26 billion) financial package for 2024-2029 to help **local electric-vehicle battery makers** diversify their supply chains in view of the government's aim to boost the competitiveness of the nation's battery industry, from mining to recycling. The financial aid will take the form of loans, credit guarantees, lower borrowing rates and insurance premiums for investment in manufacturing facilities in North America in order to help companies receive tax breaks under the US Inflation Reduction Act. The Republic of Korea's government also plans to set up a KRW 1.5 trillion (EUR 1.0 billion) fund to help firms secure minerals and expand their production overseas. The government will also relax rules on the handling of second-hand batteries to speed up the recycling ecosystem in the country, and lay down new safety rules on removing, storing and shipping spent cells. Already in April **2023**, the government announced its aim to invest KRW 20 trillion (EUR 13.5 billion) in the electric-vehicle battery industry by 2030 to turn it into a key component of the country's national security and strategic assets, along with semiconductors, and to secure a significant lead over rivals.
- In May **2024**, the Republic of Korea announced a financial aid package worth KRW 9.7 trillion (EUR 6.5 billion), including tax credits and loans, after the US changed its rules on imports of **critical battery minerals**, including graphite, from countries such as China. The Republic of Korea's officials will thus help companies improve their communications with countries that have free-trade agreements with the US for securing critical battery minerals, whose imports are allowed under new US rules. Korean officials will also help companies to: (i) meet new requirements, such as submitting plans on how to diversify graphite supplies from 2027 onwards; and (ii) accurately calculate the value of battery minerals to receive the benefits.
- In August **2023,** the **Korean Financial Services Commission** announced a set of measures to boost support for the **export industry** by providing KRW 23 trillion (EUR 16.4 billion). These export credits will be focused on strategic export sectors such as secondary batteries, electric vehicles, high-value-added shipbuilding, green industries, edu-tech, agricultural products, fishery products, smart farming, ICT services, creative contents, pharmaceuticals / medical devices, and cosmetics chips, displays, steel, machinery, petro-chemicals, nuclear power plants, national defence, overseas construction, environmental industry).
- In May **2024**, the Republic of Korea prepared a package worth over KRW 10 trillion (EUR 6.74 billion) to support the **chip industry** as part of efforts to boost the competitiveness of the critical industry and to prop up economic growth. The planned assistance programme aims to support facility investment and R&D programmes for all sectors of the chip industry from chip materials to manufacturing equipment and components. Already on **30 March 2023**, the Republic of Korea passed its own '**K-Chips**

Act', which gives specific advantages to Korean chipmakers, with tax breaks to increase production in Korea. The goal is to encourage chipmakers to spend a total of approximately combined EUR 379 billion by 2030 to help the Republic of Korea become a global powerhouse in memory and non-memory chips. In addition to giving tax breaks to semiconductor companies (15% for large companies and 25% for capital expenditure by SMEs), the Act streamlines administrative procedures for chipmakers. Moreover, any additional investment in chipmaking in 2023 received an additional 10% tax break, increasing year-on-year. Already in **2022**, the government started to apply a higher tax credit rate of 15% to facility investment in the **chip industry** for conglomerates, up from 8%, while the rate for SMEs rose from 16% to 25%. In 2024, the government announced an extension of the tax credit programme for chip investments while Korean chipmakers Samsung and SK Hynix announced a combined KRW 622 trillion (EUR 419 million) investment to build a semiconductor cluster in the region of southern Gyeonggi by 2047, following investment plans already announced in 2023 (i.e. to build a massive chip cluster with five advanced chip manufacturing plants around Yongin by 2042, for some EUR 212 billion, and to develop a semiconductor cluster in the same city, for some EUR 85 billion).

- As part of its efforts to ensure supply chain resilience and reduce the country's import dependence on specific items, including advanced materials, the Korean government has been promoting tech acquisition through overseas mergers and acquisitions in areas where it is difficult to secure 'core tech' in the domestic value chain. In **2022**, the government made available acquisition funds of over EUR 2 billion for advisory, consulting, and follow-up integrated management services.
- In February **2022**, the Republic of Korea issued the **Special Act on Strengthening and Protecting Competitiveness of National High-Tech Strategic Industries** to reduce the administrative burden, speed up relevant licensing processes, and subsidise training programmes in the semiconductors sector and beyond.
- In February **2022**, the national government adopted a new technology protection strategy to harmonise the different protection measures taken by various national ministries to avoid leakage of core technologies. To give special funding to the technologies that are considered strategic by the government, a **Special Taxation Act** has been in effect since 1 January 2023. The Act sets out a precise list of 150 strategic technologies for which Korea-based manufacturing companies could receive tax credits, amounting to a total of KRW 937.6 billion (EUR 631.1 million) in 2023. In April 2023, the Ministry of Industry announced that the list would be updated to include 50 extra technologies, bringing the list to 200 items.
- In June **2024**, the government and 12 financial institutions committed to providing a total of EUR 10 billion (approximately KRW 15 trillion) in 'refund guarantees' (RGs) to improve the competitiveness of **domestic shipbuilding orders** and expand exports. This marks the first time that policy banks and regional banks have jointly participated in issuing RGs for medium-sized shipbuilders. Through this agreement, a total of EUR 673 million (approximately KRW 1 trillion) in RGs will be supplied to medium-sized shipbuilders.

2.10 Singapore

- The **Enterprise Innovation Scheme** (**2023**) increases tax deductions for businesses on activities that boost innovation, such as R&D conducted in Singapore, registration of intellectual property, and innovation carried out with institutes of technical education**.**
- Singapore's research priorities and funding have been detailed in the **Research, Innovation and Enterprise 2025 Plan (2021)**, which gives priority to health, sustainability, digital economy, advanced manufacturing, and security. The plan's strategies respond to new technological and societal driving forces.
- In February **2021**, Singapore announced the creation of the **Southeast Asia Manufacturing Alliance**, a tripartite (public-private) alliance to secure supply chain resilience in the region. Grants of up to SGD 1.5 million (EUR 1.0 million) are provided by the Economic Development Board of Singapore (the Ministry of Trade and Industry's economic development body), while Enterprise Singapore (the government agency for business development) provides matching events and a platform. A network of private-sector 'strategic partners' offers preferential services (reduced leasing and logistics costs) for businesses that join the alliance.

3. Prioritisation mechanism of domestic supply of goods and services

3.1 United States

- **(Priorities and Allocations) of the Defense Production Act (DPA) (1950)** empowers the President to require individuals and businesses, including corporations, to prioritise and accept contracts for materials and services as needed to support national defence. This authority enables the government to mobilise the domestic industrial base in times of crisis. Under **Title III (Expansion of Productive Capacity and Supply)**, the President is authorised to incentivise the domestic industrial base to increase production and supply of critical materials and goods. **Title VII (General Provisions)** outlines key definitions, authorities and provisions for the DPA, including: (i) voluntary agreements with private industry – the ability to establish partnerships with private companies to support national defence efforts; and (ii) blocking foreign corporate transactions – the authority to prevent proposed or pending mergers, acquisitions or takeovers by foreign entities that pose a threat to national security.
- **'Buy American' rules for procurement (2021 revision of the Buy American Act)** not covered under the WTO Agreement on Government Procurement: these rules apply to all US federal government agency purchases or federally financed purchases of goods valued over the micro-purchase threshold (USD 10 000 (EUR 9 500)). To be considered as being produced in the US, goods must be manufactured in the US and at least 55% of the cost of their components must come from the US. Waivers can be granted for the public interest, for non-availability or if the cost of US products is unreasonable compared to equivalent foreign products. IT and 'commercial off-the-shelf' products are exempted.
- The Build America, Buy America Act (BABA) stipulates that federal funds cannot be allocated for an infrastructure project unless all iron, steel, manufactured products, and construction materials are produced in the US. This domestic content preference, commonly referred to as '**Buy America**', applies to all federally funded infrastructure projects, including those not directly funded by the Infrastructure Investment and Jobs Act. The

BABA specifies the criteria for determining when materials are considered 'produced in America' and defines the term 'infrastructure'.

