Global supply chain disruption during the pandemic and war

Insights from Polish enterprises

ING and EEC report

European Economic Congress

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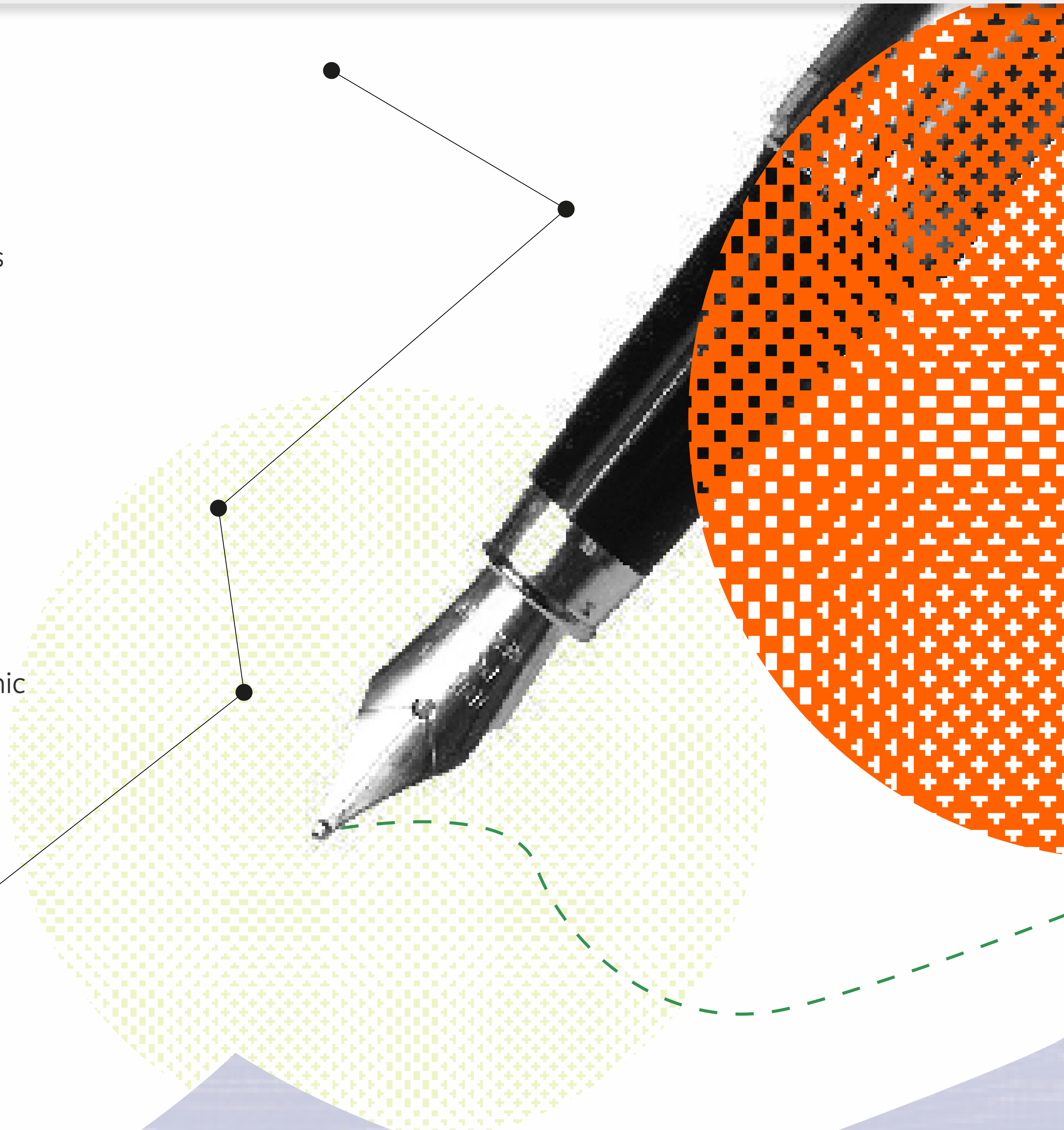


Introduction

In the past two years, the world has been impacted by two huge negative shocks, which posed a threat to basic human needs and severely disrupted business conditions. The Covid-19 pandemic created a health emergency, while the Russian invasion of Ukraine undermined well-established security foundations in Europe, and around the world. Russia attacked Ukraine at a time when the global economy was just starting to return to the "new normal".

The "old normal", characterised by the West's dependence on production and supplies from Asia as well as a dependency on sensitive goods, such as active substances in pharmaceuticals, is now in demise. Imports from China have been delivered mainly by maritime transport, and freight rates, which exploded during the pandemic, are controlled by Chinese carriers.

Our project provides evidence at the micro level to confirm the resilience of the Polish economy to external shocks, as highlighted by macroeconomic indicators. The Polish economy reached its pre-pandemic GDP level in 2Q 2021.

The pandemic shock was an asymmetric one – services suffered most, but not all services, e.g. ICT or transport and logistics, experienced a substantial demand boost in the aftermath. Also, industry fared well during the pandemic, but not all segments were alike. More generally – Polish firms passed a difficult test and elastically adjusted to new conditions.

Lessons from the pandemic require change; specifically, a larger emphasis on the security of supplies, which requires a diversification of supply and the maintenance of higher levels of inventories.

ING Bank Śląski helped Polish firms during the pandemic, for example by distributing funds from government support schemes to small and medium enterprises in 2020, and with increased credit activity in 2021. We have cooperated with partners through the various levels of the supply chain, promoting activities which also fit our own priorities: digitalisation, sustainability, and the security of entrusted funds and transactions.

PTWP Group, the organizer of the European Economic Congress (EEC) also suffered from the negative effects of the pandemic, but went unscathed from this shock. We continue – both through organising events and using our media channels – to broadcast in an objective manner, analyse the latest developments, initiate public debate, and provide projections for the future. Through various undertakings, we support the business community.

We can offer assurance that both ING Bank Śląski and PTWP Group will continue its key activities amid the war in neighbouring Ukraine, sanctions on Russia and Belarus, and elevated geopolitical risks. The war poses a direct threat to Polish companies trading with the East, and indirectly to the economy as a whole, through increased uncertainty, and higher prices of energy, metals, and food. We must phase out fossil fuels from Russia in order to cut off its revenue from energy and other commodities exports.

Let us make an effort to support the potential of the Polish economy by providing financing and sharing knowledge and lessons amid this unstable external environment This joint report fits our common purpose.

Michał Mrożek
Vice President,
ING Bank Śląski

Wojciech Kuśpik
Founder and organizer of the European Economic Congress,
CEO of PTWP Group

Contents

Summary: Poland in global supply chains during the pandemic and war

Disruptions in global supply chains during the pandemic:
In early 2020, the outbreak of the Covid-19 pandemic was a huge shock to the global economy and triggered many structural changes (e.g. increased the role of industry at the expense of unavailable services, remote work), and accelerated other megatrends (automatisation, digitalisation, sustainability).
As different regions recovered from the pandemic-induced recession in 2021 in a broadly uncoordinated manner, a series of problems were revealed. Bottlenecks in international trade emerged. There were problems with deliveries of some components (microchips). Costs jumped suddenly (e.g. of maritime freight), and there were delays in production and deliveries.
In global supply chains, the role of security and diversification of supplies became more important in corporate decision-making, with price, which was the single decisive factor before, no longer the sole driver.

**Reaction of Polish firms to global supply chain problems.
ING Bank Śląski and EEC project:**
Polish firms were affected differently by the pandemic, depending on the sector. But they weathered the shock well – with a diversified approach to purchasing policy, changes in inventory management, and a diversified base of subcontractors.
The pandemic initially brought a suspension of investment spending – due to increased uncertainty – and strategic decisions regarding future investments followed.
However – due to the diversified economy, flexibility and generous public support – the Polish economy returned to its pre-pandemic GDP levels relatively quickly. Polish firms exited the pandemic with newfound experience and resilience – trends which were confirmed in our qualitative research, covering about 30 companies from various economic sectors. The interviews, commissioned by ING Bank Śląski, were conducted by journalists of WNP.PL portal between January and mid-March 2022.

Russia's invasion of Ukraine - another huge supply shock:
A reversal of record-high Omicron cases, which turned out to be less deadly than the previous variant of coronavirus, coincided with the Russian invasion in Ukraine on 24 February, 2022. The war brought about similar economic effects as the pandemic, with some of a higher magnitude – e.g. on the energy, metals and food markets.
The West reacted to the Russian aggression with successively implemented financial and economic sanctions, imposed by governments and the EU, and voluntary sanctions from global corporates, with notable exceptions. Many foreign firms suspended or closed their operations in Russia. The US and Canada swiftly introduced a full embargo on Russian energy. The EU decided to reduce Russian natural gas supplies by two-thirds through the end of 2022, and phase out Russian fossil fuels through the end of 2027. The war translated into sudden hikes and increased volatility in global and European prices of energy and metals (of which Russia is an important producer), and food as Russia and Ukraine have a significant share in global trade of food commodities.

A new wave of disruption in global value chains is ahead of us:
Will the changes in international trade driven by trade wars, the pandemic, and now Russia's invasion of Ukraine translate into a new bifurcated world? The divergence between the main players in the global economy has been rising for many years. The war means a new wave of global supply chain disruption. It will lead to another adjustment by Polish enterprises – directly by those trading in the East, and indirectly – by the economy as a whole. In addition to the limitations resulting from the geographic distance and the rising cost of international transport, other arguments speak in favour of changing polices and investment in the EU.
A forced reallocation of capital from the (far and near) East could benefit Poland as a so-called frontier area. This will, however, require investor confidence, specifically that the eastern NATO flank is secure. Price increases in energy and other commodities may complicate access to key components in war-torn Ukraine, and Russia which has been hit by economic and financial sanctions. The war, which unlike the pandemic has mainly affected industry, will force companies to search for diversified suppliers.

Disruptions to global supply chains during the pandemic

Covid-19: unprecedented shock to the global economy

The outbreak of the Covid-19 pandemic in China in late 2019 / early 2020 morphed into a global pandemic within a few weeks. The government's response to the first wave of the pandemic in the spring of 2020 was a severe lockdown, which led to a halt in business activity and sharp reduction in people movement. This mainly affected the services sector, but was also relevant to global trade.

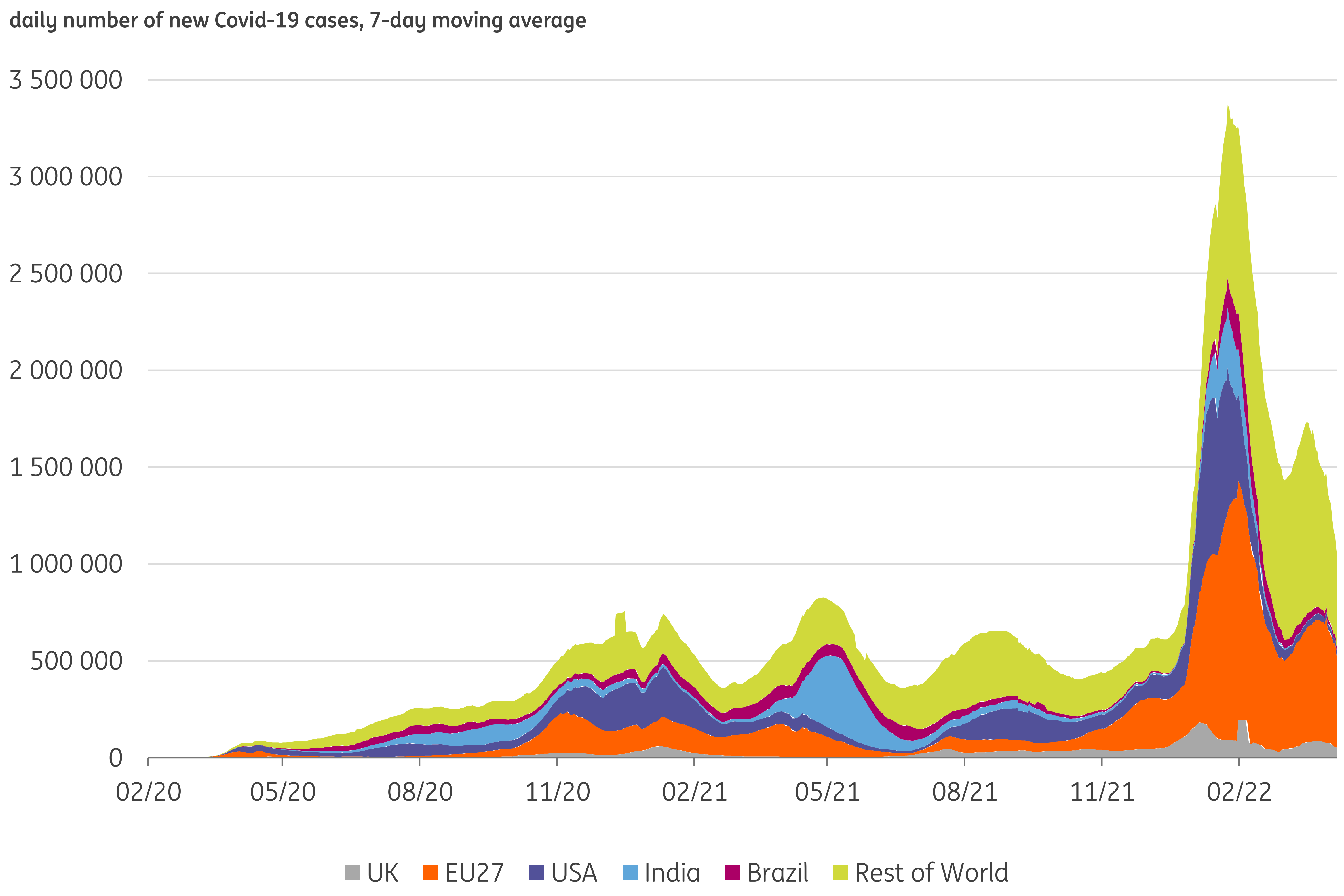
Subsequent waves of the pandemic led to milder economic constraints, as vaccines were rolled out in late 2020 and early 2021 (Chart 1). The fifth wave of Covid-19 – contagions with the highly infectious Omicron variant from late 2021 and early 2022, did not translate into an increased number of hospitalisations or deaths.
After new cases peaked in mid-January, they remained on a downward path. Higher contagion rates were concentrated in Asia (Korea, Vietnam) and some EU countries (e.g. Germany). However, most countries decided to lift restrictions in early 2022.
China was a notable exception. The Chinese authorities decided to stick to their zero Covid policy, which resulted in severe lockdowns, including at big ports and cities.

Authorities in Beijing opted for such a policy from the beginning of the pandemic and continued in 2022. This is reflected, for example, by the three week lockdown of 17 million people in Shenzen in early March 2022 (a port city on the border with Hong Kong and an important technological hub). In late March, China introduced a week-long lockdown of 27 million people in Shanghai.

New Covid-19 cases, hospitalisations, and deaths in Poland were broadly in line with trends in Western Europe, frequently occurring with a one to two week lag. Poland was particularly affected by the second (autumn/winter 2020), third (spring 2021) and fourth pandemic waves (autumn 2021). The fifth wave of the Omicron variant in early 2022 turned out to be a relatively mild one.

The pandemic waves were generally followed by restrictions and economic revival after their relaxation. We saw an economic revival in mid and late summer 2020 and in autumn 2021.
Over time, the restrictions became looser, with the Polish economy becoming more resilient to new waves.

Figure 1: Daily number of new Covid-19 cases, 7-day average



Source: ING calculations based on John Hopkins University data.

Strong response from monetary and fiscal authorities

The sudden halt of economic activity after the Covid outbreak led to disruption in production and then a collapse in demand in many sectors. It very quickly became apparent that the economy is a system of interconnected vessels and a disruption in one sector causes almost a chain reaction/ domino effect in others.

Governments and central banks - after the experience of 2009- 2013 - responded to the pandemic shock with significantly larger anti-crisis packages, both fiscal (Figure 2) and monetary (interest rate cuts to around 0% and large-scale quantitative easing programmes). Nevertheless:

1. Monetary and fiscal support has been uneven in different countries. In general, the more developed countries had more fiscal space and greater opportunities for monetary stimulation; among them, the US showed particularly strong determination. The limitation was the existing level of public debt, in which case the main role was taken by guarantee instruments.

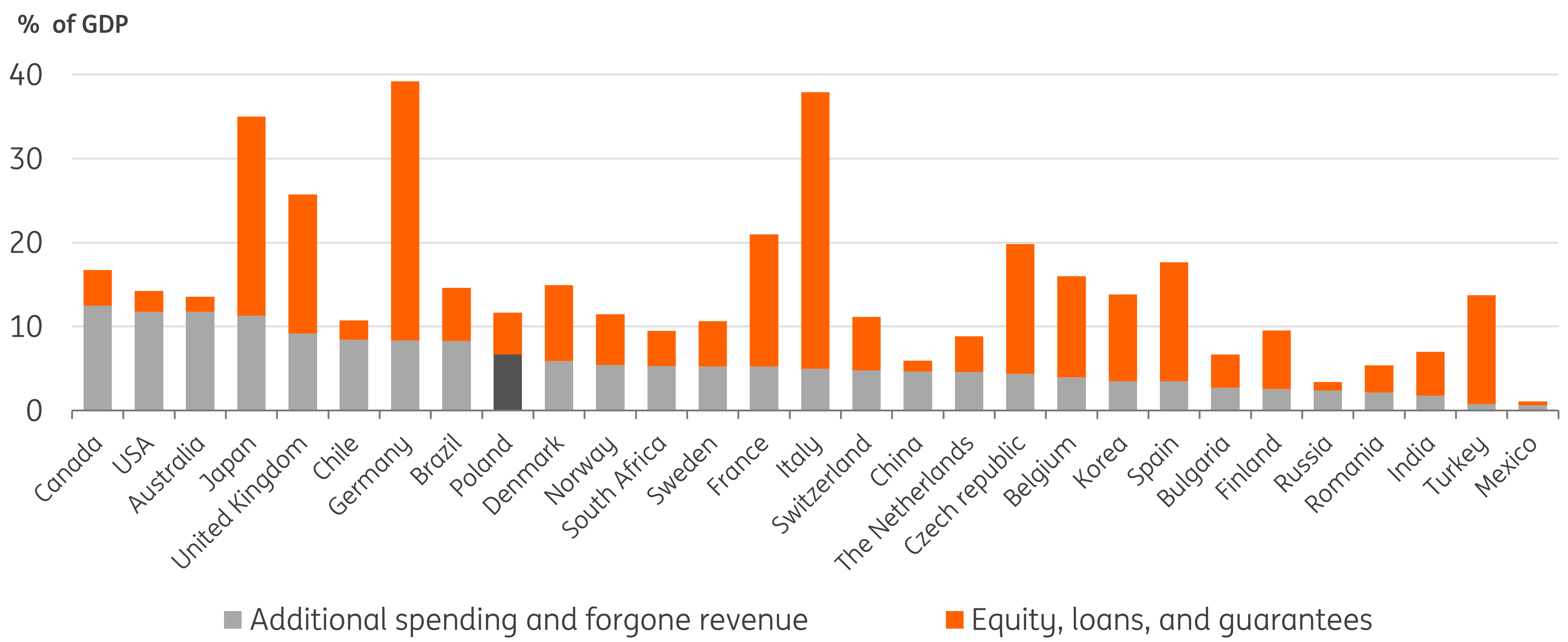
2. Fiscal support was directed at either protecting workers' incomes (US) or jobs (Europe). Companies received aid to secure liquidity and to prevent bankruptcy. Poland's anti-crisis support programmes also achieved these goals - with huge monetary stimulus and a spike in public debt.