- On 4 May **2023**, the White House introduced a **standards strategy for critical and emerging technologies (CET)**, supplementing the 2021 national standards strategy. The CET includes eight strategic technologies: (i) communication & networking; (ii) semiconductors & microelectronics; (iii) artificial intelligence & machine learning; (iv) biotechnologies; (v) positioning, navigation & timing services; (vi) digital identity infrastructure & distributed ledger technologies; (vii) clean energy generation & storage; and (viii) quantum information technologies. The strategy outlines eight measures to strengthen US standard development organisations through 2024 federal budget funding, public-private partnerships, workforce upskilling, and collaboration with international partners.

3.2 Canada

- In the **2023** federal budget, the Canadian government announced that it intended to **introduce new reciprocity requirements in federal public procurement**; these would give foreign companies the same access to Canadian federal public procurement as Canadian companies have in the respective third countries. Similar reciprocity conditions will apply to foreign companies' access to Canadian tax credits.

3.3 India

- India's **2017 'Preference to Make in India' Order** gives preference to local production of goods and services for a wide range of products on public procurement markets. The Order introduces classes of suppliers (Class I, Class II and non-local suppliers) depending on how much local content these suppliers use (50% or more, below 50% and below 20%, respectively). Sensitive sectors such as railways or defence require the supplier to be Class I or II for a bid to be eligible. Greatest procurement priority is given to tender submissions with the highest percentage of local content, and the government may mandate technology transfers. In July 2024, the government revised public procurement rules to push the **'Make in India'** initiative forward, by excluding imported inputs from the calculation of local content in its purchase orders. In a revision to the 2017 public procurement order, the government clarified that procurement and supply of repackaged, refurbished or rebranded imported products must be treated as selling imported products. The most visible impact will be seen in government purchases of IT and other technology products.
- The Department of Science and Technology has launched a '**grand challenge**' on the development of standards for electric-vehicle charging infrastructure to help develop the local industry. In September **2024**, the government announced a new revenue-sharing model between the government and the private sector, intended to make the installation of charging stations more financially viable.
- In January **2019**, the Ministry of New & Renewable Energy issued the **Approved Models and Manufacturers of Solar Photovoltaic Modules (Requirements for Compulsory Registration) Order** and, at the same time, it published a list of approved models and manufacturers complying with the Bureau of Indian Standards. The list of manufacturers was updated in 2023, with a stated capacity of 22 389 MW and more than 70 manufacturers. The module models on the list are only eligible for use in open access and net metering

projects along with government projects, government-assisted projects, and projects under various government schemes and programmes. In September 2024, an updated list of solar photovoltaic modules was issued, extending the list of models eligible for government-supported projects, and limiting non-listed imports, particularly from China.

3.4 China

- China applies a **'buy national' policy**, with a few exceptions. Under its Government Procurement Law, China applies *de facto* market access barriers, including the 'buy national' policy and 'indigenous innovation', which give preferential treatment to goods and services developed locally. In theory, foreign companies investing in China are to be treated like domestic companies, but in practice, domestic companies are preferred.
- The **dual circulation strategy (2020)** calls for relying principally on China's large domestic market and leveraging/building its strengths, including comprehensive and deep supply chains. Economic exchanges with the rest of the world are also encouraged, not discouraged, but 'domestic circulation' must be able to function autonomously in case of problems with foreign supplies.
- The **Medium- and Long-term Science, Technology and Innovation Development Plan** (**2006-2020**) directs government agencies to buy products listed in certain procurement catalogues, which include only 'indigenous innovation' products (with few exceptions). The **MLP (2021-2035** was announced, but it has not been released or implemented yet.
- The government promotes the consolidation of Chinese rare-earth and metal companies into a handful of big groups per sector, often state-owned or state-led. The stated purpose of this policy is to increase these companies' bargaining power on international markets and to modernise the sector.

3.5 Japan

- Under the **Economic Security Promotion Act (ESPA)** (**2022**), the government designates critical, core and sensitive infrastructure in 14 sectors including aviation, railways, gas, oil, etc. If a business operator owning designated infrastructure is selected as a core/important operator by the ministers in charge (not all operators), the government has the right to pre-screen any projects in these sectors, recommend remedies and potentially order operators to change suppliers or abandon transactions.

3.6 United Kingdom

- The UK has recently updated its public procurement rules with the introduction of the **2023 Procurement Act**. This Act received Royal Assent in October 2023 and is set to come into effect on 24 February 2025. It envisages new economic security powers that make it possible to bar/exclude companies from procurement competitions on national security grounds.

3.7 Republic of Korea

- On 27 February **2023**, the government announced its **renewed strategy on critical minerals for businesses**. The aim is to help mitigate Korea's reliance on imports from a few selected countries and **maximise utilisation of domestic mineral resources, helping to stabilise the supply chain**. Under the new strategy, 33 critical minerals with a bearing on economic security are to be selected and, out of the 33, 10 strategic critical minerals needed for stabilising the supply chain of chips and secondary batteries will be prioritised for intensive management. For the 10 strategic critical minerals, the government plans to cut, by 2030, its dependency on imports from the current 80% to 50% and to increase recycling from the current 2% to 20%. Moreover, to provide strategic minerals for the industry, Korea Mine Rehabilitation and Mineral Resources Corporation is currently carrying out 18 overseas projects in different stages of development, which include projects relating to copper, cobalt, manganese, and zinc.

3.8 Taiwan

- In October **2024**, the Industrial Development Administration under the Ministry of Economic Affairs issued '**Guidelines for Determining the Localization Supply Chain Cooperation Value Ratio for Mainland China Vehicle Models**', further tightening localisation requirements for domestic cars with components imported from China. By 2026, locally manufactured vehicles with Chinese components will be required to achieve a 35% localisation ratio. From 1 August 2024 onwards, the localisation rate must reach 20%, increasing to 30% by 1 August 2025, and exceeding 35% by 1 August 2026. Under Taiwan's regulations, complete vehicles made in China cannot be directly imported. Currently, Chinese cars allowed for import must be assembled or produced by Taiwanese manufacturers.
- Since 2013, Taiwan has developed its **offshore wind generation** capability through public auctions. Since 2018, local content requirements have been obligatory for successful bids. Starting from November **2024**, Taiwan is committing to introduce greater flexibility in the way winning projects in the latest auction are taken forward.

4. Stockpiling of critical inputs

4.1 United States

- In February **2022**, the US Department of Energy, the US Department of Defense and the US Department of State signed a memorandum of agreement that sets the foundation for a **critical mineral stockpile** to support the US's transition to clean energy and national security needs. The Department of Defense, which manages the national defence stockpile, currently stockpiles critical minerals for national security purposes. The memorandum of agreement creates a new, inter-agency process for stockpiling minerals that enable vital clean energy technologies.

4.2 Australia

- The Australian government committed more than AUD 8 million (EUR 5 million) in the 2023-2024 federal budget to creating a **national emergency management stockpile (NEMS)** to provide rapid access to critical emergency management goods and services to augment state and territory emergency response and immediate relief capabilities. The NEMS is comprised of three parts: (i) a national stockpile of Australian government-owned disaster goods and services, and a seasonal strategic reserve of single-use consumables; (ii) a standing offer panel to facilitate the procurement, management and deployment of critical goods and services in a crisis; and (iii) memoranda of understanding with other Australian government humanitarian and crisis response capabilities. The panel, launched in May 2024, will run for 3 years, with options for two 1-year extensions. The panel will ensure a continuous and reliable national stockpile of essential goods and services like emergency shelters, generators, and water purification systems, to assist state and territory emergency responses to communities impacted by disasters.
- Since **2021,** Australia has been maintaining a **national medicine stockpile** storing medications, vaccines, antidotes, and personal protective equipment to be used in case of supply chain disruptions in the health sector.

4.3 China

- Through its National Food and Strategic Reserves Administration, China stockpiles **critical minerals**, including aluminium, cobalt, copper, rare-earth elements, and zinc. China stockpiles minerals to safeguard against external supply disruptions, procuring these minerals from domestic producers and providing them with financial support. It is estimated that China stockpiles 1.5 million to 2 million tonnes of copper, 800 000-900 000 tonnes of aluminium, and 250 000-400 000 tonnes of zinc. China is also believed to have around 7 000 tonnes of cobalt, a key metal used in battery manufacturing. The revised '**Rare Earth Management Regulations**' that entered into force in October 2024 impose 'total (state) quantity control over rare-earth mining and rare-earth smelting and separation' (Article 10) as well as over exports and imports. Furthermore, the state is to improve the rare-earth reserve system by combining physical reserves with reserves at mineral deposits, and combining government reserves with enterprise reserves (Article 14).

4.4 Japan

- **The Japanese Organization for Metals and Energy Security (JOGMEC)** operates a national stockpiling system of rare metals to secure long-term raw material supply. Stockpiles are sufficient to meet 60 to 180 days' demand. In addition, under the planned revision of the **Mining Act**, Japan is to restrict access to rare-earth resources in Japan's exclusive economic zone (offshore deposits). JOGMEC emphasised the **importance of confidentiality in its stockpiling policy** since it is a **matter of national/economic/resource security**. This acts also as a deterrent against potential coercive practices by third countries, especially in the case of critical raw material (CRM) over-dependencies on concentrated sources / limited suppliers. The less public the information is, the more difficult potential economic coercion becomes. **JOGMEC's stockpiling plan is classified** as it includes information on selection of CRM, actual quantities required for each CRM, how/when to

purchase, release CRMs and conduct tests, the exact location of stockpiling facilities, how stocks are managed, etc. The JOGMEC Act also includes confidentiality obligations for companies participating in the stockpiling.

- As part of its Economic Security Promotion Act (ESPA), the Japanese government announced, in **2023**, the creation of a **'strategic surplus LNG'** system to ensure that liquefied natural gas (LNG) is secured on a sustainable basis by utilising the procurement capabilities of companies. The surplus LNG secured will be sold on overseas markets in normal times and to domestic operators in times of emergency.

4.5 Republic of Korea

- The Republic of Korea has a state-run reserve management and **stockpiling of critical raw materials** at national level. Under the Ministry of Trade, Industry and Energy, the state-owned KOMIR (Korea Mine Rehabilitation and Mineral Resources Corporation), launched in September 2021, implements the government's strategies and policies pertinent to raw materials. It also promotes foreign investment in overseas resource development. Moreover, under the **strategy on critical minerals** released in February **2023**, the stockpile of critical minerals has been increased in order to suffice for 100 days, up from 54 days. Furthermore, the government has allocated KRW 28.3 billion (EUR 20 million) for the stockpiling of cobalt in 2023.

4.6 Singapore

- Since **1990**, particularly in the field of food, the government can use its discretionary power to ensure a minimum quantity of private stockpiles, which need to be maintained for a stipulated period (such as under the Rice Stockpile Scheme). Given its exposure to imports from Malaysia and Indonesia, Singapore has stockpiles of **food** to prevent crises. To affect negotiations with overseas suppliers, the presence of the stockpiles is known, but not the actual numbers. Singapore maintains a national stockpile of two other essential items: granite used in construction, and personal protective equipment, including masks, drugs, and medical supplies, following outbreaks of SARS in 2003 and H1N1 in 2009.

4.7 United Kingdom

- As part of the **Critical Imports and Supply Chains Strategy** launched in January **2024**, the UK government has committed to ensuring the reliable supply of essential goods. Stockpiling critical goods is among the key measures outlined in the strategy to ensure resilient supply chains and safeguard critical import figures. In order to mitigate the impact of global supply chain disruptions, the government is thus working to maintain strategic reserves of critical goods.
- The UK has been creating **strategic reserves** of water treatment chemicals, monitoring stockpiles of chemicals and exploring stockpile requirements (**2023**).

5. Trade, and investment measures: tariffs, export restrictions, anti-coercion measures, FDI control, etc.

5.1 United States

- In October **2024**, the US Department of Commerce announced **anti-subsidy countervailing duties on solar cells imported from Vietnam, Cambodia, Malaysia and Thailand**. This announcement marked the first of two preliminary decisions expected from the Department of Commerce in 2024 in a trade case relating to solar cell imports from Southeast Asia. The case started with an anti-dumping/countervailing duty petition filed by the American Alliance for Solar Manufacturing Trade Committee. The Department of Commerce noted that imports of solar cells, whether or not assembled into solar panels, from these four countries have increased because of unfair foreign subsidies, thus warranting the need for a countervailing duty. The preliminary countervailing duty ranges from less than 1% to nearly 300%.
- In September **2024**, the US Department of Commerce's Bureau of Industry and Security published a **Notice of Proposed Rulemaking (NPRM)** that would prohibit the sale or import of connected vehicles integrating specific pieces of hardware and software, or those components sold separately, with a sufficient nexus to **China and Russia**, hence designed, developed, manufactured or supplied by entities owned by, controlled by, or subject to the jurisdiction or direction of China or Russia. This rule focuses on hardware and software integrated into vehicle connectivity systems and software integrated into automated driving systems, both being the critical systems enabling external connectivity and autonomous driving capabilities in connected vehicles. The proposed rule would apply to all wheeled on-road vehicles, but not to those used on public roads; its prohibitions on software would take effect for model year 2027 and those on hardware for model year 2030 (or January 2029 for units without a model year). The proposed rule is implemented under the information and communications technology and services authorities of the Bureau of Industry and Security, as provided by **Executive Order 13873 'Securing the Information and Communications Technology and Services Supply Chain'** (issued in May 2019).
- In September **2024**, the US House of Representatives passed the bipartisan **BIOSECURE Act** preventing executive agencies from entering into contracts with entities using biotechnologies equipment or services from a 'biotechnology company of concern', referring to companies headquartered in or controlled by the government of a foreign adversary, which poses a national security risk. The 'foreign adversaries' include North Korea, China, Russia and Iran. Indeed, the identified companies include specific Chinese biotech contractors. The Act, introduced in January 2024, contains an amendment allowing existing contracts to continue until January 2032, providing some leeway for ongoing operations.
- In June **2024**, the Treasury Department issued a **Notice of Proposed Rulemaking (NPRM)** to implement **Executive Order 14105** ('Addressing United States Investments in Certain National Security Technologies and Products in Countries of Concern' of August 2023, also known as the 'Outbound Order'). The Outbound Order sets out a process for setting up a new national security programme to address threats posed by certain US outbound investments in countries of concern (including China). The proposed rule prohibits covered transactions in quantum information, computers and components and some transactions in semiconductors, microelectronics, and artificial-intelligence systems (while other transactions in these areas are subject only to a notification requirement). An exemption is

adopted for transactions involving people in third countries that have similar measures aimed at outbound investment, so this is a sort of equivalency programme.