3. The lack of coordination in introducing lockdowns or local restrictions was visible even in the most integrated area such as the European Union. Mobility restrictions and formal requirements were set at the level of individual countries.

4. Countries were also uneven in implementing their Covid-19 vaccination programmes and initially struggled with limited access to vaccines, which had yet to receive proper regulatory approval. The fastest countries to roll out vaccines were Israel, the US and the UK. In EU countries, rollouts accelerated in the last days of 2020, but virtually all countries encountered a significant demand barrier about six months after they began.

5. China was clearly different from other markets because of its zero Covid policy. There were instances where the detection of just one Covid-19 infection caused a port to be closed for two weeks. This had many implications for global trade due to China's role as the „factory of the world."

Figure 2. Value of government anti-crisis programmes announced in spring 2020 in response to Covid-19, % of GDP



Source: IMF, WEO, October 2020.

> When the pandemic hit in 2020, China's ports came to a standstill, leaving huge numbers of containers idle. Later, when the economy took off, there were queues of ships, especially on the US west coast, waiting to unload. In that light, a blockage in the Suez Canal for almost a week really didn't matter much.

Sławomir Michalewski,
Vice-President, Maritime Port of Gdansk

Shift in demand from services to goods

In the early days, the pandemic appeared to be a symmetric shock (Covid was seen as the big equaliser). However, the situation quickly changed as lockdowns affected the service sector to a much greater extent, particularly sectors exposed to direct customer relationships. The HORECA (hotel-restaurant-catering/cafe) sectors, which could not be delivered remotely and could only operate under a strict sanitary regime, suffered more than most. Many young workers were employed in these sectors and as such, the lockdowns hit this group particularly hard. They were most reliant on public assistance.

The distinctly different economic situation in industry and services is shown both by hard data from national accounts on value added in sectors, and by soft economic indicators such as the PMI. For example, Polish GDP fell by 7.8% year-on-year in 2Q 2020, but the fall in value added in the „accommodation and catering" sector was over 80% YoY. After a temporary rebound in the following quarter, this sector recorded declines in the next two quarters, while the rebound in the other sectors became more pronounced.

Before the pandemic, PMI data (an example for the eurozone) showed a better performance for services than industry. But during the first wave of the pandemic, the PMI decline in services was clearly deeper than in industry, which remains below the 50 point mark. This key level in the PMI survey separates economic expansion from contraction. At the time of the pandemic, the services PMI in the euro area followed the path of local Covid restrictions, while the industrial PMI largely reflected fluctuations in access to materials and production parts due to supply disruptions or shortages of components such as microprocessors in car manufacturing.

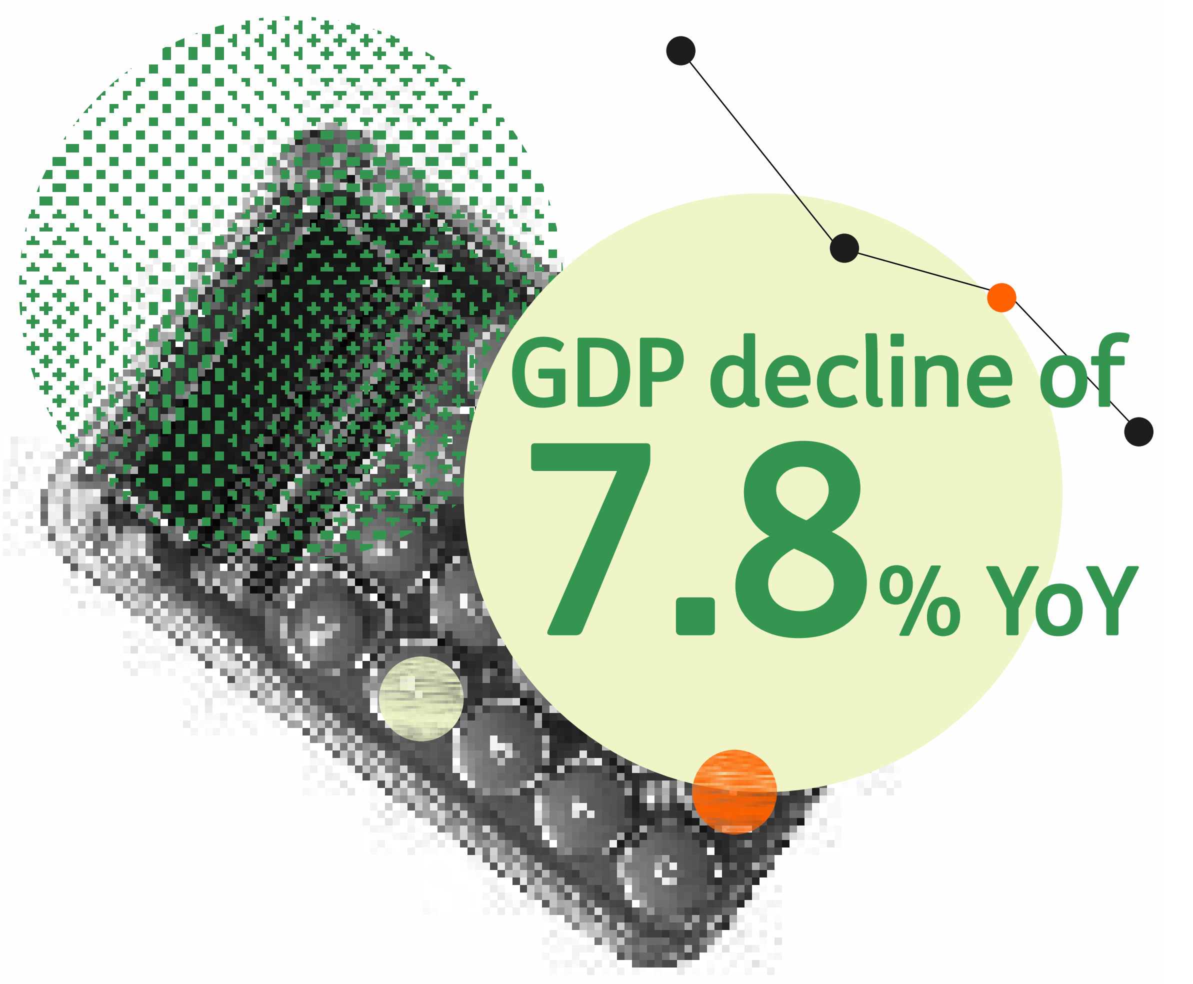
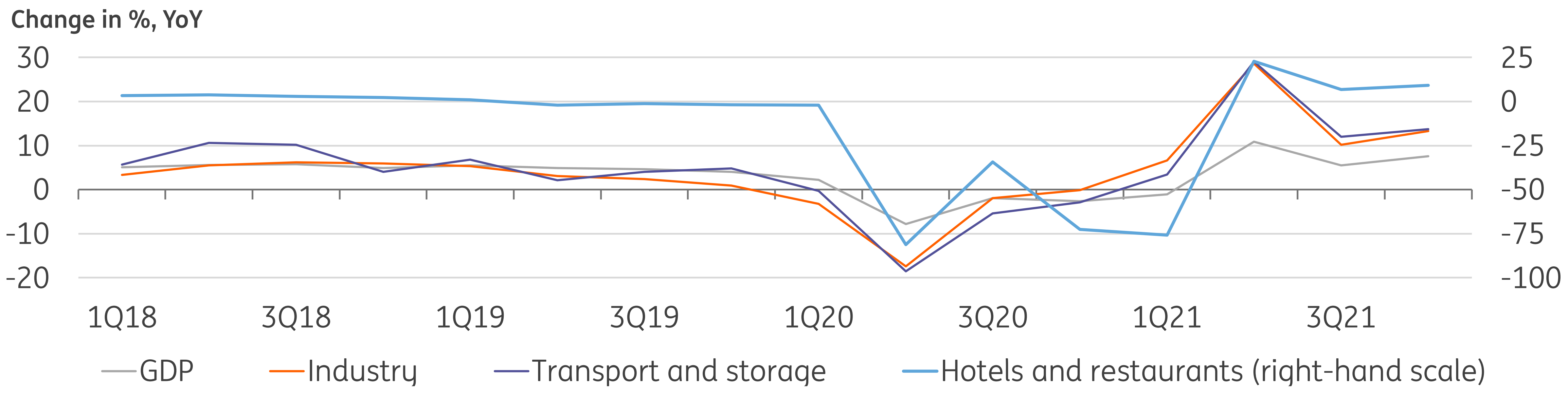
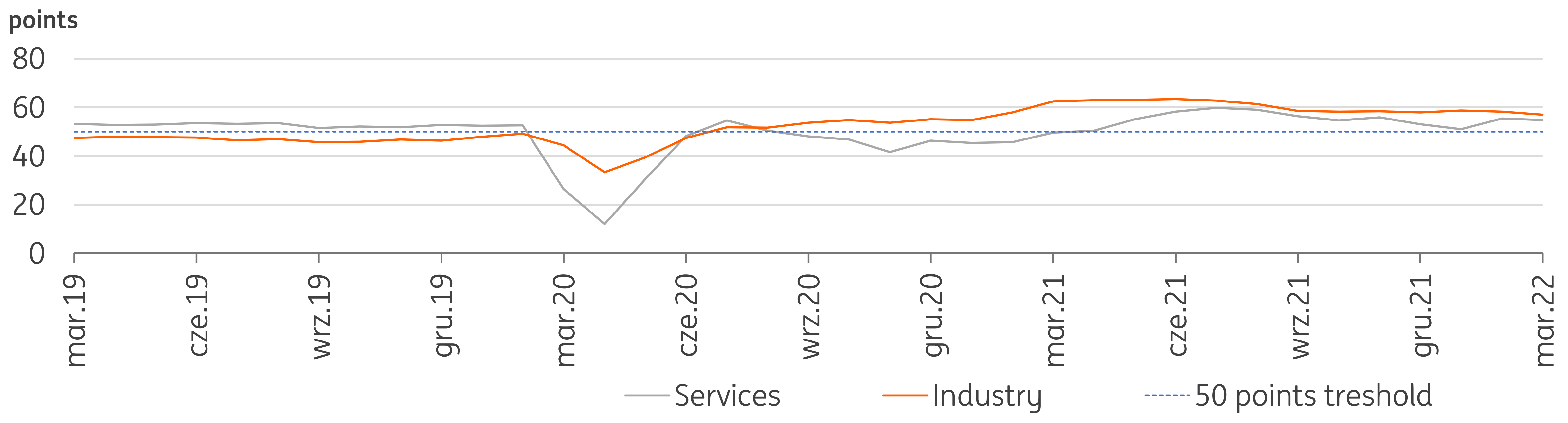


Figure 3. GDP and value added in industry and selected services in Poland 2018-2021



Source: GUS.

Figure 4. PMI for industry and services in the euro area 2019-2022



Source: Markit via Bloomberg.

Lockdowns forced people to save and deferred demand

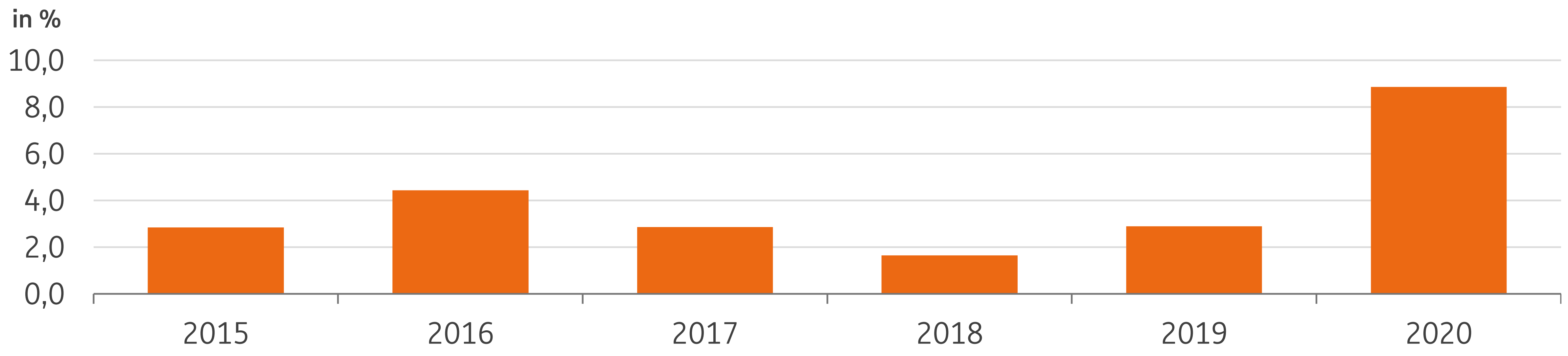
Changes in sectoral production were largely driven by changes in consumption patterns. Remote working (where possible) and the lack of access to many services, especially in times of hard lockdown (hotels, restaurants, entertainment) hit these sectors. But at the same time, many commodity producers saw an increase in demand, including for food, alcohol, electronics and video games, as well as furniture.

With generally effective government intervention to protect firms, employment and workers' incomes, it has been difficult to „make up" for previously unrealised expenditure during the opening-up of economies. This was also due to the limited availability of services or goods resulting from disruptions in global supply chains. Therefore, during the pandemic, involuntary savings increased - especially during periods of heightened restrictions – with demand increasing once restrictions were eased. According to our estimates, the household savings rate in 2020 (almost 9%) was three times higher than in the last few years (Figure 5).

In the tradable (industrial) goods segment, not all goods benefited from the lack of available services. The intermediate capital goods segment suffered greatly, as the uncertainty surrounding the pandemic stalled the investment plans of many companies - despite record low interest rates. Public investment also weakened in the first phases of the pandemic, which may have been due to delays in organising public procurement.

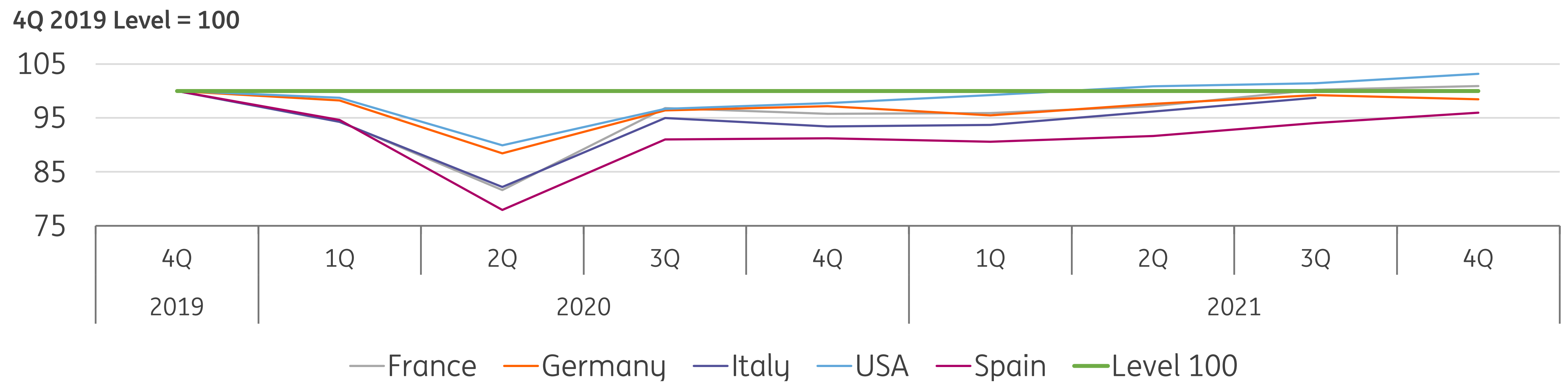
However, the uneven recovery in the global economy, as generally illustrated by GDP changes in the US and several euro area countries (Figure 6), translated into disruptions in global supply chains. This relationship was rather two-way. Demand fluctuations led to disruptions in supply chains, and disrupted supply chains were reflected in production, leading to adjustments in demand.

Figure 5: Household savings rate in Poland 2015-20



Source: ING calculations based on CSO, NBP data.

Figure 6. The level of real GDP in 2019-21 in selected countries



Source: ING calculations based on Macrobond data.

Chronology of disruptions in global supply chains - worst in spring 2020 and winter 2021/22

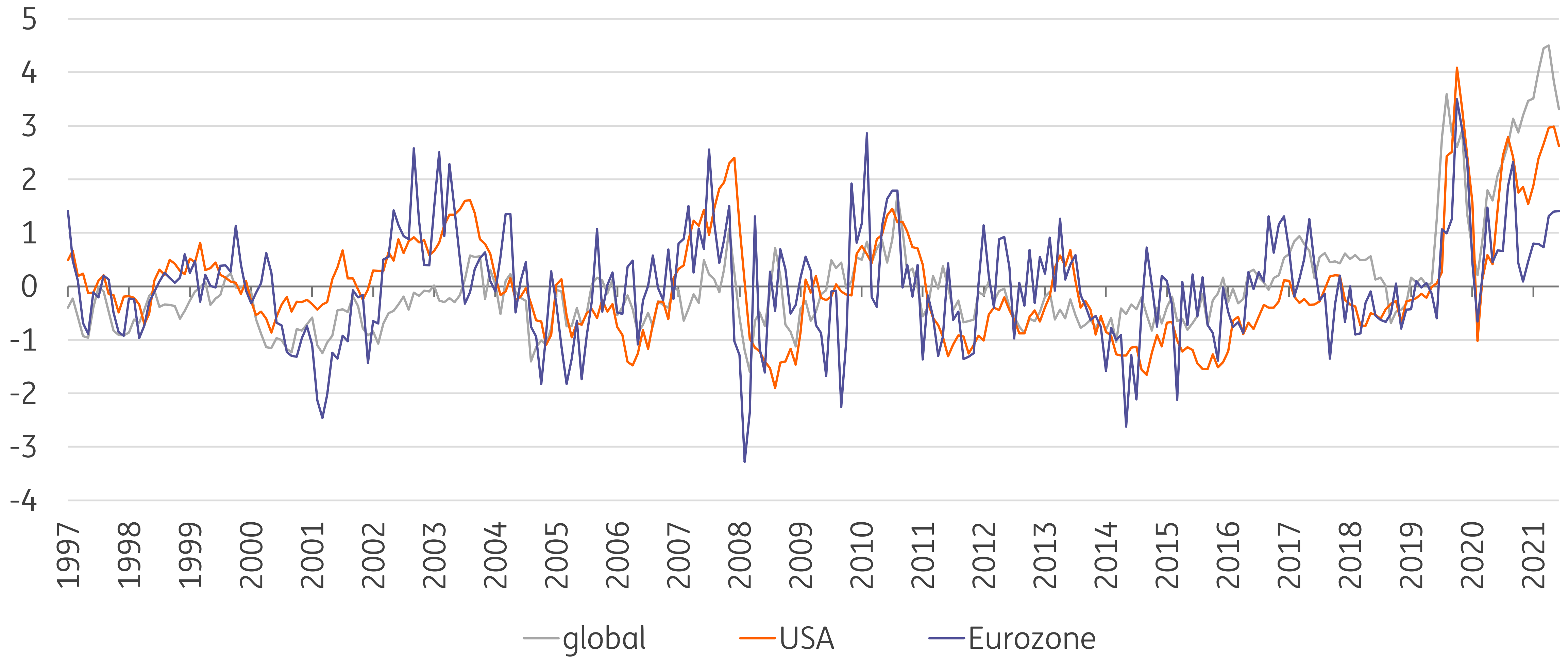
The pandemic marked a profound change in the global macroeconomic situation and disrupted the globalisation process that had been underway for several decades. This was evident in the systematic increase in the volume of international trade. This trade was carried out at the company level within increasingly complex global supply chains, rather than through bilateral trade between countries as in the past. According to WTO estimates, **around two-thirds of global trade flows involve global supply chains.** For global companies, this was driven by the comparative advantages of countries such as China (in terms of production costs) and the opening up to foreign investment. Exports were treated here as a lever for the development of the economy and a way to lift people out of poverty.

In early 2022, the New York Fed estimated a new barometer of pressure in global supply chains, which allows for retrospective facts, taking into account a certain set of economic indicators on a global basis. The latest update of this index - from March 2022 - shows that in 2021/22, the situation in global supply chains was even worse than after the pandemic (although already slightly better in Europe) and at the same time, the worst in 25 years (the index goes back to 1997). The index covers, among other things: freight and air transport costs, PMI and ISM components describing delivery delays, adjusted for demand effects for seven markets: US, Eurozone, UK, China, Japan, South Korea and Taiwan.

Unsurprisingly, the barometer of supply chain disruption was markedly elevated in the early days of the pandemic - in the spring of 2020. This was due to the huge uncertainty and acute response of governments to the risk of infection in the form of nationwide lockdowns, which would have meant a collapse of production and trade flows. In contrast, the record high pressure on global supply chains in late 2021 came from the uneven recovery of different economic sectors and regions in the global economy from pandemic shocks. The release of deferred demand, resulting from forced austerity, juxtaposed with supply-side bottlenecks, including in the labour market, caused disruptions in accessing many raw materials, components and products, and exacerbated cost pressures.

Figure 7. Fed supply chain pressure index: far from normal by early 2022

multiple of standard deviation for the period 1997-2022



Source: New York Fed, March 2022.

In the components of the Fed barometer, indicators corresponding to transport costs and mobility play an important role. The group of TSL sectors (transport-shipping-logistics) including, in particular, the operation of ports and maritime transport (dominance of Chinese companies), have played a significant role in disrupting supply chains. Pandemic restrictions and related fluctuations in supply and demand on global markets have disrupted the previous smooth functioning of the sectors mentioned. They experienced a surge in demand that they could not fully or quickly meet; they were also affected by problems related to the inability to expand or replace their fleets, or to find new vessels.
They have also experienced issues due to their inability to expand or replace their fleets, or due to difficulty in finding workers, especially drivers.

An explosion in maritime freight prices

In a globalised economy with so much dependence on inputs from other markets, the supply response to fluctuations in demand could not possibly be instant. International transport, which is about 90% based on sea freight, was not ready to handle fluctuations in demand. Covid outbreaks, which led to the closure of entire cities or ports in China, translated into delays in port handling and an explosion in freight rates from China. Supply chains depend on smooth transportation and transshipment, so even a short bottleneck at one stage can result in a significant increase in overall transportation time.

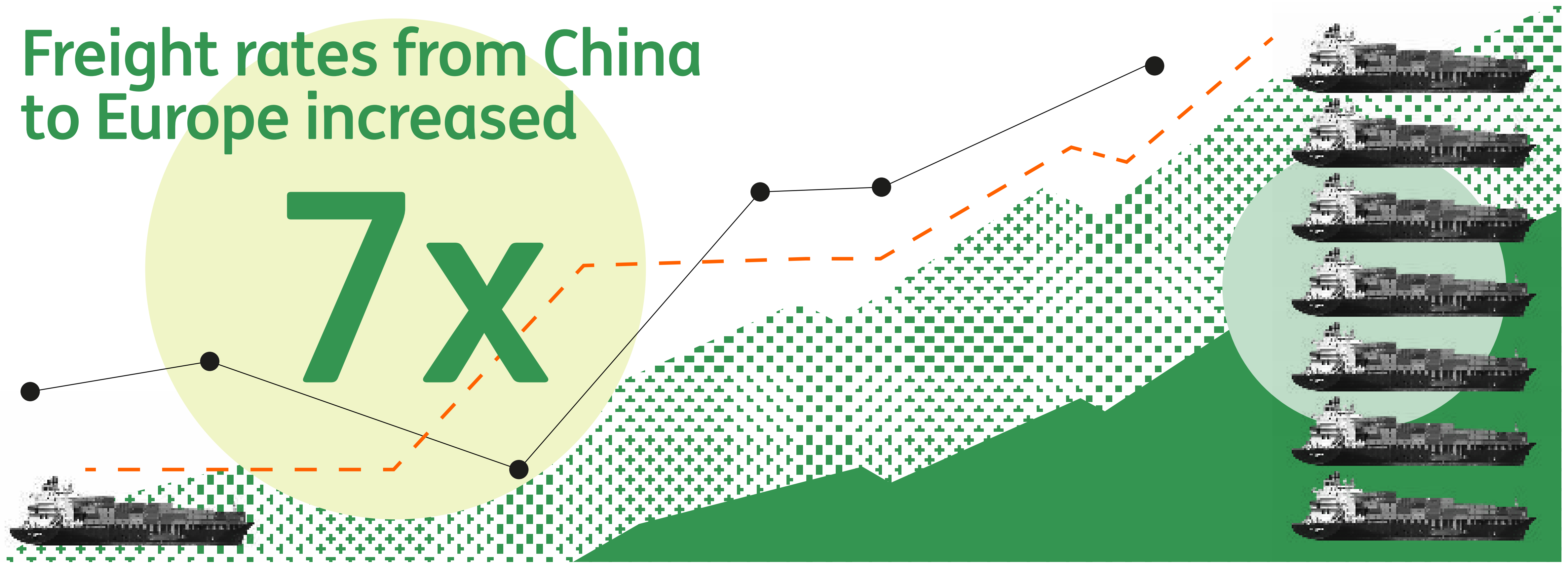
Freight rates from China to Europe increased most strongly in autumn 2020 and spring 2021 - to a peak of about seven times normal. Freight rates from China to the US, on the other hand, doubled in the second half of 2020 and tripled from this increased level in 2021 – rising to about six times normal at the peak. Interestingly, freight rates in the other direction (from Europe or the US to China) changed little during the pandemic (Figure 8). Higher freight costs have therefore affected importers in the West, but not in China.

The increase in ocean freight prices during the pandemic was a feature of disruption in global supply chains. Fluctuations in demand in the West and port difficulties in China translated into long delays in production, deliveries and sales in many sectors. Higher cost pressures from freight have gradually had an increasing impact on PPI producer prices. However, it was only after the rebound in energy prices in 2021 that higher producer prices began to be passed on to the consumer, as is evident in the inflation readings for late 2021 and early 2022.

Another feature of the disruption to supply chains was the temporary closure of the Suez Canal in March 2021 due to a blockage by a large container ship.
This resulted in an avalanche of adverse impacts and huge supply backlogs around the world.

> The large imbalance in the maritime container transport market has caused the increase in freight rates, i.e. the costs for cargo receivers. However, the imbalance was due, among other things, to the blocking of almost a tenth of the capacity of container ships, as they waited up to a week in front of or in container ports to be loaded/unloaded. This is because the major container ports could not cope with such a large increase in demand and cargo volume.

Konrad Hernik,
CEO, OT Logistics



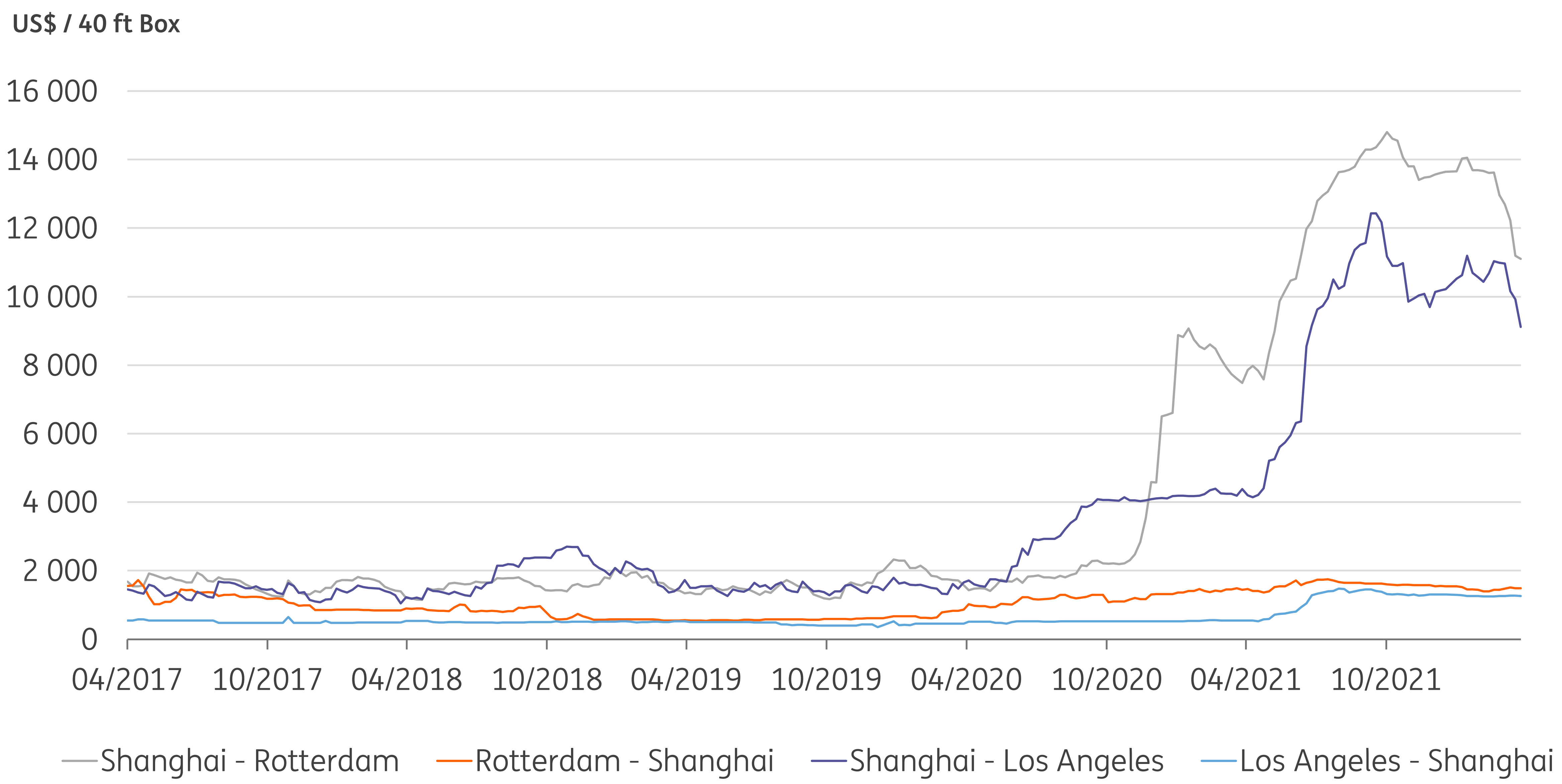
Expectations of an easing of international trade tensions have given way to the belief that tensions are a permanent trend and that freight rates will not return to pre-pandemic levels, even if port blockages disappear or the container fleet expands.
The marked correction in freight rates in February-March this year can be linked to the Russian aggression against Ukraine and the worsening growth outlook for the global economy. Nevertheless, it is difficult to expect rates to return to pre-pandemic levels.

The automotive sector proved to be very vulnerable, due to its difficulty in accessing microprocessors. After the automotive sector reduced demand for chips in spring 2020, during the first wave of Covid - manufacturers from Asia (Taiwan) redirected production capacity to other sectors, such as healthcare. In the second half of 2020 and practically the whole of 2021, it was not possible to rapidly restore production capacity and deliver volumes to meet demand.
For example, microprocessor shortages proved to be one of the main reasons preventing the German economy from reaching pre-pandemic GDP levels by the end of 2021 (Figure 6).

In addition to freight prices, other cost pressures have emerged as we exit the Covid-induced recession, particularly in energy and food, and in the labour market. These were further reinforced by the Russian aggression against Ukraine, which began on 24 February 2022. Additional tensions have emerged in the wake of the war and sanctions on Russia (including in the metals and food markets), which we discuss in Chapter 3.

Increasing cost pressures from transport rates were reflected in producer prices. Only over time (second half of 2021 and early 2022) did higher producer prices start to be passed on to the consumer. This was also due to the marked increase in energy prices in 2021 and the explosion of natural gas and coal prices in the fourth quarter of 2021, and further price increases and volatility following the outbreak of war in Ukraine.

Figure 8. Freight rates (World Container Index) per 40 ft container on selected routes in 2017-22



Source: Bloomberg.

Qualitative study by ING and EEC among companies operating in Poland

Scope of the study. Response of Polish companies to problems during the pandemic and war

Due to their strong integration into global, and in particular European, supply networks, Polish companies have been hit hard by the pandemic shock. To better understand their response to this shock and to draw lessons for the future, in collaboration with the European Economic Congress (EEC), we conducted a qualitative study - 30 interviews with representatives of 28 companies operating in Poland and heads of German and Scandinavian chambers of commerce in Poland. On the initiative of ING Bank Śląski, the survey was conducted by journalists of the WNP.PL portal from January to mid-March 2022.

Several interviews with companies and both interviews with chambers of commerce took place after the start of the Russian invasion of Ukraine. These interviews covered both pandemic topics and the effects resulting from the war in Ukraine and sanctions on Russia.

The primary objective of the study was to better understand the risks to economic activity in Poland arising from two powerful negative shocks - the effects of the pandemic and the war in Ukraine. The more or less distant consequence of these shocks, and of the revealed and potential costs, may be the departure of (global) companies from offshoring or dependence on unstable economic partners in favour of near- or right-shoring. This would involve shortening global supply chains and concentrating more on local markets or on local markets or economically integrated regions, such as the European Union. The Polish economy and companies operating in Poland could potentially benefit from such a change.

The framework set of questions addressed the following 10 issues:

1. What has happened in supply chains / international trade?
2. What was the prompt response / measures from the company?
3. Does the company plan to respond to these events in the long term, e.g. changing supply routes or suppliers?
4. How has the pandemic affected investment?
5. What factors will be most difficult to change (e.g. logistics, shortages of raw materials or components, high prices)?
6. Expectations for 2022 (normalisation, escalation, new factors and phenomena).
7. Prospects for nearshoring for Poland and CEE in the next five years?
8. In the case of foreign companies - how does a pandemic or war change plans for engagement in Poland?
9. Polish companies - how will the pandemic or war shocks affect foreign expansion plans? What is the role of pandemic and structural factors such as the security of supply, digitalisation, ecology, social/human rights considerations, US, EU and Chinese trade policies, and sanctions on Russia.
10. Do climate policy/corporate environmental goals or ESG (environmental-social-governance) factors motivate a change of partners/sub-suppliers in the next few years (shorter distances, need to report indirect emissions within the chain, consumer expectations, ESG standards for sub-contractors and procurers).

The interviews are available at:
https://www.wnp.pl/lancuchy-dostaw/

Companies participating in the survey

In the study, we made an effort to ensure a diverse group of interviewees, coming from different sectors. We conducted several interviews after the start of the Russian invasion of Ukraine on 24 February 2022 (including Forte, Arctic Paper, both chambers of commerce). Regarding the structure of the survey,:

- **manufacturing companies were in the majority:**
  - including the automotive, chemical, construction, pharmaceutical, paper, furniture, clothing, footwear and food industries;
  - our interviewees were the following companies, in alphabetical order: ABB, Adamed Pharma, Amica, Arctic Paper, Atlas, CCC, Ciech Soda, Colian, Fakro, Federal Mogul Polska, Forte, LPP, Maspex, Mlekpol, Newag, Nowel, Polpharma, Solaris, Stellantis, Śnieżka, Toyota Polska, VRG and;
- **logistics and transport companies (OT Logistics, Fracht FWO, Port of Gdansk, Raben);**
- **and a technology company (Comarch).**

As a rule, the selected group consists of large companies that are generally open to foreign exchange and foreign investment. They faced disrupted supply chains during the pandemic period, which was further exacerbated during the war.
The proportion of involvement of these companies at the regional, European or local level was quite diverse; the global companies certainly included representative offices of global concerns.
Nevertheless, the majority of entities covered by the survey were companies with a dominant share of Polish capital, including family businesses.

The study did not look at service industries that were directly affected by administrative restrictions on business activity during lockdowns. Their challenges were generally not directly related to disruptions in global supply chains.

The companies surveyed faced many similar challenges but also sector-specific ones. Our report summarises their way of coping with negative shocks, describes similar practices and identifies factors that make it difficult to do business in difficult times. We also attempt to isolate structural factors that were already present but have increased in importance, such as:

- automation and digitisation,
- sustainability

We also refer to factors which, as the experience of the last two years has shown, have in our view become a new megatrend, mainly:

- security of supply by minimising the risk of disruption or avoiding a sharp increase in supply costs.

What happened to business after the Covid-19 outbreak

At first, the pandemic appeared to be a symmetrical shock, affecting different industries relatively evenly. **However, differentiation between sectors quickly became apparent** - depending on the restrictions defining contact with clients, the possibility of remote working or restrictions on people's mobility. With a significant surge in demand, some industries benefited from increased demand - including pharmaceuticals, logistics, IT, furniture and the food industry. This was due to the increased need for health care, the spread of e-commerce, the desire to retrofit the home or the increase in household food consumption.

In the first reaction after the outbreak of the pandemic, it was necessary to introduce sanitary protection measures and information campaigns on sanitary rules in terms of hygiene, distance and the wearing of masks. Companies decided to reorganise work or breaks between shifts so that workers to exchange without contact. This required the implementation of safety and control systems. The challenge for companies was to move quickly to a remote or hybrid working model where possible. This required providing employees with the ability to work from home.

> At the operational level for the Port of Gdansk Authority, this has meant the changing of working modes and unexpected investment.
> We have had to purchase several hundred laptops, switch to remote working, all the time ensuring operational capacity, continuing investment projects for several hundred million zlotys, coordinating the work of contractors. The fact is, however, that the disruption to supply chains has affected our operators, although not as much as operators in Western European ports.