- In May **2024**, following the statutory review of the tariff actions (initiated in 2022) in the **'Section 301 investigation'** of China's acts, policies and practices related to technology transfer, intellectual property, and innovation, the US President announced to increase tariffs on an additional USD 18 billion (EUR 17 billion) in Chinese goods imposing certain modifications, some of which effective starting from 2024 while others from 2025 and 2026 to give importers time to identify alternative suppliers. In September 2024, issuing the corresponding notice, the United States Trade Representative announced the final adjustments to Section 301, largely upholding the proposed changes but making several adjustments regarding rates and implementation timelines, as well as introducing new exclusions.
- **In July 2024, the US re-imposed Section 232 duties on any steel products or derivatives from Mexico** that are melted and poured in a country other than Mexico, the US or Canada, as part of the measures taken by US and Mexico to strengthen the North American steel and aluminium supply chains (Mexico, US, Canada) and protect it from unfair trade. On aluminium, the new smelt/cast requirement is more flexible, in that the US will reapply Section 232 duties only where the 'reported primary country of smelt, secondary country of smelt, or country of most recent cast' is China, Russia, Belarus or Iran. At the moment, any article containing aluminium smelted or cast in Russia is already subject to a 200% tariff; this higher duty rate continues to apply to anything produced in Mexico that has Russian origin.
- The **Export Control Reform Act of 2018** allows the US government to enact controls on exports, re-exports and transfers of emerging and foundational technologies if they could be used to threaten the national security of the US or if they give a qualitative military or intelligence advantage to the US. Some 14 emerging technologies are identified, including biotech, artificial intelligence, and semiconductors.
- The Defense Production Act (DPA) (**1950**) sets up the **Committee on Foreign Investment in the United States**. The committee can review foreign investments and real estate transactions by foreign persons in the US if these investments could present a risk to national security. It can also impose conditions on such acquisitions or refer the case to the President for decision. Australia, Canada, New Zealand and the UK are exempted from review by the committee, but the EU is not.

5.2 United Kingdom

- On March **2024**, the UK government issued new amending regulations, i.e. the **Export Control (Amendment) Regulations 2024**, which update the Export Control Order 2008 and the retained EU-Dual Use Regulation, and introduce new export controls related to emerging technologies, including quantum, cryogenic and semiconductor technologies as well as additive manufacturing equipment and advanced materials. These came into force in April 2024.
- In March **2023**, the UK launched **a new economic deterrence initiative** to boost its diplomatic and economic tools to respond to and deter hostile acts. With up to GBP 50 million (EUR 60 million) of funding over 2 years, the initiative is intended to improve sanction implementation and enforcement. On outbound investments, the UK is working to develop the evidence base to enable it to assess the potential national security

risks posed by outward direct investment and best calibrate its action to respond effectively to them.

- The National Security and Investment Act (2021) sets up a foreign direct investment screening regime with mandatory notifications to the government for acquisitions in 17 'most sensitive' economic sectors, including defence, communications, and energy. The government can review and potentially block acquisitions if they risk undermining the UK's national security.

5.3 Australia

- Reforms of the **Foreign Investment Review Board (FIRB)** in **2020** introduced a mandatory notification procedure for acquisitions connected to 'national security business' or 'national security land' or linked to critical infrastructure (i.e. 15 sectors including electricity, gas, water, ports, healthcare, and cloud services). The government can order divestment or prohibit the acquisition if it finds that it could present risks to national security. Since January 2021, with the implementation of an updated foreign investment regime, the government's focus has firmly been on national security and compliance. The FIRB may require businesses to take action, including in matters relating to governance, location of senior management, listing requirements, market competition and pricing of goods and services (e.g. that all offtake arrangements must be on arm's-length terms) and other industry-specific matters.

5.4 India

- In July **2024**, the Indian government proposed to fully **exempt 25 critical minerals** (including rare-earth metals) **from customs duties** and reduce the basic custom duty on two of them. Zero duty was proposed for copper, gallium, germanium, hafnium, indium, lithium, molybdenum, niobium, nickel, potash, rare earths, rhenium, strontium, tantalum, tellurium, tin, tungsten, vanadium, zirconium, selenium, cadmium, silicon other than quartz and silicon dioxide. Currently, the customs duty for these 25 minerals varies between 5% and 7.5%.
- In October **2023**, India launched a new online **authorisation system for imports of laptops, tablets, and personal computers** to monitor the quantity of imports and where they originate from. The government may ask importers of laptops, servers, and other IT hardware to provide an international certification attesting that their product is from a trusted source before allowing a licence-free import of it. In response to US concerns raised at the WTO Committee on Import Licensing, India stated that the import monitoring system aimed to ensure supply chain resilience and address national security concerns. India also announced that it had no intention of expanding the applicable list of items. In September 2024, the Indian government announced that companies would need to seek fresh approvals for the import of laptops and tablets starting from 1 January 2025.
- With effect from April **2022**, the Indian government imposed a basic **customs duty on the import of solar photovoltaic cells and solar photovoltaic modules** of 25% and 40%, respectively. The aim is to reduce the influx of imported photovoltaic cells and modules and increase the domestic manufacturing. The Indian government temporarily relaxed these rules, but then reintroduced strict restrictions on solar panel imports, effective from 1 April 2024. Since 1 April 2024, projects commissioned in India can only use panels from suppliers on an 'approved list', which currently excludes all overseas manufacturers.

- India revised its foreign direct investment policy in **2020** to make foreign acquisitions of Indian companies more difficult. In particular, companies from countries that share a border with India must undergo a security analysis before an acquisition can go through. However, the Indian government may decide to scrutinise acquisitions by any foreign entity. The Indian government has published for guidance a list of sensitive sectors in which it is likely to scrutinise acquisitions, including broadcasting, telecommunication, satellites – establishment and operation, private security agencies, defence, civil aviation and mining and mineral separation of titanium-bearing minerals and ores.

5.5 China

- **The Export Control Law (2020)** is China's primary piece of legislation for restricting exports of goods and technology for reasons of national security and public policy. Export controls of concern are numerous, but include those on antimony, rare earths (including their processing technologies), urea, gallium and germanium, drones and graphite.
- **The Catalogue of Technologies Restricted and Prohibited for Export (2002)**, which does not fall under the Export Control Law, but instead under the Foreign Trade Law, additionally restricts the export of technologies. The legal basis for adding technology to the catalogue is broad, ranging from national security to compliance with any Chinese legislation. It includes, in particular, technologies for processing rare earths, including the production of rare-earth magnets, a key input to the green and digital transitions used in electric vehicles, robotics and wind turbines. A revised version of the catalogue was issued by the Ministry of Commerce and the Ministry of Science and Technology in December 2023, resulting in 134 controlled items to date.
- The **Foreign Investment Information Reporting System** centralises information submitted by all foreign companies investing in China, collected at province level, to enable the Ministry of Commerce to have a clear picture of overall foreign direct investment (FDI) in China. Moreover, **the Foreign Investment Law** (2020) gives discretion to local authorities to block any FDI. It also includes a **negative list** of sectors published by the Ministry of Commerce in which FDI is prohibited or severely restricted, though the list is regularly revised and generally shortened. The revised negative list for foreign investment was released in **September 2024**, to enter into force on 1 November. The Ministry of Commerce pointed to a reduction in the number of sectors with FDI restrictions from 31 to 29, as well as to the fact that there are zero restrictions for manufacturing. The law also includes an **Encouraged Activities List** of sectors in which incentives are provided. Additionally, the law includes a **national security review** for any FDI that may affect national security. The review is triggered by any acquisition in sectors such as major agricultural products, major energy and resource products, infrastructure, transportation services, key technologies, and key equipment manufacturing.
- In November **2023**, **China added rare earths to the Catalogue of Energy and Resource Products Subject to Export Reporting** requiring exporters to report information such as the place of origin, contract date, quality, loading and arrival information, and customs arrival port. At the same time, **crude oil, iron ore, copper concentrate and potassium fertiliser were also added to the Catalogue of Energy and Resource Products Subject to Import Reporting.** The China Chamber of Commerce for Import and Export of Minerals and Chemicals is responsible for collecting, organising, summarising, analysing and verifying the reported information.