Sławomir Michalewski,
Vice-President, Port of Gdansk

The interviews show that:

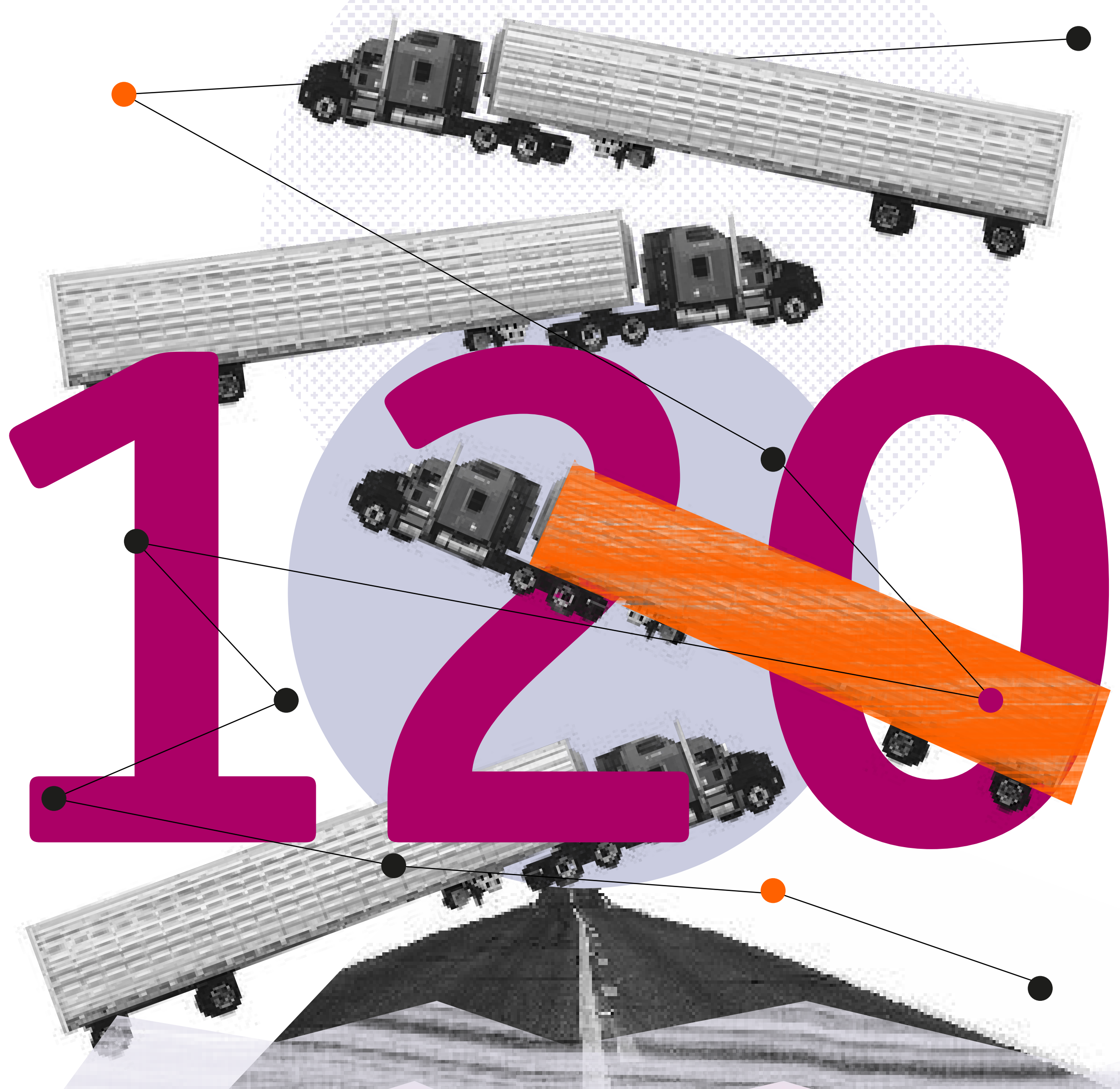
1. **Group 1: Pharmaceutical and IT companies** (Polpharma, Adamed Pharma, Comarch):

Pharmaceutical companies experienced an exceptional increase in demand with the outbreak of the pandemic. Disruptions in supply chains reduced the availability of active substances and intermediates from India and China, their main suppliers to Europe. These countries protected their own markets through import bans on certain substances.

2. **Group 2: TSL companies (transport-shipping-logistics),** represented in our survey by OT Logistics, Fracht FWO, Port of Gdansk, Raben, generally benefited from the increase in demand and increased turnover, although adjusting to the new conditions was challenging.

- Congestion at land transshipment terminals was created, the situation was complicated by the insufficient number of containers or container chassis and a shortage of drivers, who were sent, among others, to courier companies. (According to Raben, there is a shortage of 120,000 drivers in Poland).
- Demand for TSL services in the energy industry was stable, while demand fell in the automotive and electrical machinery industries.
- Immediately after the outbreak of the pandemic, there was a significant change in the structure of demand - in favour of transporting fast-moving products.
- Transport companies have begun to suffer from the unavailability of new trucks (9-12 month wait).

A shortage of



thousand drivers

Despite much turbulence in the logistics market, as well as in the investment market - the last year was record-breaking in terms of financial results and the projects we carried out. Revenues almost doubled (...). Many manufacturers, importers and exporters are now looking for alternatives to the solutions they have been using for years. The natural way out of this situation was therefore to turn to more flexible forwarding companies.

Andrzej Bułka,
President, Fracht FWO Poland

Due to a more than fivefold increase in sea freight prices for containerised cargo, part of this cargo began to be delivered by general cargo vessels. This has had a positive effect on the turnover and operating prospects of the ports belonging to the OTL Group. Also, the restrictions on road transport resulted in an increase in turnover in the ro-ro segment (a system of horizontal maritime transhipment, consisting of independent entry and exit of goods - on trucks and semi-trailers or rail wagons). (...) Cargo for the steel sector, i.e. iron ore, coking coal and coke, recorded high growth in demand for sea transport. (...) Exports of coal, long unseen, began to appear.

Konrad Hernik,
CEO, OT Logistics

It turned out that manufacturers were short of components, steel or rubber. Lockdowns returned to the companies, not because of the Covid threat, but because of a lack of raw materials for production... This has been compounded by the shortage of drivers, which continues to affect us. In Poland, there is a shortage of over 120 thousand drivers. Another effect of the pandemic, which we notice as a company not only in transport but also in logistics, is the increase in the costs of warehouse infrastructure construction. Prices of materials have increased by 50-60 per cent. On top of this, there is a problem with finding construction workers.

Agnieszka Haik,
group business development director, Raben

3. **Group 3:** Other manufacturing companies (in our study - ABB, Amica, Arctic Paper, Atlas, CCC, Ciech Soda, Colian, Fakro, Forte, Federal Mogul Polska, LPP, Maspex, Mlekpol, Newag, Nowel, Solaris, Stellantis, Śnieżka, Toyota Polska, VRG) experienced severe supply chain disruptions and a sharp increase in costs.

- In the machinery manufacturing sector, the difficulties were the most serious in 20 years.
  - » Shortages of basic raw materials and strong cost increases in other sectors such as:
    - Fuel and electricity (all sectors), plastic granulates, cement and building materials (construction),
    - paper (publishers and packaging manufacturers),
    - steel (machinery manufacturers),
    - rubber
    - wood (furniture, energy and heating industry)
    - cotton (clothing companies)
    - cocoa, milk powder, rapeseed oil and others (food companies).
  - » There was also a shortage of more advanced assemblies or components, such as semiconductors (automobiles, machinery manufacturing), chemical products (cellulose, furniture) machinery and equipment and packaging (food industry).
- Despite the supply constraints, many manufacturing firms benefited significantly from the shift in demand from services to goods that became desirable during the pandemic. Examples include furniture producers (consumers decided to buy new furniture for their offices or homes) or paper (producers of paper for book printing, whose availability from China decreased significantly) benefited.
- In an environment of increased demand for warehouse space, the problem has been the increased cost of construction and the difficulty in finding construction workers.
- In shortage conditions, anomalies such as a higher offer price for larger purchases occurred.
- As part of their adaptation efforts, companies have been looking for replacement materials, including from intermediaries and the secondary market.

We do not remember in the history of the company that we ever recorded such a dramatic increase in the prices of certain raw materials. We estimate that ,producer inflation' is several times higher than consumer inflation. In our industry we are talking about increases of 30-40%.

Mariusz Gazda,
Board member, Forte

With limited supply, the suppliers there [in China] started to hold a kind of fair - and they chose those customers who offered a better price, better conditions. At the time of the biggest supply problems, we were losing up to 30% of our production due to the lack of semiconductors.

Andrzej Korpak,
CEO, Stellantis Gliwice

The beginning was the most difficult. A pandemic also means new and unfamiliar operating conditions, so we did not know what to expect. (...) The temporary closure of ports stopped shipments and the execution of contracts. (...) In the later stages of the pandemic, the cause of disruption to supply chains was global economic change, in particular increased demand for consumer goods.

Andrzej Korpak,
CEO, Stellantis Gliwice

Limited availability and higher production costs

Disturbances in global supply chains have been characterised by the limited availability of raw materials, materials or components and their rising price.

> However, the behaviour of raw material producers is changing. Many of them have started to limit supply, perhaps in anticipation of developments. Until now, prices depended on the volume of purchase, for example, and now we have seen offers in some cases, that ‚you can buy more, but at a higher price'. Many European producers of raw materials for construction chemicals declared a state of „force majeure" last year, i.e. they informed that they could not guarantee constancy of prices, delivery volumes, and timely execution of contracts. For Atlas, the consequence was an increase in imported raw materials by an average of 30%, but in some groups even by 100%.

Paweł Kisiel,
CEO, Atlas

> The majority of goods ordered by Colian have become more difficult to access, and therefore - more expensive. Inflation does not make the situation any easier. Prices of most raw materials used by Colian have increased dramatically. In comparison to last year, cocoa has increased by approximately 12% and rapeseed oil by as much as 25%; milk powder is breaking price records and citric acid from Asia already costs up to five times more than a year ago. In addition, sugar, nuts and even packaging have risen in price.

Jan Kolański,
Founder and CEO, Colian

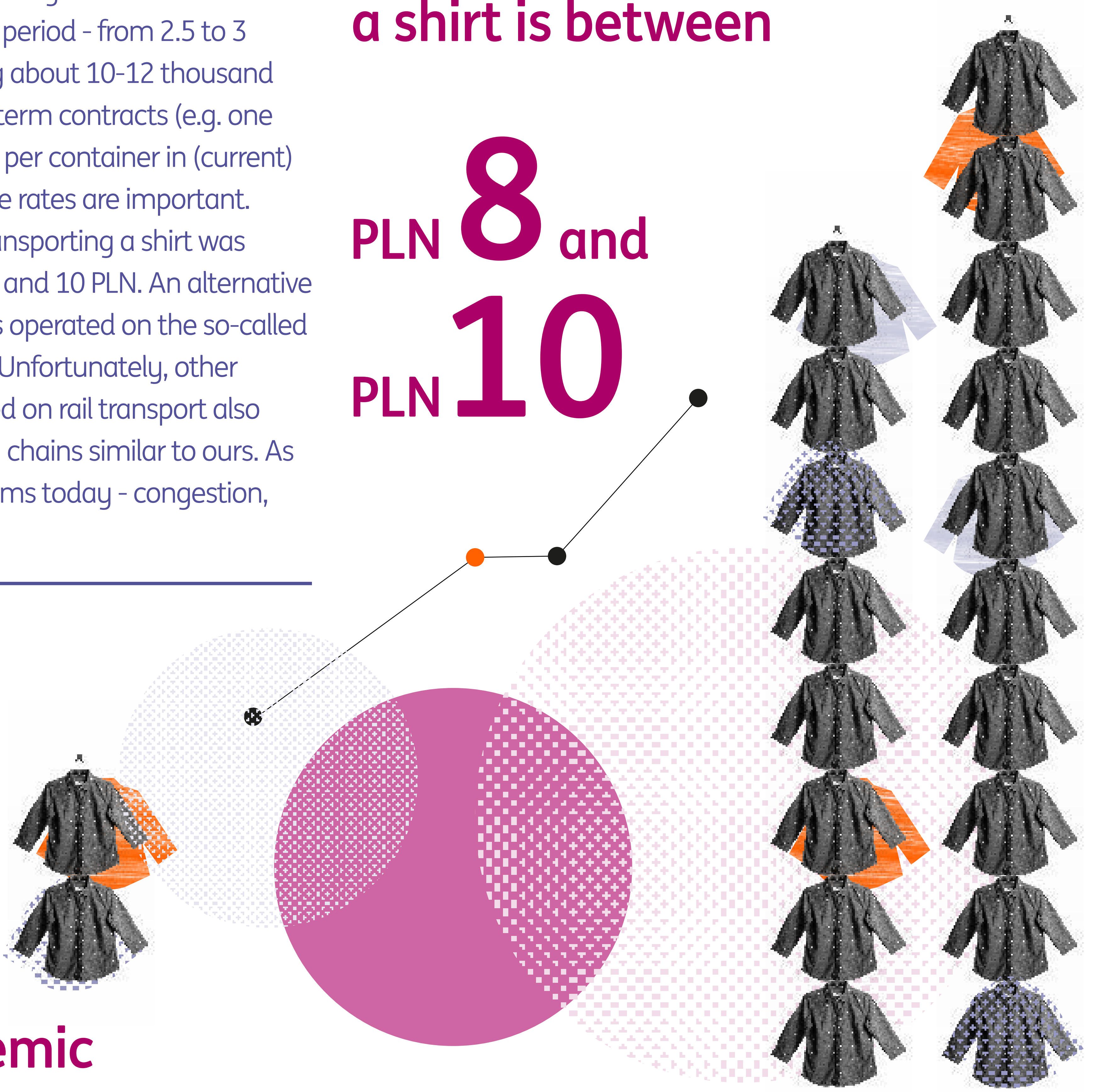
The increase in sea freight prices discussed earlier has led to a search for alternative modes of transport, which has also increased pressure on their availability and price. For example: rail has benefited from the increase in demand for transport from China, but poor infrastructure has proved a barrier, leading to delays in train arrivals and price increases. One of the bottlenecks is the Polish terminal at Małaszewicze near the border with Belarus, and all terminals have capacity constraints as trains from the east travel on a wide track. After the Russian invasion of Ukraine, warfare and sanctions against Russia and Belarus are a risk to rail transport.

> Freight costs have increased 3-4 times. As recently as 2019, the cost of importing a container of clothes from China was - depending on the period - from 2.5 to 3 thousand USD. Today we are talking about 10-12 thousand dollars for transport based on long-term contracts (e.g. one year), but even 14 thousand dollars per container in (current) contracts, where surcharges on base rates are important. Before the pandemic, the cost of transporting a shirt was around 2 PLN, today it is between 8 and 10 PLN. An alternative to sea transport from Asia are trains operated on the so-called New Silk Road, which we also used. Unfortunately, other companies in Europe that have relied on rail transport also have problems with hijacked supply chains similar to ours. As a result, it too is experiencing problems today - congestion, delays, rising freight rates.

Przemysław Lutkiewicz,
Vice-President, LPP

Today the cost of transporting a shirt is between

PLN 8 and PLN 10



PLN 2 before the pandemic

The price increase has also affected air transport. Taken together, the rise in the price of virtually every mode of transport has changed a situation in which the „shipping element" was previously a small percentage of the total cost of goods. It has thus contributed to mounting inflationary pressures.

> The high prices of land and sea transport have also been followed by air transport. In the „purchasing area" we experienced an increase in the cost of indirect and direct purchases, as well as longer lead times from suppliers.

Robert Wawro,
COO, Maspex

The spike in production costs was bound to translate sooner or later into prices for the contractor or final consumer. Price increases have become increasingly common since the second half of 2021, with accumulating pressure on many costs including energy, raw materials, labour costs. At a time when economic activity was hit hard, some cost pressures were cushioned by reducing trading margins.
Such action was justified on the assumption that cost increases were temporary and that supply chains would begin to stabilise. By the second half of 2021, however, such hopes had evaporated.

> Last year, prices rose for both chemicals necessary for the production of pulp and and paper production, as well as wood itself, as well as transport and electricity. For this reason, we implemented four price increases. This is the first time this has happened in many years. This year we have planned two price increases
> - One of about EUR 120 at the beginning of January and another one of about EUR 50-70 from 1 April.

Michał Jarczyński,
CEO, Arctic Paper

> Problems such as the blockage of the Suez Canal, the situation on the border with Belarus and the introduction of Covid regulations in some countries significantly affected the fluidity of the supply chain. We were faced with a shortage of raw materials, a lack of electronics, employee absenteeism, constant changes in legislation, and constant price increases.

Ryszard Florek,
CEO, Fakro

Relying on strategic partners, but looking for new ones

In a situation of shortages or rapidly rising costs, Polish companies have had to make changes to reduce delivery risks. This concerned:

- The selection of business partners
- Reorganising the processing of orders and placing them well in advance
- Increases in inventories (negative impact on working capital as a side effect)
- Diversification of raw materials and transport services (relationships with multiple logistics companies)
- Changes in company organisation and internal business processes.

In the first instance, however, companies relied on their proven strategic suppliers or business partners. During the pandemic, long-term contracts with strategic partners worked well. In difficult times, relationships with them have become even stronger: there has been more open communication and transparency, mutual support.

> The pandemic has verified, for many entrepreneurs, existing business relationships for many entrepreneurs. We see this period as a time for even closer cooperation, based on trust with business partners. At the time of any calls, we jointly considered possible alternatives. Of course, with shortages of raw materials, materials or equipment parts, we implemented countermeasures on a case-by-case basis and resorted to alternative sources. (...) Short supply chains, proven business partners - that's our way of maintaining continuity in our supply chains.

Michał Zajezierski,
Vice-President, Nowel

Support from the network within global companies: Multinational companies or companies operating in different markets were able to redeploy within their global/regional network. In doing so, they pointed out the role of flexibility and continuity of cooperation. Within a group, company branches on different continents can use synergies when buying goods or services. This makes it possible to negotiate better prices or faster delivery times. Operating in different markets allowed resources to be redeployed from one market to another if, for example, turnover was falling because of local lockdown. However, such intra-company redeployments were ad hoc and did not lead to a major reorganisation of work.

"Before the pandemic, Federal Mogul tried to have two or three suppliers in different locations. This made it possible to shift orders between them. So when we didn't get as much as we needed from China, we were able to rescue ourselves with supplies from Turkey or Germany. Sometimes it meant a higher price to get the same products, but it is more profitable to pay more than to stop production lines in a car factory, because that can cost up to 30,000 euros an hour. (...) We have a well estimated capacity of 14 plants in the group, (...) so sometimes - when necessary - we can use spare capacity in China or Mexico to fill orders for the Gorzyce plant.

Adam Krępa,
CEO, Federal Mogul Gorzyce

Faced with shortages of key materials or prohibitive prices, companies sought alternative suppliers. But for pharmaceutical companies, for example, the availability of alternative suppliers of active ingredients in Europe was limited. Substitutes proved available in vehicle manufacturing, but this involved time spent looking for replacements.

In the food industry, diversification of the supplier base went hand in hand with the review of commercial terms with established partners. Communication was improved and the review also covered existing processes and the legal and commercial situation.

"Instead of ad hoc measures, our approach is to maintain flexibility and continuous cooperation with all our partners. We have largely been able to resolve existing issues by sharing full knowledge of the current situation with our suppliers (...) We strive to improve the quality of our deliveries. (...) We try to monitor supply chain disruptions on an ongoing basis and to a much greater extent than before the pandemic, which gives us the ability to react quickly to problems.

Krzysztof Kwaśny,
General Manager, Toyota Motor Manufacturing Poland

"The main strategic decision was to increase the number of leading raw material suppliers. The previous two (leading and supporting) were replaced by three to four (...) Another decision was to look for alternative raw material suppliers.

Paweł Kisiel,
CEO, Atlas

Stopping production lines in a car factory can cost up to 30,000 euros an hour

Advance orders and increases in inventories

With extended lead times, ordering well in advance became the norm during the pandemic. Adequate supply planning was key, especially in companies where production and sales are seasonal - such as in the footwear and apparel industries. Companies were also introducing new tools to monitor or forecast changes in demand and often revised their existing models. For example: changes in the pharmaceutical market in Western European countries were a good predictor of the situation in Poland. Proactive forecasting allowed for a better reaction when forecasts or scenarios were already materialising.

Although companies had clearly defined procurement procedures during the pandemic they supplemented them with new elements - such as „redefining" safety stock at suppliers and in-house, multisourcing (alternative suppliers), alternative components, supplier involvement in purchasing processes. The changes in purchasing strategy also consisted of an increase in stocks of critical components and breaking down regular orders into smaller batches.

> Wherever possible, we are ordering pools of goods so as to fully meet our production plans. We also work in the opposite direction. We strive to ensure that all our customers receive their products on time, avoiding situations where one customer exhausts our current production resources and another, at the same time, receives nothing.

Tomasz Wolanowski,
CEO, ABB Poland

> To minimise the risk of delays in fulfilling orders for customers, we collect information from the market on the availability of strategic components and we carry out the so-called stocking in advance. In this way, we have replenished stocks. We all have to adapt to the market situation and customers understand this. If necessary, work schedules are drawn up together with them to take account of delivery delays, logistical problems and international trade restrictions.

Janusz Filipiak,
CEO, Comarch

Due to logistical disruption, some manufacturing companies have started to prioritise shipments, depending on the situation of their business partners and their challenges. They have also introduced cargo and transport tracking.

The build-up of higher stocks has been one of the key actions companies took in response to supply disruptions. Such action came at a cost to the company, as it led to the freezing of operating capital. This was the price for improving security of supply and maintaining continuity of production, which was ultimately profitable for business. At pharmaceutical companies, increased inventories concerned both active substances and finished goods.

> It is difficult to predict whether the current price increases are related to the so-called Forrester effect (i.e. stockpiling after shortages) or whether they are a long-term phenomenon and will remain at that or higher levels.

Bartłomiej Rodawski,
Board member, Adamed Pharma

At shipping and manufacturing companies, the change in purchasing concept from „just in time: to „just in case" sometimes required investment in warehouse space to store larger stocks. Clothing companies were creating buffers in warehouses while expanding their distribution. In general, while larger inventories in just-in-case have been held in warehouses, they have not been able to keep them in the shops. While larger stocks in the initial phase froze capital in raw materials or inputs, they increased the flexibility of production and the resistance of companies to new turbulences.

The automotive industry was particularly affected by the shortage of chips, which did not allow production to be completed and vehicles to be sold. Some vehicles were therefore waiting in the yard for the shortage to be filled.

> We also needed to reorganise the production process, i.e. we combined current production in parallel with the replenishment of cars from the yard, which were finishing the production process with some shortages. The specifics of our production and product allows them to be replenished at a later time, when the missing components arrive at the factory.

Michał Woźniak,
Director of logistics, Solaris

Other bottom-up changes: people, processes, outsourcing

The pandemic and disruption of supply chains has prompted:

- changes in internal organisation
- business process reviews
- additional investment in people

These changes have been aimed at increasing the flexibility of operations and ensuring continuity of production in adverse external conditions.

Internal organisation
Companies have set up special rapid response teams, sometimes called war rooms, to support operations in an emergency. Such a team was established, for example, at car manufacturer Stellantis - to ensure the supply of semiconductors and other automotive parts.

> At the very beginning of the pandemic, we set up a special „Day After" team which focused on analysing the changes taking place and developing recommendations for many areas of our business.

Błażej Sroka,
board member, Amica

Business process reviews

- Footwear company CCC put an emphasis on discounts and stock management through faster turnover. The idea was to free up a larger pool of stock for marketing - by „stocking up" more efficiently for successive collections. This resulted in leaving less stock on hand until the end-of-season discounts.
- Rolling stock manufacturer Newag conducted an analysis of the scope of work entrusted to its suppliers and service providers. With the difficulties faced by other companies, the timing of the pandemic encouraged more work to be done in-house. For example, window manufacturer Fakro benefited from having its own fleet so the company was not dependent on outsiders and could more easily ensure continuity of supply.
- The pandemic experience has allowed Raben Transport to be more flexible in dealing with subsequent waves of coronavirus infections and associated restrictions.
- The VRG clothing and jewellery group, to cope with rising costs among other things, focused on product analysis and an appropriate pricing policy.

> We have definitely started to think more about carrying out part of the scope entrusted to suppliers and service providers in our company... Behind such decisions stood the speed of implementation of a given technology and the long waiting time for delivery and/or service. (...) This forced us to invest to a certain extent and change the way we plan production.

Zbigniew Konieczek,
CEO, Newag

> Nie mamy potrzeby skupiania się na optymalizacji dalekowschodniego kierunku zamówień. Większy potencjał, jeśli chodzi o budowę rentowności, dostrzegamy w obszarze produktu i optymalizacji cenowej.

Michał Zimnicki,
Vice-President, VRG

Investment in people

- Many companies in our survey said they took advantage of the crisis period to invest in people and build interdisciplinary competencies.
- "Investment in the workforce" gave bus manufacturer Solaris greater flexibility in the use of resources as parts availability increased.
- The transport company Raben has put a lot of effort into raising the standards of drivers' work, resulting from a great shortage of people in this profession.

Alignment of investment plans

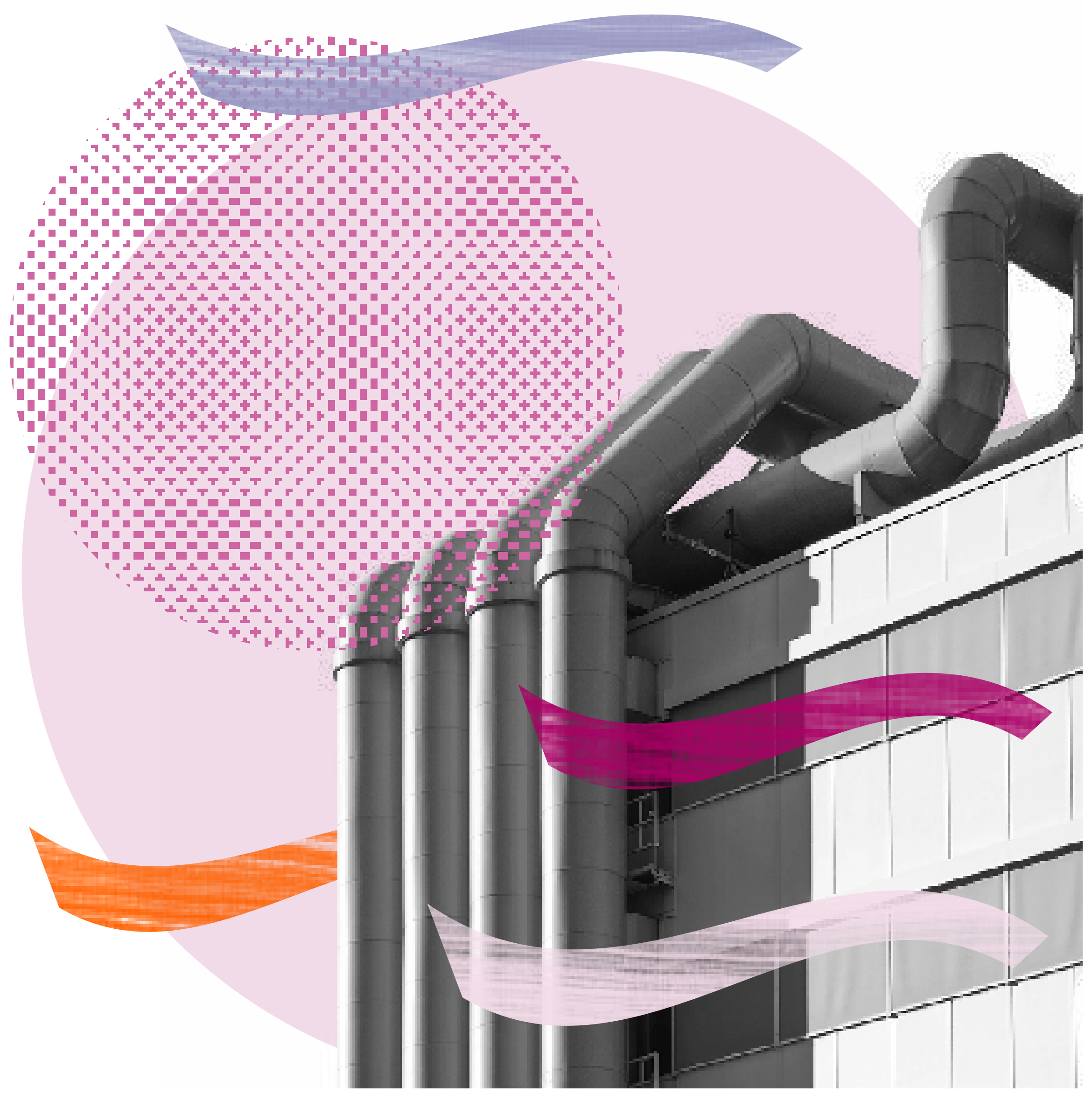
The outbreak of the pandemic led to very high uncertainty among producers and consumers. We know that this initially meant a deep fall in investment in the economy followed by a faster-than-expected rebound. Of course, individual sectors were asymmetrically affected by administrative tightening and disruption in supply chains, and therefore the adjustment of investment also varied across industries.

Most of the companies surveyed generally maintained their planned investments (e.g. Śnieżka), and some even increased such spending to meet increased demand or to increase storage capacity, necessitated by supply disruptions and deliveries or the automation of port reloading, which increased general cargo handling (OT Logistics). Large investments in the port's handling capacity are planned by the Port of Gdansk. Some companies have temporarily limited their investments in order to better control cash flows (Forte). Others have used opportunities to make acquisitions or foreign investments (Śnieżka in Hungary, Atlas in Romania, Adamed in Vietnam).

> I am thinking of investments concerning the external port, expansion of the road network, railway tracks, connecting the DCT with the second track and a four-lane, two-way road, and the railway crossing. (...) I would add the investments that are now being planned by DCT (Deepwater Container Terminal Gdansk), i.e. the expansion of the third terminal. (...) In a few years, about 6 GW of electricity will flow to Poland from the Baltic Sea. The point is to limit the risk connected with transport and ensure access to supplies, including raw materials in the horizon of at least 20-30 years. We have not lost any operators due to the pandemic. We have signed a letter of intent with Gaz-System to build a regasification terminal in the waters of the Gulf of Gdansk, the so-called FSRU (floating storage and regasification unit).

Sławomir Michalewski,
Vice-President, Maritime Port of Gdansk

Plans to build a regasification terminal in the waters of the Gulf of Gdansk



Many companies said that even during the pandemic they did not economise on development investment or R&D expenses (Comarch, Adamed Pharma, Nowel - a bread producer which expanded production lines and introduced new products during the pandemic). New investments are also supposed to relieve economic tensions that have arisen (e.g. Arctic Paper - in packaging and energy and energy production).

In the surveyed group of companies operating in Poland, there were no companies that decided to quickly reallocate production from a distant market to one closer to the country of origin (nearshoring). They suggested, however, that the experience of pandemics and disruptions in global supply chains should prompt others to think about such reallocation or at least a more careful strategic assessment when locating future investments. Arctic Paper's pulp mills in Scandinavia, for example, prefer to buy locally; they have benefited from the book printing boom as, with delays in deliveries from China, customers have placed orders in Europe.

In a difficult situation, companies and industries also started to look for less routine, conventional solutions. Sometimes even simple, but not previously practiced ideas resulted in an acceleration of the supply chain.

Megatrend #1 Automation and digitalisation

Part of the capital expenditure in the pandemic era was related to digitisation and automation of processes. Digitalisation has changed from a "nice to have" to indispensable. In many cases, it was a sine qua non for a company's existence during the pandemic. This was due to a change in the way we work (home office) and the continued proliferation of a specific shopping channel (e-commerce) with consumers. Companies have also invested in the digitalisation of logistics and purchasing departments, which makes it possible to increase the efficiency of logistics services. Investments in process automation were also a response to difficulties in recruiting employees.

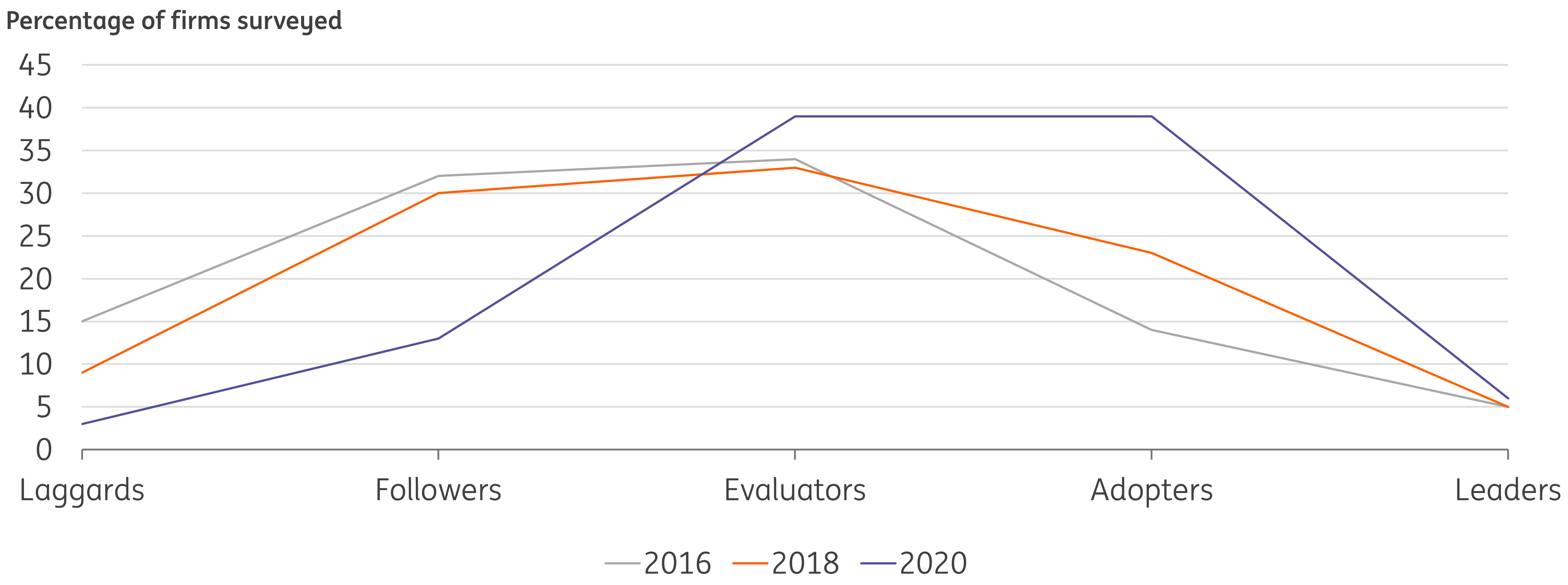
> Investment in the Production and Logistic Centre assumes a doubling of the production and storage capacity, automation and robotisation of selected processes. Its aim is to achieve the highest level of robotisation in Poland among pharmaceutical companies and to increase the capacity of the production centre - from 2 billion tablets manufactured in 2020 to 4 billion in 2027. (...) A very important issue is also the limited supply of employees, so we have to think about implementing new solutions with a high level of necessary automation.

Bartłomiej Rodawski,
Board member, Adamed Pharma

E-commerce has become an important shopping channel both during lockdowns and on a permanent basis. The rapid growth of the e -commerce industry has resulted in the previously mentioned warehouse investments. Data also confirms the growing role of digitalisation. For example, the Dell Digital Transformation Index indicates that in 2020, the proportion of companies that had mature digitisation plans jumped from around 15% to 40%, while the proportion of companies that did not have such plans fell from 15% to 5%.

Pandemia mobilizowała przedsiębiorstwa do przyśpieszenia cyfryzacji i automatyzacji, także z wykorzystaniem rozwiązań sztucznej inteligencji. Według prezesa Comarchu pozytywne jest, że w Polsce w informatykę mocno inwestują mali i średni przedsiębiorcy, rozwija się sektor e-zdrowie oraz informatyzacja placówek ochrony zdrowia.

Figure 9: The level of maturity of companies' digital transformation plans, global sample



Source: Dell, Digital Transformation Index study.

> We invest consistently in digitisation - so that we can better track the product on its way. So that our system covers 100 percent of the suppliers and does not only concern the distance between the producer and distribution storage, but also between storage facilities and clients.
> We are also investing in e-commerce, further processing capacities, and in the development of new products.
> We are also investing in e-commerce and in further processing capacities in order to deliver products to our customers more efficiently and faster. We are increasing the availability of goods, which are shipped directly to the customer - regardless of whether it is an e-commerce warehouse or a retail warehouse where the ordered pair of shoes is located.

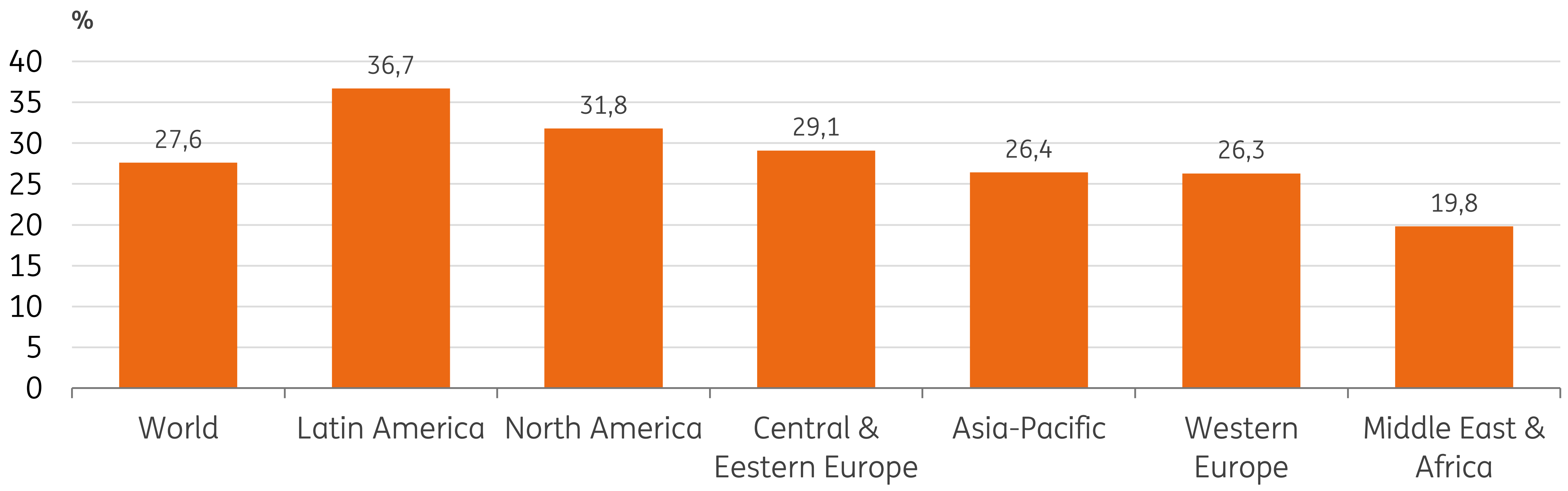
Igor Matus,
Vice-President, CCC

In addition, we have focused in our warehouses on implementing solutions based on artificial intelligence. This is our response to the current challenges in turbulent times of permanent delays in supply chains.

Przemysław Lutkiewicz,
Vice-President, LPP

To sum up: digitalisation of processes is crucial (Maspex). It allows for effective monitoring and early reaction in case of disruption. Amica invests in IT systems, prediction and risk management systems, and building skills of employees. Digitalisation also enables „online tracking" of the entire chain, from goods readiness, loading, to final delivery to the warehouse. And it also increases the security of deliveries. For example, Raben has implemented Picture Confirming Delivery - a delivery without signature, which is automatically recorded on the platform and uses robots for accounting work.

Figure 10: Global e-commerce retail sales growth in 2020, in %



Source: eMarketer, December 2020.

We made specific investments related to order logistics throughout 2021. We revised virtually all online shop engines, optimised connections with the local logistics provider, developed mobile sales applications. All of this was done to ensure that our goods moved more and more efficiently between warehouses, shops, and end customers - in line with the omnichannel model. (...) We were less affected by the disruption than I can imagine if the company was not already in the process of diversifying and optimising supply. The pandemic has only mobilised us to speed up certain processes.