- Data protection rules such as the **Data Security Law,** the **Personal Information Protection Law** (**2021**) and the **Measures for Security Assessment for Cross-Border Data Transfers (2022)** restrict the flow of data out of China.

5.6 Japan

- On 24 April **2024**, Japan published an update of its Economic Security Action Plan with a number of policy measures strengthening its conventional export control regime, introducing a novel technology transfer catch-all control system for specific cutting-edge technologies. This will be based on increased engagement and information sharing with the industry and strengthening of the government's analytical capabilities in the area of economic security. According to the revised action plan, Japan also aims to take a technology-based approach to risk analysis and management in the area of economic security, and to strengthen its strategic engagement with the industry. The Ministry of Economy, Trade and Industry has thus categorised 'key materials and technologies' into three categories:
    (1) areas of 'disruptive technological innovation' (that should be a priority for R&D support);
    (2) areas where Japan has technological superiority (where technologies need to be protected); and
    (3) areas of increased dependence on foreign countries (commoditised technologies like electric vehicles, legacy chips, to manage interdependencies and protect markets).
- In June **2023**, the government of Japan expanded the sectoral coverage of its inbound foreign direct investment screening to cover all 11 materials designated as 'specified critical materials' under the Economic Security Promotion Act.

5.7 Taiwan

- The **National Security Act** (amended in June **2022**) aims to prevent the leakage of national key technologies. The Act imposes fines of up to TWD 100 million (approx. EUR 3 million) and imprisonment for up to 12 years for the illegal transfer of national key technologies. In December 2023, Taiwanese authorities issued the **critical technologies list** (implemented as part of the National Security Act) that designates 22 technologies believed to be Taiwan's leading technologies requiring immediate protection. On 1 November 2024, Taiwan announced its plan to add 10 new technology items and their respective regulatory authorities, covering the fields of space, quantum technology, semiconductors, and energy.
- In June **2022**, authorities amended the **Regulations Governing the Approval of Investment or Technical Cooperation in Mainland China,** which now require Taiwanese firms to obtain approval if they plan to sell their local assets and factories or transfer their equities in China, to avoid the risk of technology leakage.
- Stricter administrative rules issued in **2022** on **foreign direct investment screening** aim to prevent circumvention by firms from the People's Republic of China (PRC). These rules follow changes made in 2021 to tighten the definition of a 'PRC investor' so that a third-area company can also be defined as such.
- The **Foreign Trade Act (2019)** provides the legal basis for managing Taiwan's export control regime and the trade in strategic high-tech commodities. The strategic high-tech

commodity entity list currently includes over 7 000 items, for which Taiwanese exporters must obtain an export licence from the International Trade Administration of the Ministry of Economic Affairs of Taiwan.

6. International partnerships

BILATERAL PARTNERSHIPS

6.1 United States

- **US-Norway**: On 30 September **2024**, the US Secretary of State and the Norwegian Minister of Foreign Affairs signed the **Memorandum of Cooperation on High-standard, Market-Oriented Trade of Critical Minerals**, which aims to secure the critical mineral and clean energy supply chains of the US and Norway. The memorandum thus formalises the countries' intent to advance high labour and environmental standards while maintaining and identifying appropriate responses to non-market policies and practices in third countries.
- **US-Argentina**: On 23 August **2024**, as part of the US-Argentina Energy Security Dialogue, the US Under Secretary of State for Economic Growth, Energy, and the Environment and the Argentine Minister of Foreign Affairs signed a memorandum of understanding to strengthen cooperation between the US and Argentina on **critical minerals**. It aims to promote trade in critical minerals and investment in critical mineral resource exploration, extraction, processing, refining, recycling and recovery, in line with the counties' shared interest in energy transition and deploying clean energy technologies. It sets the direction for further collaboration on sector governance, investment, and global supply chain security in the area of critical mineral resources.
- **US-Peru**: On 29 August **2024**, the US Under Secretary of State for Economic Growth, Energy, and the Environment and the Peruvian Minister of Foreign Affairs signed a memorandum of understanding to strengthen cooperation between the US and Peru on **critical minerals**. In line with the two countries' common interest in diversifying and securing global critical mineral supply chains, this memorandum sets the direction for further collaboration on sector governance, investment, and global supply chain security in the area of critical mineral resources.
- **US-India:** During the Trade Policy Forum held in New Delhi from 12 to 14 January **2024**, both parties committed to launch future joint initiatives in areas including critical minerals, customs and trade facilitation, supply chains and trade in high-tech products. The parties agreed to set up a **Joint Facilitative Mechanism** to mitigate non-tariff barriers and enter into mutual recognition agreements on a bilateral basis wherever possible.
- **US-India:** On 3 October **2024**, the Indian Minister of Commerce and Industry and the US Secretary of Commerce signed a **memorandum of understanding on critical raw materials** aiming to keep supply chains open and foster collaboration between India's Ministry of Mines and the US government. During its visit to Washington, the Indian Minister of Commerce also co-chaired the sixth meeting of the India-US CEO Forum. The two countries discussed opportunities for American investment in 20 of India's upcoming industrial cities to foster mutual growth besides prospects to collaborate in critical sectors such as defence, space, semiconductors, telecoms, artificial intelligence, and clean energy**.**

- **US-UK:** On 8 June **2023**, the two countries announced the intention to negotiate a bilateral **critical minerals agreement**. President Biden and Prime Minister Sunak said that this targeted agreement will ensure that five critical minerals necessary for batteries – cobalt, graphite, lithium, manganese and nickel – that are extracted or processed in the UK count towards the sourcing requirements for clean vehicles eligible for the Section 30D clean vehicle tax credit of the Inflation Reduction Act. In May 2024, senior officials representing the US and the UK governments met at the White House to discuss progress and next steps since the June 2023 Atlantic Declaration for a Twenty-First Century US-UK Economic Partnership. Officials discussed how to advance efforts to build resilient clean energy supply chains, including how to advance negotiations towards a critical minerals agreement.
- **US-Australia:** In May **2023**, Australia and the US signed the Compact on **Critical Minerals and Clean Energy**. The inaugural meeting of the Australia-US Taskforce on Critical Minerals that arose from the compact took place on 2 October 2023. The task force aims to expand reliable, responsible and secure global access to critical minerals.
- **US-Canada:** In March **2023**, the US and Canada announced the **Energy Transformation Task Force** to coordinate the countries' efforts on critical clean energy technologies and the related supply chains, including critical raw materials. The task force's stated function is to 'accelerate cooperation on critical clean energy opportunities and supply chains, including but not limited to, securing and strengthening renewable energy and electric-vehicle supply chains, critical minerals and rare earths, grid integration and resilience, advanced and conventional nuclear energy and other areas'. The task force is to be chaired by the US Special Presidential Coordinator for Global Infrastructure and Canada's Deputy Prime Minister.
- **US-India:** In March **2023**, the two countries signed a memorandum of understanding on setting up a **semiconductor supply chain and innovation partnership.** This will seek to create a collaborative mechanism on semiconductor supply chain resilience and diversification, in line with the US's CHIPS and Science Act and India's Semiconductor Mission. The memorandum also aims to leverage the complementary strengths of both countries and facilitate commercial opportunities and development of semiconductor innovation ecosystems. It also envisages mutually beneficial R&D, talent, and skill development.
- **US-Japan:** On 28 March **2023**, the two countries signed a bilateral **agreement on critical minerals**. The agreement is expected to make Japanese companies eligible for Inflation Reduction Act subsidies. It covers five critical raw materials used in electric-vehicle supply chains (cobalt, graphite, lithium, manganese and nickel), and aims to maintain the current practices of not imposing import and export limitations while safeguarding environmental and labour rights. It will be revised every 2 years.
- **US-Republic of Korea:** In May **2022**, the two countries signed a memorandum of understanding on setting up a '**Supply Chain and Commercial Dialogue**' and upgrading their existing working-level industrial cooperation dialogue platform. Under the memorandum, the two countries plan to hold an economic security dialogue between their respective national security councils once a year and discuss a wide range of industry and economic issues, including resilient supply chains of semiconductors and other high-tech items, the digital economy, healthcare technologies and exports control. They also agreed to boost cooperation on R&D, and create more business opportunities. On the occasion of President Yoon's attendance at the 2023 Asia-Pacific Economic Cooperation summit in San Francisco, US companies GM, DuPont, IMC and Ecolab committed to invest in the Republic of Korea.

6.2 Canada

- **Canada-Republic of Korea:** Republic of Korea's Ministry of Trade, Industry and Energy has facilitated the signing of memoranda of understanding between LG Energy and several Canadian companies to strengthen **cooperation on critical mineral supply chains**. These memoranda will help Korean companies to develop new supply chains in North America for secondary batteries and electric vehicles, particularly in conjunction with the US Inflation Reduction Act.
- **Canada-Republic of Korea**: In July **2024**, both countries agreed to an **action plan** to deepen their bilateral relationship and implement the **Canada-Korea Comprehensive Strategic Partnership (CSP)**. The action plan joins together the CSP with the Indo-Pacific strategies to build towards a stronger friendship. It builds on the achievements of the CSP since September 2022 and expands on each of its thematic areas (such as regional security, economy, technology, supply chains, health and climate change) with aspirational initiatives to work together as partners in the Indo-Pacific and North Pacific. A bilateral strategic dialogue between senior officials will review the implementation of the action plan on an annual basis.

6.3 United Kingdom

- **UK-Indonesia:** In September **2024**, the UK signed a **strategic partnership on critical minerals** with the Indonesian Ministry for Energy and Mineral Resources. Recognising the pivotal role that critical minerals play in the global energy transition, both countries committed to setting up a cooperative framework that strengthens collaboration on critical minerals as well as a robust policy framework that promotes environmental, social and governance practices in the sector. The partnership intends to facilitate policy dialogues and the sharing of technical knowledge, skills and expertise, encompassing key areas such as supply chain resilience and security, sustainable upstream and downstream processing, and mineral criticality.
- **UK-Republic of Korea:** On 22 November **2023**, the UK and the Republic of Korea signed the **Downing Street Accord** to broaden the scope of their bilateral economic cooperation to areas such as science and technology, supply chain security, and energy solidarity – focusing on high-tech industries. In February 2022, the two countries signed the **Memorandum of Understanding on Critical Supply Chain Resilience**, calling for holding both senior-level and working-level talks on a regular basis to exchange policy measures and information regarding supply chain issues, and to promote two-way investment and trade.
- **UK-Taiwan:** On 14 November **2023**, the UK and Taiwan announced an **enhanced trade partnership** focused on three priority areas: **(i) investment; (ii) digital trade; and (iii) renewable energy and net zero.** The two partners agreed to cooperate on green trade by developing energy infrastructure, supporting offshore wind deployment in Taiwan through the development of port capacity and financing models, and improving health and safety implementation. Additionally, they agreed to collaborate in emerging energy technologies, to seek to remove barriers to trade in environmental goods and services, and to work bilaterally to build a circular economy, develop skills and share best practice.

- **UK-Japan:** At the G7 Trade Ministers' Meeting in Osaka (28 October **2023**), the UK Secretary of State for Business and Trade and the Japanese Minister of Economy, Trade and Industry signed a **memorandum of cooperation** setting up a new partnership on **critical minerals**. The memorandum delivers on a specific commitment made by leaders in the Hiroshima Accord. It will provide a framework for deepening critical mineral cooperation between the two countries and promote dialogue on a range of areas including: research and innovation, critical mineral data and traceability, industry partnerships and public-private cooperation, infrastructure projects in third countries, cooperation to support developing producer countries, and cooperation on technical standards and environmental, social and governance standards.
- **UK-India**: Both sides launched the **Technology Security Initiative**, which sets out a new approach to collaboration in critical and emerging technologies across priority sectors including telecoms, critical materials, semiconductors, artificial intelligence, quantum, biotech and advanced materials. The initiative seeks to build upon the ambitious cooperation agenda set out in the India-UK Roadmap for 2030.
- **UK-South Africa**: In November **2022**, the two countries announced a new partnership on **minerals** for future clean energy technologies to promote increased responsible exploration, production and processing of minerals in South Africa and southern Africa.
- **UK-Canada:** In March **2023**, the two countries announced a new partnership to increase their cooperation on the supply of critical raw materials. This new **UK-Canada Critical Minerals Supply Chains Dialogue** has the stated objective of integrating the critical raw material supply chains of Canada and the UK, driving higher environment, social and governance standards, and boosting R&D in the field.
- **UK-developing countries**: In **November 2022,** the government announced over **GBP 65 million (EUR 78 million) of investment to help speed up the development of new green technologies**. This pledge will go towards a large-scale industry transition programme, managed by the Climate Investment Funds (to which the UK has committed up to GBP 1 billion (EUR 1.2 billion) through the Ayrton Fund), to help energy-intensive industries in developing economies – including India and Indonesia – to go green. This comes on top of a further GBP 65.5 million (EUR 78.7 million) for the Clean Energy Innovation Facility, which provides grants to researchers and scientists to accelerate the development of innovative clean energy technologies in developing countries.
- **UK-Australia:** In February **2022**, the UK and Australia set up a **capability building initiative for supply chain resilience** to help develop shared understanding of and insight about common dependencies and critical supply chain risks. Its aim is to engage interested countries in developing and improving public-sector approaches to managing critical supply chain risks. The initiative will begin with a pilot project to further determine its scope.
- **UK-Australia:** A **working group** on critical minerals was set up in **2021**. Australia and the UK are continuing to identify investment opportunities that would bolster Australia's critical mineral sector and the UK's manufacturing and energy ambitions.

6.4 Australia

- **Australia-India:** In June **2022**, the two countries concluded a bilateral commercial cooperation agreement on **rare-earth elements** to strengthen supply chains between the two countries in the related sectors.