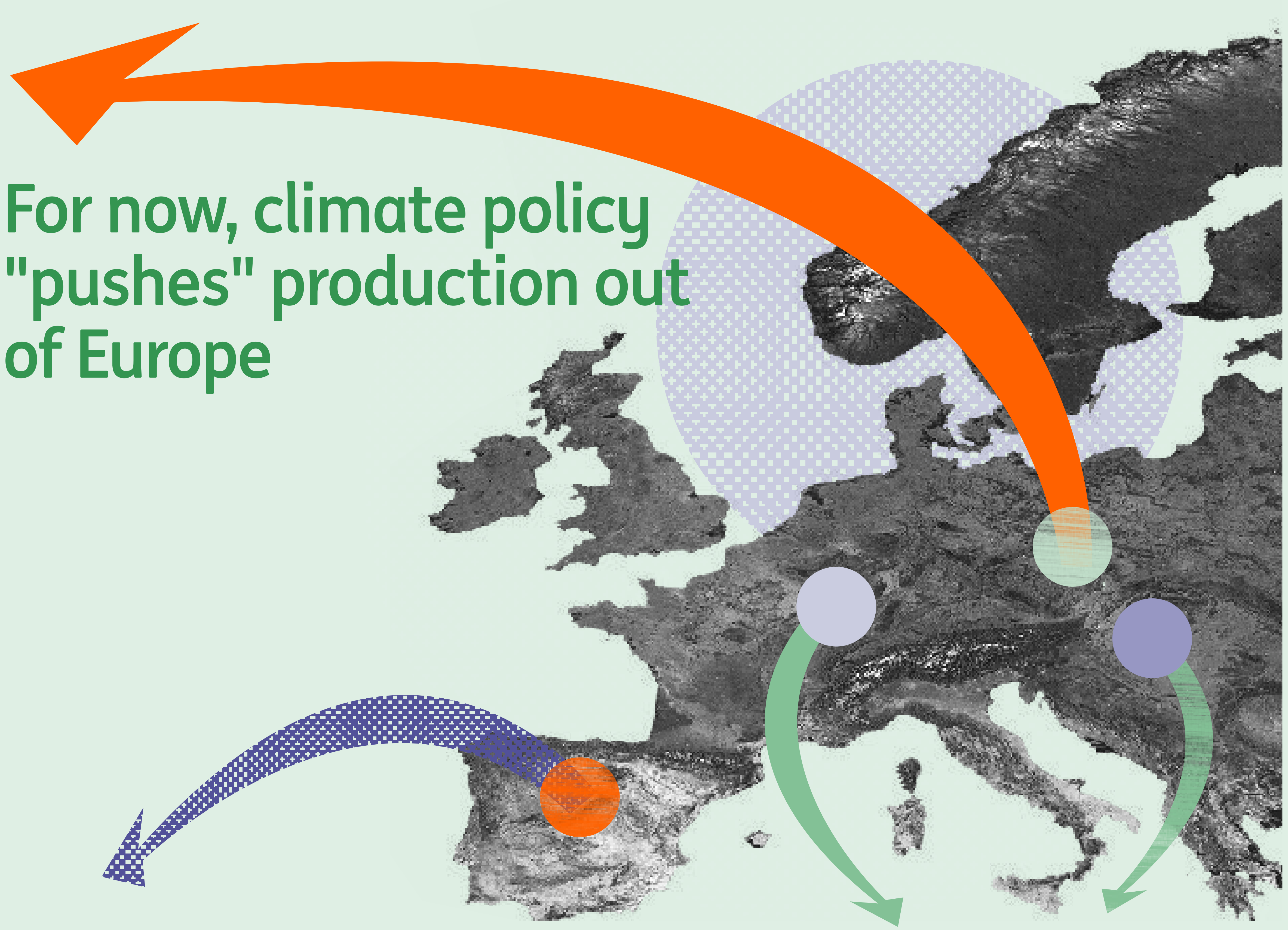
Michał Zimnicki,
Vice-President, VRG

EU climate policy and competitive conditions in foreign trade

Our interviewees, most of which represent energy-intensive industries, often pointed to the role of the EU's **ambitious climate policy as a key factor in determining where to invest and do business.** They perceived the role of unequal climate commitments in various countries or regions of the world and the need to purchase CO2 emission allowances in the European Union. This is all the more important as the price of these allowances on the European market (EUA) has increased several times in recent years.

In recent decades, it has not been profitable for multinational companies to relocate production to Europe because of high energy prices and the cost of CO_2 emission allowances. Therefore, many industrial activities will not be replicated in Europe (such as in the chemical sector, which is energy-intensive and carbon-intensive and based on natural gas) unless the EU introduces, as announced in the EU Green Deal, carbon tariffs that take into account the total carbon footprint. **For now, climate policy „pushes" production out of Europe to countries that don't care about climate protection,** and longer supply chains create additional CO2 emissions (Atlas). The costs of emission allowances are very important in the chemical industry among others (Ciech Soda).

For now, climate policy "pushes" production out of Europe



According to Stellantis, over time higher CO2 prices will eliminate carbon-intensive companies as they become less competitive. This is already happening. Because of high electricity prices, Comarch is considering relocating servers from its own data centres in Krakow and Warsaw to the US or France and Germany, where the company already has data centres.

TSL companies also pointed to cost pressures resulting from the EU mobility package, which took effect from the beginning of February 2022 and, among other things, introduced the obligation to keep detailed records of drivers' working hours. This could lead to exacerbating tensions over the shortage of professional drivers in EU countries (Fracht FWO Poland).

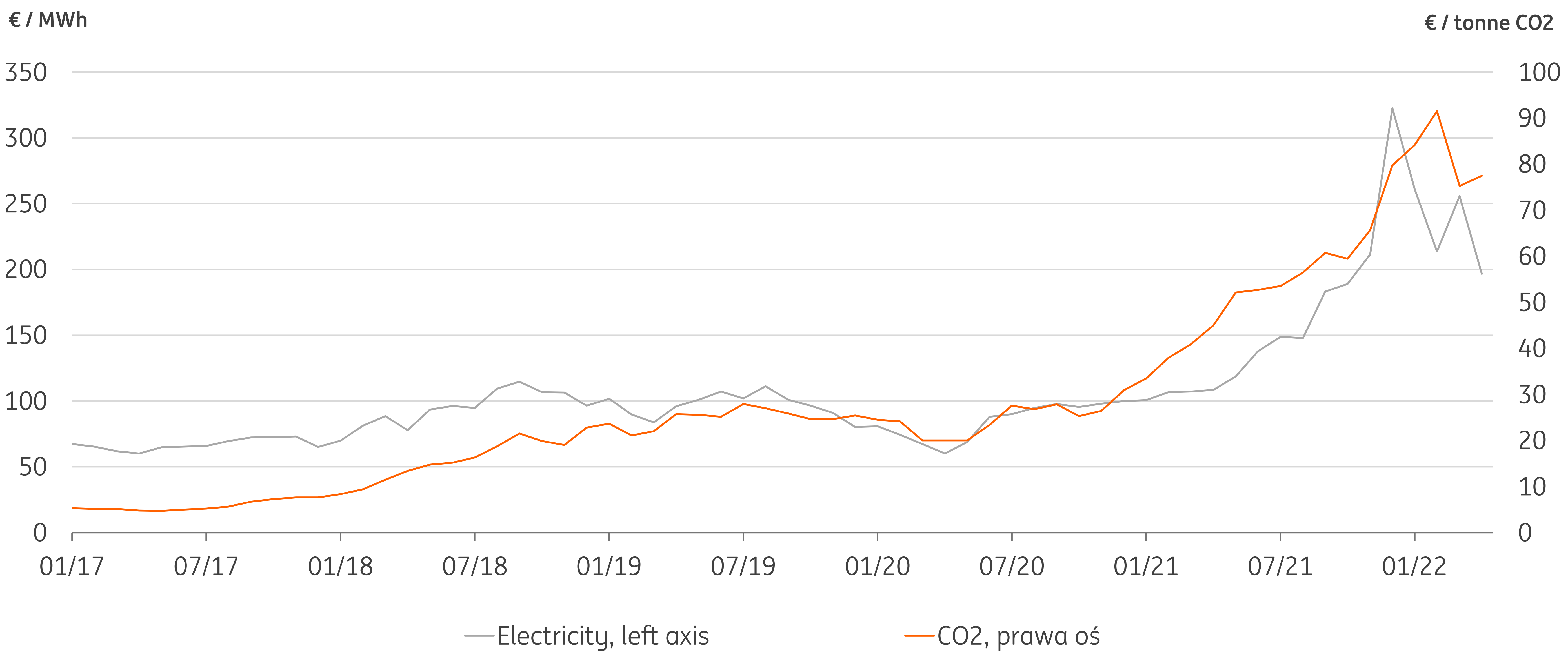
On the other hand, companies' climate goals or climate neutrality commitments will translate into requirements for subcontractors.
As a result, they may increase incentives to shorten supply chains to avoid using carbon-intensive echnologies in countries with weak climate policies, or to avoid emissions from emissions from long-distance freight transport.

> An important factor, in connection with climate policy, is and will be ecology, which forces far-reaching changes in logistics. Implementing these changes will, however, cost money. The costs may be partly passed on to consumers, but they can also be offset by automation and digitalisation.

Tomasz Wolanowski,
CEO, ABB Poland

In this context, an additional factor in favour of production ‚closer to home' is the announcement of a **carbon border tax** by the EU as part of the European Green Deal policy. In mid-March 2022, EU countries agreed on a carbon border adjustment mechanism (CBAM) to be levied on imports of goods from countries with less stringent climate standards. The carbon border tax will enter into force progressively from 2023 and will tax imports according to CO2 emissions associated with the production of goods such as steel, aluminium, cement, fertiliser or electricity, among others. CBAM will serve to protect EU industry from competition from countries that do not have comparably ambitious climate policies.

Figure 11: Wholesale prices of electricity in Poland and prices of CO2 emission allowances in the EU ETS



Source: Boomberg New Energy Forum.

Megatrend #2 Increasing role of ESG factors

In last year's report Business for Climate, authored by ING Bank Slaski and EY, we wrote that the role of ESG (environmental, social and corporate governance) factors in the activities of companies and financial institutions increased during the pandemic. Although global CO_2 emissions fell by around 6% during the 2020 pandemic (which was due to emissions from unburned fuel in power plants, cars, factories and planes), the United Nations Environment Programme (UNEP) estimated that this reduced the global temperature increase to 2100 by just 0.01˚C...As soon as the economy rebounded from the most dramatic period of the pandemic, there was unfortunately an increase of almost 5% in CO_2 emissions in 2021 (International Energy Agency estimates).

An increasing number of companies around the world are reporting their emissions. According to the CDP thinktank, in March 2022, over 13,000 companies worldwide have already announced such a commitment. At the same time, **almost 2,000 around the globe have adopted a climate neutrality pledge,** i.e. zero net emissions from their operations. Depending on their profile, service/consulting/IT companies are aiming to achieve this goal within a decade, and energy companies within two to three decades. Climate neutrality in the middle of this century is necessary to control global temperature increases below 2˚C.

In our study, most companies indicate an **increased motivation to consider ESG factors** in their operations in recent years. This is due to:

- pressure from individual customers and business partners
- social pressure (still insufficient according to some companies - Atlas)
- policies and regulations, national and EU
- pressure from capital markets (banks, investment funds, funds issuing and buying bonds).

Paying attention to ESG factors isn't enough. Instead, **a real commitment is demanded.** Many companies said they addressed ESG issues before they became „fashionable" (e.g. Śnieżka, ABB, Newag).

In our survey they mentioned such **specific ESG activities** as:

- sustainability as one of the pillars of the company's strategy (CCC, Atlas, Fakro, ABB)

- the climate neutrality goal (Toyota globally by 2050, ABB globally by 2030) and the goal that by 2030, 80% of products and solutions will be produced according to the idea of a circular economy (ABB)
- creation of a separate ESG department in the company's organisational structure (Solaris)
- environmental reporting according to specified standards (Forte)
- use of biofuels in transport and electric cars and greater use of intermodal transport (Mlekpol, Amica, Fracht FWO)
- energy-efficient buildings and equipment and photovoltaic installations, ecological transport, rainwater harvesting, tree planting (Comarch)
- reusable pallets (Nowel)
- opakowania recyklingowane i zwrotne (CCC)
- contractualisation of CO2 emissions, per shipment, green power purchase agreement (PPA) from photovoltaic farms, sustainability-linked loan, tree planting (Raben)
- construction of installations for supplying ships moored at quays with shore-side electricity so that they do not use their own diesel generators, collection of oil waste from ships (Port of Gdansk)
- Focusing on those ESG factors that are influenced by the company (OT Logistics).

Companies in our survey also indicated increasing ESG-related requirements for suppliers or business partners. These included:

- ESG inspections and audits of suppliers, including audits of raw materials and semi-finished products and working conditions requirements (CCC, Amica)
- guidelines for sustainable purchasing, including respect for human rights and environmental social requirements (Toyota, ABB)
- the need for certificates (certificate of origin of wood from responsible plantations - Forte, VGR, certificate of warehouse emissions - Raben)
- Business partner code and supplier analysis for compliance with ESG standards (Ciech Soda)
- requirements for „green products or services" for electricity, heat and materials suppliers and the collection of information on the carbon footprint and preparations for its counting in the organisation within the entire logistics chain (LPP, Maspex, Mlekpol, Stellantis.

Our interlocutors pointed out that the requirements for business partners will become stricter in the coming years, and over time, and failure to meet ESG requirements may eliminate a given supplier from the market.
In transport companies (Raben) there are customers who are ready to accept longer delivery times if the transport will be done by „green" means, such as intermodal transport. Companies expect the ESG trend to strengthen in the coming years (Adamed Pharma).

> In 2021, we implemented a voluntary supplier self-assessment survey on environmental standards, ethical standards, employee rights and other responsible business criteria. From next year, the survey will already be mandatory, and from 2024 - the impact of its results on the tendering process will be decisive.

Sebastian Szymanek,
CEO, Polpharma

> As all our customers are looking for ways to decarbonise their operations, we must offer products that meet their expectations. But we also need to demonstrate that we are reducing our carbon footprint ourselves... We therefore expect the same from our business partners - and they are working hard to meet these demands.

Michał Woźniak,
director of logistics, Solaris

> In the relatively short term, specific environmental commitments can be expected when negotiating supply conditions and may become an important element of competitive advantage. Failure to implement an environmental policy will become an argument that may eliminate a given supplier of services or products to meet these requirements.

Robert Wawro,
CEO, Maspex

Russia's invasion of Ukraine. Another supply shock and a new wave of disruption

2022 was supposed to ease the disruption, but the war has exacerbated it

The Omicron variant of the virus ultimately proved to be less serious, with a lower number of hospitalisations and deaths. However, problems in supply chains could not disappear overnight and companies were aware of this, although there were signs of improvement in supplies of semiconductors, among other things. Also, the barometer of global tension in supply chains decreased significantly in early 2022, especially in Europe.

The situation changed dramatically with the start of the Russian invasion of Ukraine on 24 February 2022. The war in Ukraine has many of the same economic effects as the pandemic, in some areas more profound - such as in energy, metals and food markets. The Western world has responded to Russia's aggression with severe financial and trade sanctions at the government level. In March, the US and Canada introduced an embargo on Russian energy resources, and the EU decided to cut Russian gas imports by two-thirds by the end of 2022 and to move away from Russian fossil fuels by 2027. Foreign companies doing business in Russia have voluntarily and extensively joined the governments' actions. Many of them have stopped or closed their business activities in Russia.

> There is now a significant improvement in the production capacity of suppliers, such as semiconductors. Our customers, who used to reduce their orders due to lack of semiconductors, are now increasing them. There are still supply disruptions, but there is a significant improvement compared to last year.

Adam Krępa,
CEO, Federal Mogul Gorzyce

> The semiconductor supply situation should be calming down. Of course, there will still be turbulence, because supply chains are empty in places. The lack of interim storage makes any delay in supply, such as a ship being stopped by a storm, a problem. The pool of semiconductors on the market has increased. **Last year, shortages were as high as 30%, and this year we estimate it will be as low as 10% in the automotive industry.**

Andrzej Korpak,
CEO, Stellantis Gliwice

According to Yale University, more than 500 foreign corporations have suspended operations in Russia since the invasion of Ukraine through early April. Polish companies have responded strongly to the war with a huge mobilisation of humanitarian aid.