- **Australia-Republic of Korea:** In December **2021**, the two countries signed a memorandum of understanding on cooperation on **critical mineral supply chains** to further strengthen cooperation on resources and energy. This builds on previous commitments outlined in their 2019 memorandum of understanding on cooperation on energy and mineral resources.
- **Australia-Singapore:** The two countries launched the Australia-Asia Sun Cable project in **2022**. The goal is to develop physical interconnections between Singapore and Australia's electric grids, and to increase Singapore's access to green electricity via massive investment in solar farms in Australia.

6.5 India

- **India-United Arab Emirates:** In September **2024**, India signed a memorandum of understanding with the United Arab Emirates on cooperation on **critical mineral**s exploration in third countries. Work will focus on project identification, conducting joint due diligence, collaborating on risk management strategies, and develop a long-term offtake strategy.
- **India-Singapore:** In September **2024**, the two countries signed a new memorandum of understanding on cooperation on semiconductors.
- **India-US**: In September **2024**, the Indian Prime Minister signed a partnership on the global semiconductor ecosystem with the **US** Department of State.
- **India-Japan**: In September **2023**, the two countries signed a memorandum of understanding on semiconductor design, manufacturing, equipment research, and talent development to bring resilience to the semiconductors supply chain.

6.6 Japan

- **Japan-Peru:** In November **2024**, in the margins of the 2024 Asia-Pacific Economic Cooperation summit, the two countries signed a joint statement accompanied by a **10-year roadmap** and an **updated memorandum of cooperation** between Japan's Ministry of Economy, Trade and Industry, the Japan Organization for Metals and Energy Security (JOGMEC) and the Peruvian Ministry of Energy and Mines (MINEM). This memorandum is intended to intensify cooperation on energy transition and mining technology between the two countries. As specified in the text of the roadmap, it entails joint promotion by JOGMEC and MINEM of information exchange and technical cooperation, and special emphasis is placed on opportunities related to critical minerals.
- **Japan–New Zealand**: In June **2024**, Japan and New Zealand agreed in principle on an **Information Security Agreement (ISA)**. Under the ISA framework, both countries will share classified information on Chinese cyberattacks and their military movements in the region. Japan and New Zealand will also intensify joint military training to deter China's maritime expansion. They will strengthen cooperation in economic security, addressing economic coercion and increasing supply chain resilience.
- **Japan-Malaysia**: In May **2024**, Japan and Malaysia agreed to collaborate in several areas, including decarbonisation, digitalisation, cybersecurity capabilities, and economic security to strengthen supply chains. Moreover, both countries will cooperate in addressing issues such as the situation in the East and South China Seas, and North Korea's nuclear and missile development.

- **Japan-United Arab Emirates:** On 17 July **2023**, on the margins of a state visit by the Japanese Prime Minister, leading to 23 bilateral agreements on strategic technologies and critical raw materials, Japan and the United Arab Emirates signed a **memorandum of understanding for the supply of clean iron and steel**, entailing the development ofa joint framework for collaboration on logistics and digital supply chain requirements and information and expertise sharing on industry best practice. Abu Dhabi Ports will be responsible for providing the land for a new plant, in the KEZAD Musaffah economic zone. It will also offer maritime and logistics services for the supply of iron ore to the plant, and the export of the materials around the world. Emirates Steel Arkan will provide 'extensive decarbonisation expertise' and use clean and green energy sources, including solar and hydrogen, to power the plant.
- **Japan-Brazil**: In May **2024**, the two countries endorsed a joint statement entitled 'Further Strengthening the Brazil-Japan Strategic and Global Partnership', which, among other things, stressed the need to work together in building transparent, diverse, secure, sustainable and reliable supply chains to reduce vulnerabilities in strategic areas and to ensure stable production activities. The statement also welcomed the signing of the memorandum of cooperation between the Brazilian Ministry of Development, Industry, Trade and Services and the Japanese Ministry of Economy, Trade and Industry on the Initiative for Brazil-Japan Industry Co-Creation. Moreover, the two countries endorsed an '**Initiative on Environment Climate, Sustainable Developments and Resilient Economies**', which, in particular: (i) stressed their commitment to achieve net-zero emissions by 2050 and the need to scale up investment to decarbonise automotive value chains, promote recycling and increase energy efficiency; (ii) expressed further support for utilising Japanese and Brazilian start-ups in the field of environmental cooperation; and (iii) recognised the importance of stimulating cooperation and investment in clean energy supply chains, including critical raw materials, sustainable aviation fuel and low-emission hydrogen.
- **Japan-Norway**: In their **Green Strategic Partnership Joint Communiqué** of December **2023**, Japan and Norway reaffirmed their commitment to accelerate the clean energy transition to achieve climate neutrality at the latest by 2050, and recognised the importance of promoting an efficient diversification of supply sources to improve energy security and affordability. The strategic partnership aims to ensure well-functioning and resilient industrial value chains, and to boost trade and investment, energy security, and business cooperation, including on innovation and R&D. It will encompass hydrogen, ammonia, offshore wind, batteries, carbon capture, carbon utilisation and storage, carbon recycling, green transportation, raw and processed materials, and manufacturing. Japan and Norway will also exchange information, share best practice on standards, regulations and certification to expand demand and supply of low- and zero-emission goods and services, and cooperate in developing resilient value chains.

6.7 Republic of Korea

- **Republic of Korea-Peru:** In November **2024**, the two countries signed a memorandum of understanding on critical minerals to strengthen information exchange, joint geological surveys and technological cooperation.
- **Republic of Korea-Africa:** On 4 June **2024**, the President of the Republic of Korea hosted the **Korea-Africa Summit** attended by delegations from 48 African nations. The leaders

adopted a joint declaration on fostering mutually beneficial trade and investment, supporting Africa's industrialisation and the creation of a single market, strengthening economic cooperation frameworks, developing and collaborating on smart, sustainable and resilient infrastructure projects, increasing digital technology integration across sectors, and developing green technologies. The Republic of Korea signed 12 agreements and 34 memoranda of understanding, in particular:

  - **agreements with Madagascar and Tanzania** to cooperate on critical minerals essential for industries like batteries – this includes a commitment to set up a high-level dialogue to ensure a stable supply chain for these minerals; and
  - agreements to expand the **Economic Development Cooperation Fund**, through which Korea offers low-interest loans and grants.
  - Korea pledged to double its current **official development aid to Africa** to USD 10 billion (EUR 9.5 billion) by 2030.
  - Korea will also provide USD 14 billion (EUR 13 billion) in export financing by 2030 to help Korean companies expand trade and investment across Africa.