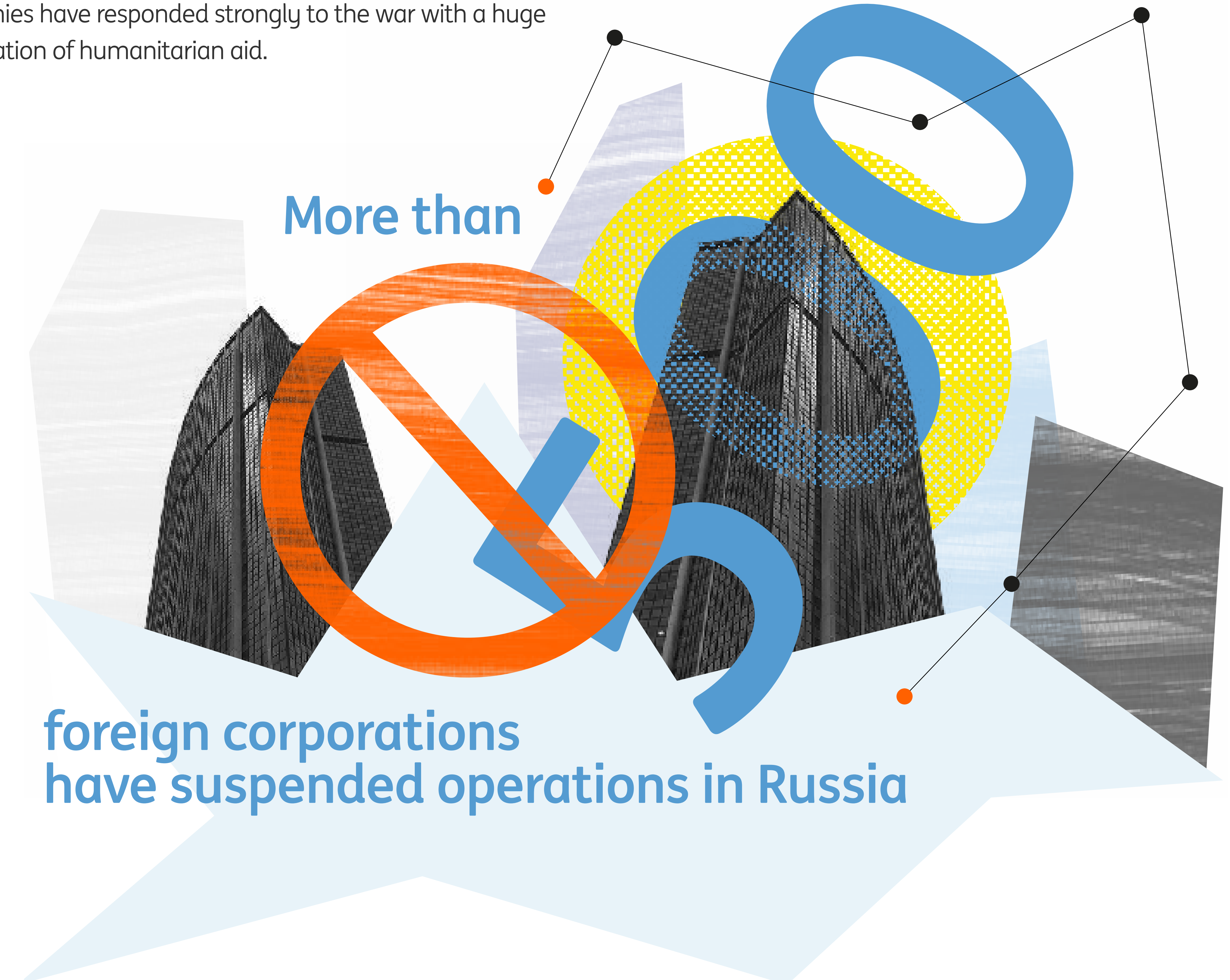
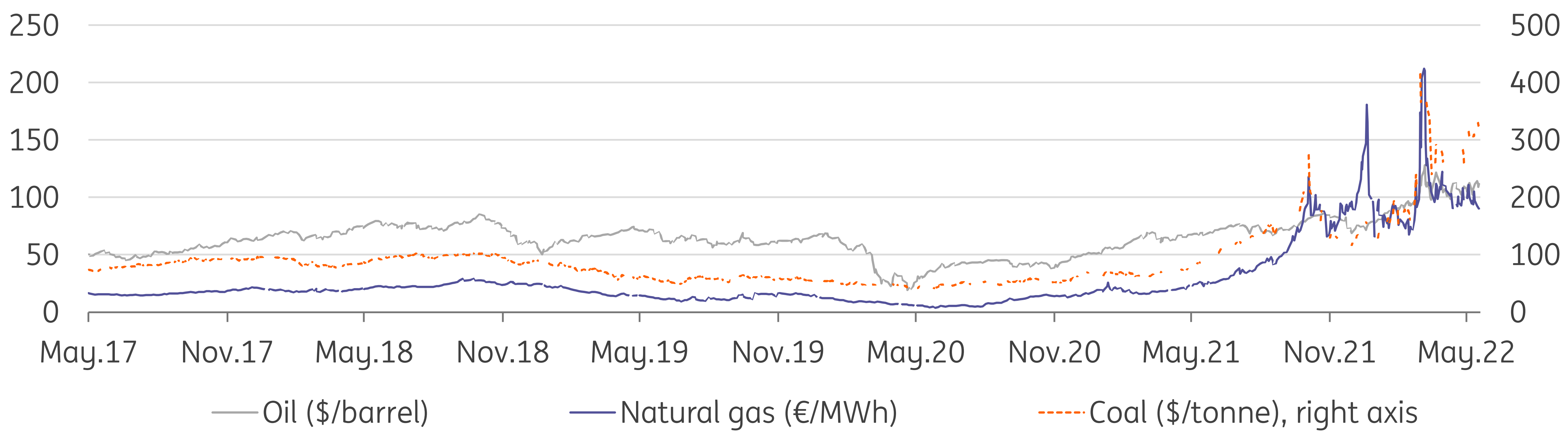
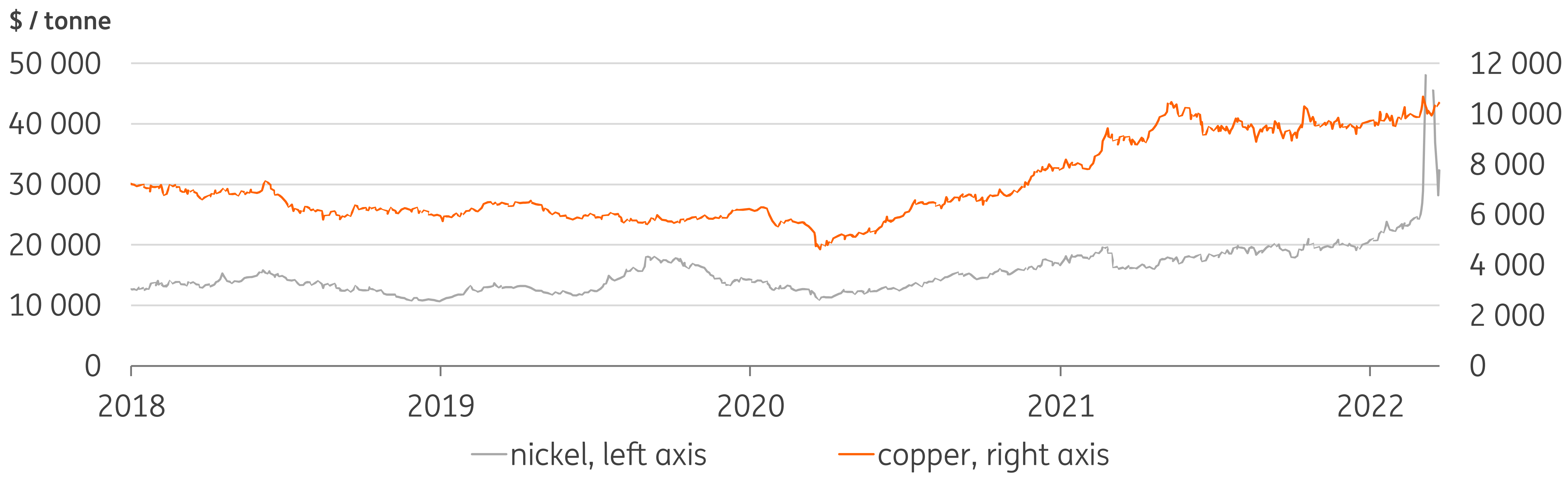


Figure 12: Daily prices of fossil fuel on the European market in 2017-22



Source: Macrobond.

Chart 13. Daily prices of nickel and copper on the LME in 2018-22



Source: Macrobond.

When it seemed that we were finally entering a period of stability, Russia's military incursion into Ukraine took place, which radically changes the situation. This will have a major impact on supply chains or logistics, e.g. through the diversion of supply sources, the driver market, etc. But - on the other hand - just a few days later, we see that it is possible to supply customers in Central Asia and the Caucasus (e.g. from Kazakhstan, Georgia or Armenia) with routes through Russia being replaced by those through Turkey, for example.

Zdzisław Czerwiec,
Vice-President, Śnieżka

The war in Ukraine has significantly worsened growth prospects for the global, European or Polish economies. Our economy entered 2022 strongly boosted (GDP growth exceeded 7% in Q4 2021 and around 7% in Q1 2022); however, after the outbreak of the war, the scenario of slowing GDP growth and rising inflation became the most likely. High energy and other commodity prices are likely to stay with us for longer (Figure 12). Existing disruptions in supply chains will be compounded by new problems resulting from heightened uncertainty or fear. Companies fear that war will further complicate what are already very challenging supply chains.

The outbreak of war in our neighbour's territory has significantly increased uncertainty for companies and managers; it will have a negative impact on production and supply chains. The war will have a serious impact on supply chains and logistics, both for raw materials and semi-finished products and for finished production. For example: Śnieżka plans to supply customers in Central Asia and the Caucasus, replacing routes through Russia with supplies through Turkey.
The sanctions also cover Belarus to some extent. For Forte, for example, this country is one of the suppliers of wood. According to AHK, German investors had production lines in Ukraine that were bombed, so they were cut off from their suppliers. Federal Mogul customers are reporting problems with a shortage of electrical harnesses, produced in Ukraine.
There have been concerns about gas supplies and further increases in energy prices.

New shocks - in energy, metals and food markets - have overlapped with old ones

The war translated into sharp increases and fluctuations in global and European energy and metal prices, as Russia is an important supplier of these. This was particularly evident in natural gas prices on the European market, which at times exceeded 350 euros per MWh, **while the 5-year average market price until mid-2021 was EUR 17.**
The increase in energy prices has been passed on to the food market - through more expensive fertilisers and transport costs in agriculture.

Strong market pressure on food products further increased after the outbreak of the war, as Russia and Ukraine are important producers of many agricultural products, especially cereals and oilseeds. The war is taking place in an important region not only for production but also for the transport of these products from the Black Sea and the Sea of Azov. Ukraine and Russia account for about 30% of global wheat production and are leading exporters of maize and barley. Shipments from Ukraine account for nearly half of global sunflower oil exports.

Many Ukrainian farmers are directly involved in the fight against Russia. In turn, Russia is under embargo, which makes financial settlements difficult.
In addition, the sowing period for spring crops, including maize and sunflowers, among others, is approaching (April, May). It is also uncertain whether, in wartime conditions, all the winter crops can be harvested. It is for these reasons that wheat prices on the Chicago Commodity Exchange shot up in late February and early March - to nearly $1,500 per bushel. And although they retreated significantly by early April, they remained well above the long-term average of $600. (Figure 15)

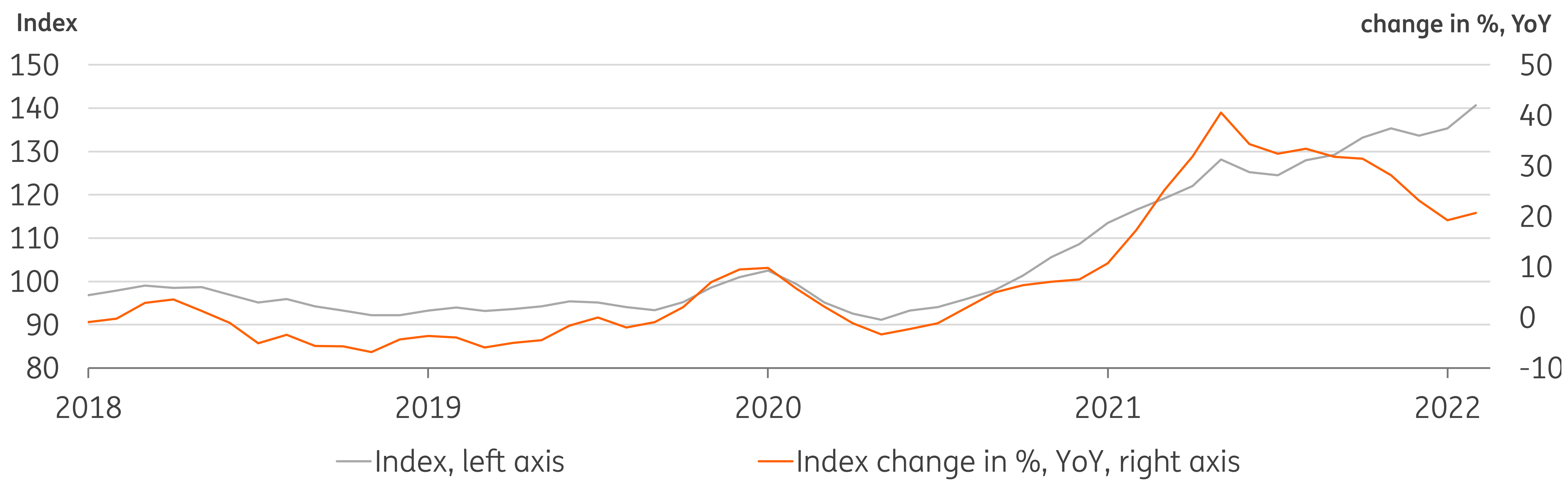
Rising gas prices are also bad news for fertiliser manufacturers and ... meat eaters. In the production of nitrogen fertilisers about 70% of the costs are natural gas. Russia remains the largest exporter of ammonium nitrate (a component of many fertilisers). Oilseeds are feedstuffs, so the cost of livestock farming, and ultimately of meat, is expected to rise. Disruption to animal production sites is also significant. Ukraine was until recently the third largest supplier of poultry to the EU market. A prolonged war could disrupt the supply of poultry products in Europe.

> The ongoing war is adversely affecting not only the supply of certain raw materials and food products from Asia, as in the case of wheat, but above all it is affecting the foundations of the European energy market. European road transport will also become more expensive as a result of a combination of events, such as additional operating costs for haulage companies caused by the introduction of the Mobility Package, rising driver salaries and road tolls.
> Fuel price increases are also possible and could be large due to the Russian aggression against Ukraine and the related economic sanctions imposed on Russia.

Paweł Kisiel,
CEO, Atlas

The war and tensions between the major players in the world economy mean **a new wave of disruption in global supply chains** and will trigger further adjustments in Polish companies; directly in those operating in the East, and indirectly throughout the economy. At this stage it is difficult for companies to assess the impact of this war on the economic situation in Europe with any precision. Sales in Eastern Europe will depend on the growing sanctions, but, on the other hand, they can be redirected to Western Europe (Arctic Paper).

Figure 14: FAO Food Price Index and its year-on-year change, YoY



Source: Macrobond.

Figure 15: Price of wheat at the Chicago exchange (CBT)

The war in Ukraine has, of course, significantly worsened the growth outlook for the Polish economy and raised inflation forecasts. The impact will come through three channels:

- **Lower foreign trade turnover.** The war in Ukraine and the associated sanctions by the West against Russia (and Belarus) mean above all a slump in foreign trade
- with the East. Poland's combined exports to Russia, Belarus, and Ukraine account for over 5% of Poland's total exports.

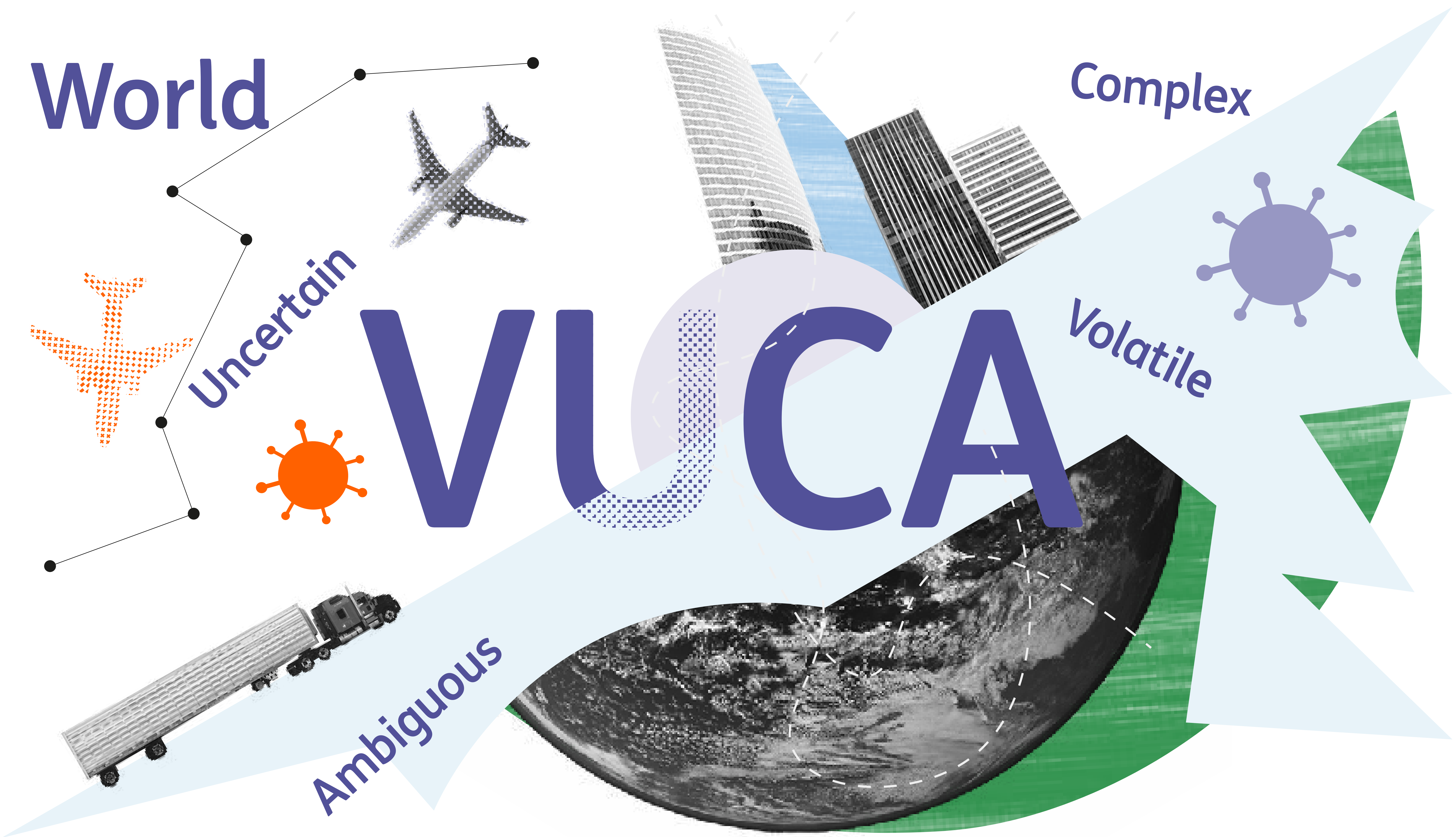
- **Weaker investment and consumption of durable goods.** This will be compounded by increased uncertainty, discouraging investment and purchases of durable goods.

- **Higher consumption of basic goods and services.** However, the decline in investment in Poland due to higher uncertainty will be more than offset by spending on hosting refugees. From the beginning of the war until the beginning of April 2022, almost 2.5 million refugees from Ukraine have arrived in Poland.

High commodity prices, independence from Russian energy sources, and the forthcoming fiscal spending e.g. on national defence will mean higher inflation.

How to continue in unstable times?

Chapter 4 summarises the main conclusions of the representatives of the companies and the two foreign chambers of commerce for foreign trade and Polish investment. In a world that has been described for several decades as a **„VUCA" world (volatile-uncertain-complex-ambiguous),** events such as a pandemic or war mean additional disruption and require structural changes in the economy and often changes in corporate strategy.



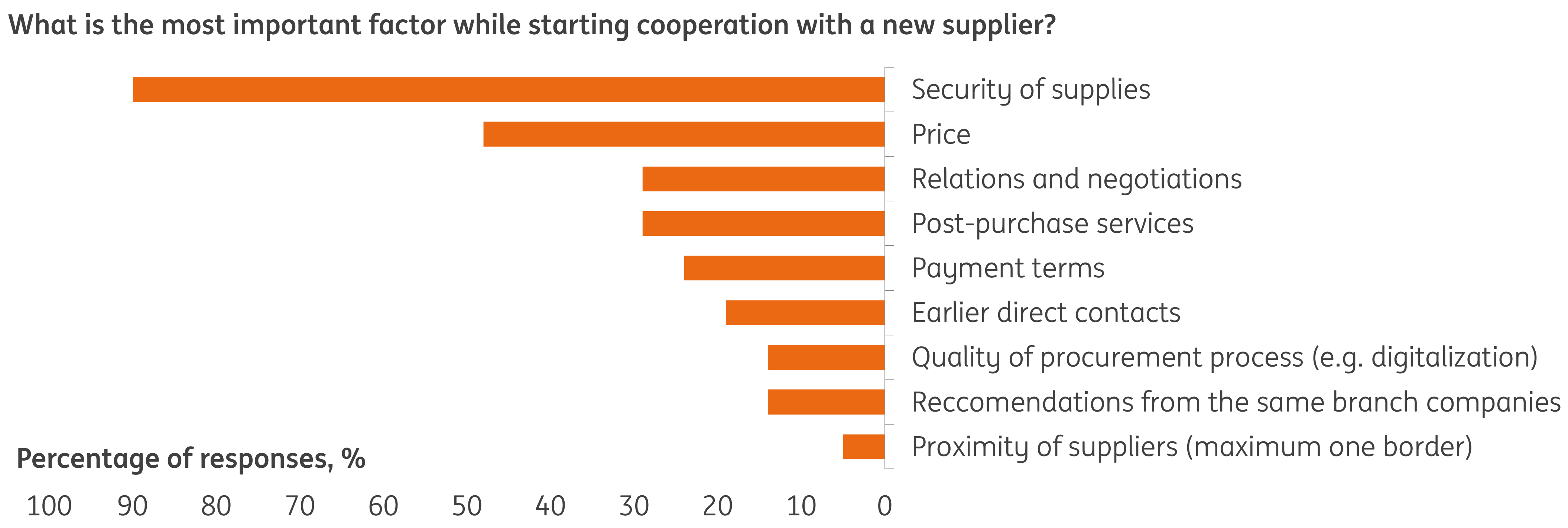
Megatrend #3: Security of supply in an environment of heightened uncertainty

The companies we interviewed (several after the outbreak of war in Ukraine) generally perceive a change in approach, with security of supply playing a greater role (less risk) and a lesser role for price. So far, however, price has been the primary criterion in business decisions - supplies from a distant country have been cheaper and stable for many years (Figure 16).