- **Republic of Korea-central Asia:** In June **2024**, the President of the Republic of Korea announced the launch of the **'K-Silk Road Cooperation' Initiative**, which seeks to create a new cooperation model linking Korea's innovation capabilities with the development potential and abundant resources of five countries in central Asia, including **Turkmenistan, Kazakhstan, Uzbekistan, Kyrgyzstan and Tajikistan**. The initiative has four main partnership pillars: resources, official development assistance, cultural and people-to-people exchange, and government- and private-level networking. Based on these pillars, Korea will focus on tailored cooperation with each of the five nations in the respective areas.
  - **Republic of Korea-Turkmenistan:** Both countries agreed to expand cooperation in large-scale energy and infrastructure projects, as well as shipbuilding, public health and climate change. Eight cooperation documents were signed, including the Trade and Investment Promotion Framework, to pave the way for comprehensive economic cooperation between the two nations. Additionally, several memoranda of understanding were signed between the two nations' governments, financial institutions and hospitals, in the fields of infrastructure and urban development cooperation.
  - **Republic of Korea-Kazakhstan:** Both countries signed more than 30 agreements to cooperate in the field of critical minerals, energy and climate change responses. One key agreement is a memorandum of understanding on a **critical mineral supply chain partnership**, which will pave the way for comprehensive cooperation on the extraction and development of critical minerals, including lithium, chromium, manganese and uranium. Other agreements cover joint lithium mine exploration and development, technology cooperation for the commercialisation of rare metals, such as lithium, tungsten and titanium, and renovation and modernisation of power plants and thermal facilities.
- **Republic of Korea-the Philippines:** In October **2022**, during their annual economic cooperation committee, the two countries agreed to sign a memorandum of understanding on the supply of critical minerals and other raw materials for industry purposes, and to launch working-level talks on the details. Under the memorandum, a new director-level entity on supply chains is expected to be set up.
- **Republic of Korea-Chile:** In October **2022**, on the occasion of the bilateral dialogue at prime-ministerial level, the Korea Mine Rehabilitation and Mineral Resources Corporation

signed a memorandum of understanding with its Chilean counterpart on the supply of mineral resources.

- **Republic of Korea-Indonesia:** In February **2022**, the Republic of Korea and Indonesia signed a total of five memoranda of understanding to boost bilateral cooperation in the supply chains of key minerals and the electric car sector. The memorandum on key minerals, in particular, called for information sharing between the two ministries of trade and industry and supporting related joint projects to help ensure that the countries have a stable supply of major industry items.
- **Republic of Korea-Uzbekistan:** In December **2021**, the two countries signed memoranda of understanding to create a communication channel for energy, cooperate in producing rare metals, and join efforts to develop industrial technology for electric vehicles.

PLURILATERAL AND MULTILATERAL PARTNERSHIPS

- **UK-US-Australia**: In **September 2024**, the UK, the US and Australia signed a memorandum of understanding setting up a new trilateral collaboration to strengthen strategic cooperation and address risks to critical supply chains. It envisages to set up an Australia-UK-US **Supply Chain Resilience Cooperation Group** to cooperate on data sharing and to take joint action to build resilience in priority supply chains, improving the mutual ability to identify and address risks, threats and disruption to critical supply chains. The group will develop an early warning pilot **focused on the telecommunications supply chain**.
- **Biopharmaceutical Alliance (Republic of Korea, US, Japan, India, EU):** In June **2024**, the Republic of Korea, the US, Japan, India and the EU launched an alliance to jointly build a resilient supply chain in the biopharmaceutical sector, in response to the drug supply shortages experienced during the COVID-19 pandemic.
- **Japan-US-Republic of Korea**: In June **2024**, Japan, the US and the Republic of Korea agreed to identify potential supply chain vulnerabilities for strategic goods resulting from a wide range of non-market policies and practices, as well to strengthen supply chains for critical minerals and clean energy, semiconductors and electric cars. The trio also agreed to deepen cooperation on artificial intelligence, cybersecurity and other advanced technologies, including those associated with export controls, research, and developing international standards.
- **The Indo-Pacific Economic Framework for Prosperity (IPEF) involves 14 partners (including the US, the Republic of Korea, Japan, India, Australia and members of the Association of Southeast Asian Nations (ASEAN)).** The Supply Chain Agreement, the Clean Economy Agreement, and the Fair Economy Agreement have entered into force and aim to further deepen economic cooperation and to deliver concrete benefits.
    - **The IPEF Supply Chain Agreement** was signed in 2023 to set up a framework for deeper collaboration to prevent, mitigate and prepare for supply chain disruptions, such as those experienced during the COVID-19 pandemic. Three supply chain bodies – the Supply Chain Council, the Crisis Response Network, and the Labor Rights Advisory Board – were set up to implement this agreement.
    - **The IPEF Clean Economy Agreement** aims to create an economic framework to support the IPEF partners' efforts towards achieving their respective climate goals by accelerating the deployment of clean technologies and facilitating

investment. It also outlines incentives to support the implementation of the agreement, such as financing and technical assistance and capacity building, and to advance cooperation on developing and deploying clean energy and climate-friendly technologies, facilitating investment in climate-related projects, connecting markets through policies and standards, and promoting low- and zero-emission goods and services. To support this agreement, the first **Clean Economy Investor Forum** gathered the region's largest investors and innovative project proponents, companies, and multilateral development banks to exchange market insights, explore business opportunities, and develop a pipeline of investment opportunities. The Investor Forum identified priority infrastructure projects for consideration worth over USD 23 billion, and launched the **IPEF Catalytic Capital Fund** to deploy concessional financing, technical assistance, and capacity-building support to expand the pipeline of quality, resilient and inclusive clean economy infrastructure projects in emerging and upper-middle income economies party to the IPEF Clean Economy Agreement. The fund's founding supporters include Australia, Japan, the Republic of Korea, and the US, which plan to provide USD 33 million (EUR 31 million) in initial grant funding to attract up to USD 3.3 billion (EUR 3.1 billion) in private investment.

- The **Asia Zero Emission Community** (AZEC) is a framework for decarbonisation in Asia founded by **Japan** in January **2023**. It aims to develop technologies and rules to meet the increased electricity demand and to reduce CO_2 emissions. It entails the participation of 11 partners countries, namely nine ASEAN members (all except Myanmar), Japan and Australia. The **Action Plan for the Next Decade**, agreed at the second leaders' summit, held in Laos in October 2024, has the following main points: (i) promoting 'AZEC solutions' (including visualisation of greenhouse gas emissions throughout the supply chain, transition financing, decarbonisation of all industrial sectors); (ii) launching sectoral initiatives; and (iii) promoting tangible projects led by Japan and Australia. Among other things, it envisages to introduce perovskite solar cells and common rules for calculating and reporting greenhouse gas emissions in Japan and ASEAN countries.
- **Chip 4 Alliance (US, Japan, Republic of Korea, and Taiwan)**: Announced in March **2022,** the Chip 4 Alliance is a US-led cooperation forum for governments and companies to discuss and coordinate policies on semiconductor supply chains, workforce development, R&D, and subsidies.
- **The Quad (US, Australia, India and Japan) has set up a Critical and Emerging Technology Working Group** (**2021**) to monitor and improve the security of supply chains for critical technologies. The working group promotes global technology markets and standards based on openness, diversity, trust and resilience. It cooperates on technical standards, 5G, horizon scanning, and technology supply chains.
- **Australia-India-Japan:** In **2021**, the three countries set up the **Supply Chain Resilience Initiative** to cooperate on supply chain resilience in the Indo-Pacific region. Cooperation consists of sharing best practice on supply chain resilience and holding an investment promotion / buyer-seller matching event.
- **US-Mexico-Canada:** The US-Mexico-Canada Agreement (**July 2020**) includes provisions to promote transparency and accountability in supply chains, particularly in relation to labour and environmental standards. These provisions require companies to disclose information about their supply chains, investigate allegations of forced labour or human trafficking, and take corrective action in response to findings. The agreement also sets up a

framework for implementing and enforcing these provisions, aiming to prevent forced labour and human trafficking, protect workers' rights, and promote environmental sustainability.

[1] This document is a non-exhaustive list of resilience measures to date taken by the EU's key international partners.
[2] The data used in this inventory is publicly available and has been collected through the knowledge and intelligence of Commission services and EU delegations, notably in media articles, press releases, official governmental documentation, as well as from interactions with respective public authorities.
[3] 300052290.pdf (jogmec.go.jp)