> One of the effects of the pandemic remains the high unpredictability of changes in costs and the availability of materials and services - including those that historically have fallen into very stable purchasing categories. All of this represents a high degree of uncertainty and business risk that is not possible to „hedge" with traditional hedging methods.

Adam Czarnul,
Board member, Ciech Soda Polska

Figure 16: What factors are key when looking for new subcontractors?



Source: Survey of the Club of Chief Financial Officers www.businessdialog.pl

The pandemic has forced a more diversified approach to suppliers. Price is still important, but companies are generally prepared to pay more to strengthen supply chain security. This applies both to the supply of products to the company (inbound) and the transport of products out of the company (outbound). Enhanced security of supply avoids much higher costs in the event of line stoppages - and therefore makes it is economically justifiable and not biased.

The risks of dependence on external markets have been perfectly illustrated by the pandemic (from Asia/China) and the war (from Russia for energy resources). The materialisation of these risks is, of course, acute for EU countries.

> The European Union has just realised how dangerous it is to be dependent on one area whether it concerns raw materials, medicines or components for electronics or cars. Today, however, the key areas are energy and health care. Security has no price here.

Bartłomiej Rodawski,
Board member, Adamed Pharma

Polish companies expect that uncertainty or limited predictability will stay with us permanently; it cannot be completely eliminated, they will have to manage it. Maintaining costs in an upward trend will accelerate actions to improve efficiency and diversification of suppliers and supply routes (Ciech Soda). We will see solutions, such as the deployment of warehouses in Poland and Europe, aimed at ensuring that the product reaches the customer as quickly as possible. Companies are counting on a decrease in the availability of goods on order (CCC). Some, in an environment of uncertainty, will limit investment and focus on maintaining production and sales (Colian).

Companies expect consumer purchasing power to fall due to high inflation, as they are forced to pass on higher costs to the consumer. This increase in costs has happened very quickly, but limiting its effects will take time. The phenomena in one purchasing category translate into another, a domino effect takes place (Maspex). The lack of interim warehouses means that any delay in deliveries (e.g. a ship being held up by a storm) will lead to disruption. Supplies have also become very sensitive to political and military events (vide: war at our borders).

Real diversification of supply requires the construction of new factories, which takes time and investment (Stellantis).

Some global companies had already decided to reduce logistics and transfers between continents. Some 10 years ago, ABB launched a programme „Europe for Europe", sourcing components for factories in Europe mainly from the Old Continent market. Similar programmes have been implemented on other continents. More secure supplies often meant price pressure from companies that took advantage of cheap production - for example, in Asia.

> The lasting effects of this global turbulence could, of course, be changes in production and sourcing models, progressive automation and digitisation of logistics, as well as an increased pace of innovation in reducing material consumption and seeking efficient alternatives for certain raw materials, which is now also noticeable at ABB.

Tomasz Wolanowski,
CEO, ABB Poland

Companies see the **need for flexibility in responding to changing market conditions.** They expect that the period of supply chain „de-calibration" will take quite some time (Solaris).

More flexibility is provided by suppliers which are closer. Companies want further suppliers in Asia but also as a back-up in Europe and organise transport accordingly (Raben).

> In the long term, costs and flexibility are also important - because today the customer needs more, tomorrow less. If I have a supplier close by, I can agree with him on an ongoing basis and adjust the volume of supplies required. When the supplier is in China, even if I notify him today about a change in demand, the material will continue to flow to me in the previous quantity for some time because, after all, the specific goods are already on ships on the ocean when we talk about a change in the volume of deliveries. That is another argument for shortening supply chains.

Adam Krępa,
CEO, Federal Mogul Gorzyce

Companies assume that a return to pre-pandemic prices for raw materials, materials and energy before the pandemic is impossible (Solaris). For many companies, 2022 will be marked by shortages of materials and raw materials and an increase in their prices (e.g. cotton - for LPP). Due to the scale of supply chain disruptions, recovery will be a longer process (Newag, Sniezka). Material price increases are now affected by higher electricity or gas costs (Federal Mogul, Stellantis). Rising raw material and component costs are currently the biggest headache for car manufacturers. They will grow at around 6-10%, of which steel is the lion's share. Rare earth metals, essential for the production of electric motors and batteries, have become another uncertain element. Here, too, there are several monopolists, with China in the lead (Stellantis). For machinery and equipment manufacturers, the availability of industrial components and metals will remain the biggest challenge (ABB).

> I do not foresee a significant improvement in the availability of materials or raw materials in the near future - for several reasons. The first is the scale of the supply chain disruption we are in. Rebalancing will not happen suddenly, but will be a longer process. Another is the increase in supply - and therefore the launch of new projects and investments that will increase the availability of these basic materials, which we currently have problems with. There is nothing to suggest that such investments can change the situation in the near future. Finally, a point that needs attention is that suppliers should not care about changing a situation where demand is so strong that the customer can accept high prices and be more lenient with changing (delaying) delivery times. Let's not forget the raw materials we are depleting, which are not coming...

Zbigniew Konieczek,
CEO, Newag

Additional cost pressures are brought by regulatory changes and a tight labour market, which compound the effect of pandemics and war. These can include: „difficult to understand tax decisions", the sugar tax (food industry) or the introduction of Extended Producer Responsibility and - in the future - a deposit and deposit system with rather high rates (Colian). Some companies pointed to technological barriers to increasing supply (it is impossible to build a factory quickly - OT Logistics). Others - to stronger wage pressure due to high inflation (Federal Mogul). Companies have problems filling many vacancies for specialists in various fields, not only IT specialists (Comarch). For many companies, a challenge may be the return of employees from home office to offices after 2 years of forced remote working (Raben).

> The reality around us is changing, so the competitive advantage will go to those companies that are able to react quickly to new circumstances.

Ryszard Florek,
CEO, Fakro

Prospects for shortening supply chains - assessment of companies

Companies in our survey are very pragmatic about the prospects for shortening supply chains. While many generalisations are possible, this assessment varies by industry and by the market power of Asian (Chinese) companies. Companies acknowledge that the EU is not a resource-rich market, especially for the increasingly critical rare earth metals, so will remain somewhat dependent on external sources.

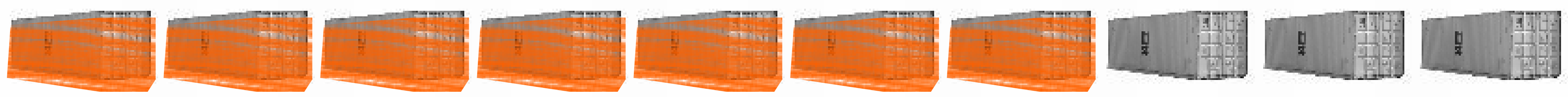
However, the current situation is exceptional, as the availability of raw materials and components has become a more important factor for companies than their price, as this is the only way to guarantee liquidity of production (Newag).

Some of the surveyed companies believe that nearshoring has already started and it will be a long-term trend. Poland may benefit from it. In the next five years, Eastern Europe has a chance for new, highly automated investments (Maspex). A significant barrier, however, is the low level of social capital in Poland - little trust and cooperation (Fakro).

Sector perspectives

- **Maritime transport:** Asia will dictate the stakes as more than 60% of the merchant fleet is owned by Asian operators. China produces 96% of dry containers and 100% of refrigerated containers in the world. **Asia generates 80% of container traffic,** is home to 7 of the 10 largest terminals and over 90% of the 195 coal-fired power plants currently under construction. Electricity in Asia is significantly cheaper than in Europe. More than 75% of international trade, particularly from Asia, is carried by ship. Rail carries 5% of cargo from the continent - its role will grow, but from a low level.

Asia is home to 7 of the 10 largest terminals



China produces

96% of dry containers

and 100% of refrigerated containers in the world.

» **Companies have given up hope of a significant drop in transport prices and expect freight rates to rise in the long term,** influenced by stricter environmental requirements and rising fuel prices. Due to the sulphur directive, which came into force at the beginning of 2020, marine fuel prices have increased by tens to hundreds of percent, depending on the bunkering location (Port of Gdansk). About 25-30% of the freight price is the fuel rate, depending on the fuel price (Raben). Shipowners do not necessarily strive to improve the situation; it is only in 2023 that freight rates will start to decrease, when container ships, which are already being built, will gradually appear on the market (LPP).

» **The current cost of maritime freight from China to Europe in many industries undermines the viability of importing from Asia.** What is needed is the involvement of international organisations and dialogue with shipping company owners and container operators. Gdansk and other Polish ports could shorten other supply chains by contributing to the establishment of permanent sea connections - to the USA or Canada. Polish ports still face effective lobbying from Northern European ports, which are strengthening their position as major container hubs in the European supply chain (Fracht FWO).

- **TSL sectors:** These sectors can expect increased demand, including to streamline e-commerce deliveries. Cost pressures will persist in these sectors due to shortages of logistics workers - professional drivers and warehousemen, demand for which is higher than for workers in the IT sector (LPP). The EU Mobility Package is also driving up transport prices. In air transport, there is a shortage of aircrew (Raben). China's zero Covid policy increases the risk of delays and downtime in China (Amica).

- **Pharmaceutical and IT industries:**

  » **Pharmaceutical industry:** Asian countries have a strong price advantage in the production of active ingredients and intermediates, in some cases a monopolistic or duopolistic situation. This production has been abandoned in Europe. EU systemic support for European companies (Polpharma) is needed to compete.

  » **IT:** Electricity prices will become increasingly important for maintaining office buildings, powering and cooling server racks. For this reason, Comarch is considering moving servers to the US. As for sales, the company will develop them further in Asia, as the demand for IT services is growing there.

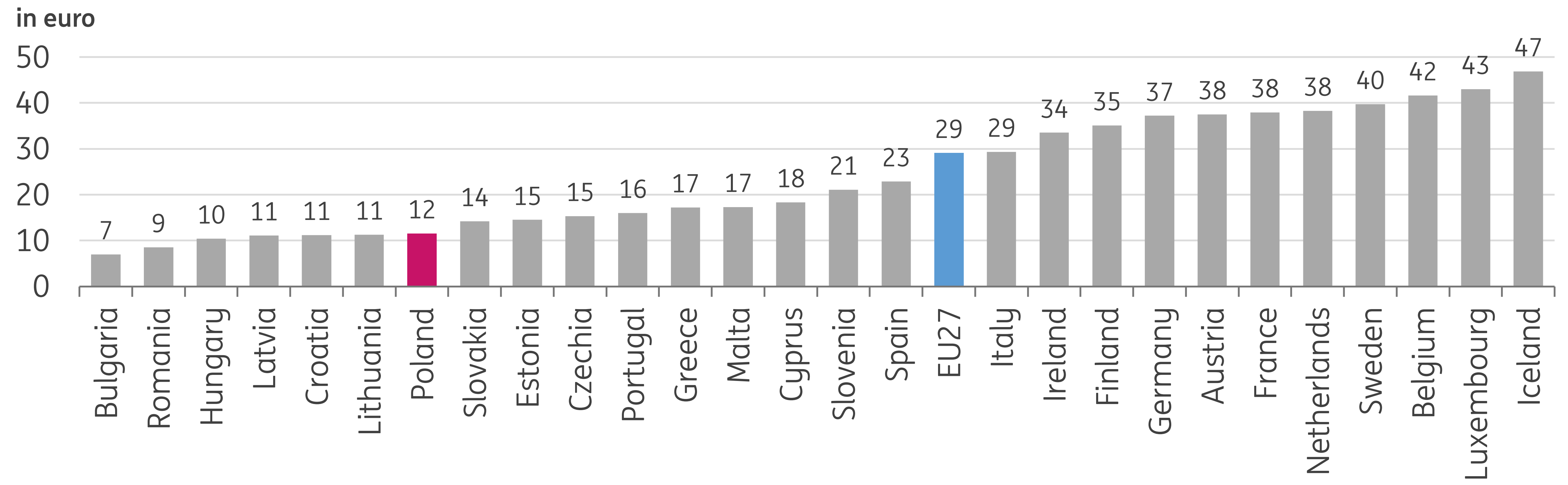
- **Other manufacturing sectors**

  » **Shortening supply chains will not happen quickly and to a limited extent,** as multinationals have invested too much in the Far East, especially China, to rebuild more expensive production in Europe. However, companies will increase safety stocks, seek more efficient transport and some critical production, e.g. semiconductors, will be relocated to Europe (OT Logistics). Moving production to Europe will certainly optimise supply chains (Nowel).

  » **Moving part of the production process to Europe is reasonable,** but this won't happen quickly, if only because of the lack of labour or large capital outlay. Eastern Europe, where labour costs are relatively low, may now be regarded as a region of higher risk for investors (Fracht FWO Poland) (Figure 17).

  » **In the light industry** (clothing, footwear), the search for suppliers closer to home is made more difficult as Asia has built up huge competitive advantages there. Some industries have so far sourced 90%

Figure 17: Hourly wages in EU countries, average in 2021



Notes: Labour costs (compensation of employees plus taxes minus subsidies) in industry, construction and services, excluding public administration, defence and social security.

Source: Eurostat

of their goods from the Far East and cannot suddenly change these proportions, changes will be evolutionary (e.g. VRG). Due to high transportation prices, however, apparel companies are looking for „close" apparel factories that can deliver premium products faster (LPP). CCC is not looking for other places to produce, but will be looking into it. Amica has a similar approach to relocations- Locating production closer to the consumer requires analysis (the pandemic showed what a supplier in a distant country means) and thinking beyond five years.

» In the **paper industry,** rising sea freight costs reduce the profitability of exports outside Europe, and competitors from Asia have higher shipping costs to Europe. Modern Polish printing should seize the opportunity (Arctic Paper).

» Newag - the **rolling stock manufacturer** - is looking for suppliers as close to the company as possible - wherever possible.

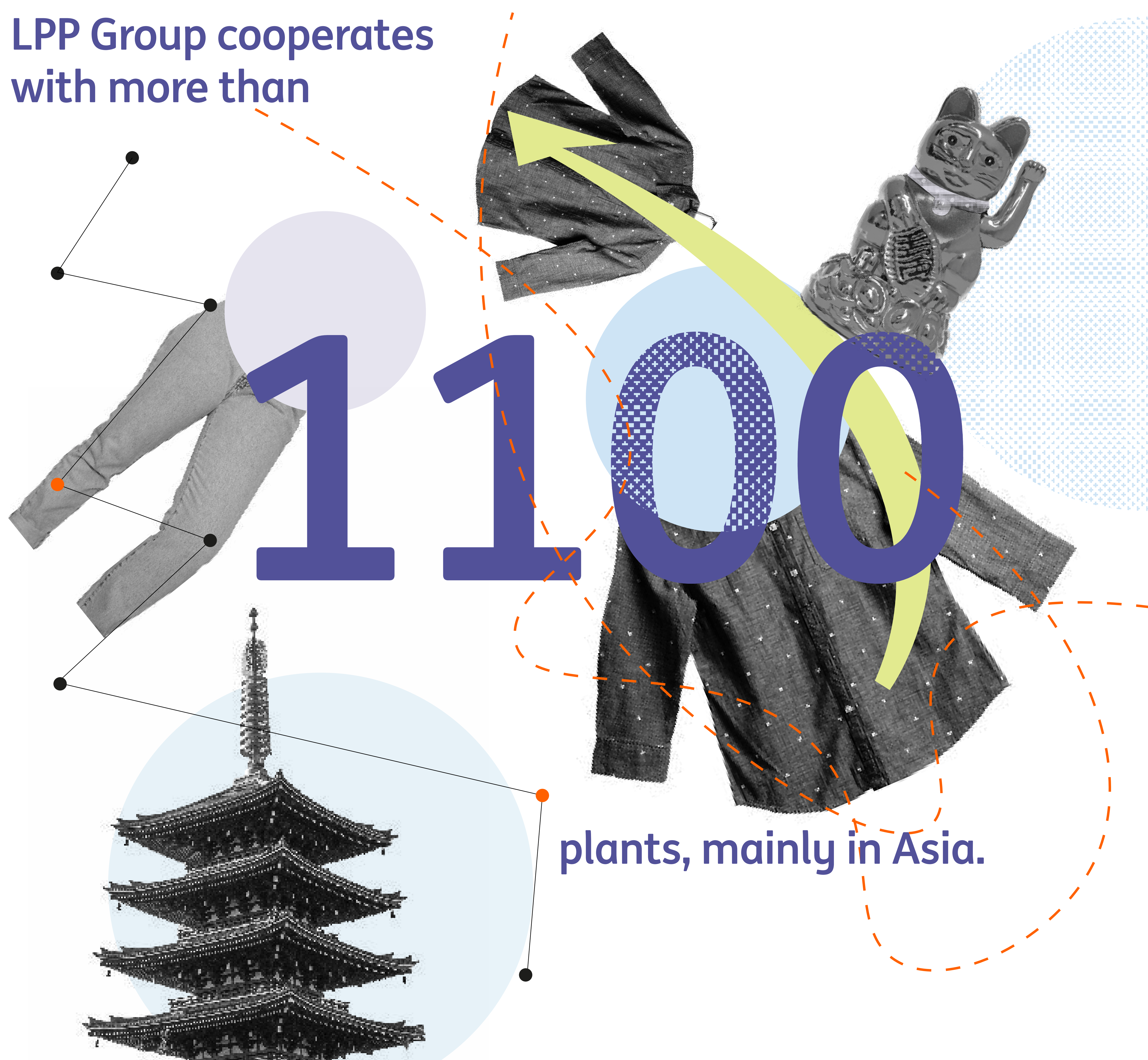
» In the **automotive industry,** there is a real interest in locating some investments closer to Poland and Slovakia, among others, to countries with lower costs. Global suppliers are building factories in Poland or expanding existing ones to produce parts for future electric versions of cars (Stellantis).

> **LPP Group cooperates with more than 1100 material suppliers and sewing plants, mainly in Asia.** We are not able to completely replace our 1100 partners with European manufacturers. European factory sewing is at least 50% more expensive than in Asia. And we operate in a very competitive market. All of LPP's main Western competitors also manufacture mainly in Asia, so the Polish clothing group does not plan to create a separate business model and move its production to Europe. What is more: the level of specialisation of Asian factories and their scale of operation does not provide much alternative.

Przemysław Lutkiewicz,
Vice-President, LPP

> The pandemic made it very clear that the more medicine produced by domestic manufacturers, the greater the country's drug security. Today, we know that this is a strategic issue for each country, and there has been much discussion both at the national and EU level about reintroducing the production of medicine and active ingredients in Europe.

Bartłomiej Rodawski,
Board member, Adamed Pharma



Prospects for shortening supply chains - assessment of chambers of commerce

The interviews with the Scandinavian (SPCC) and German (AHK) chambers of commerce were conducted in March, so they cover thematically the effects of the pandemic and the war in Ukraine - a bit of a bird's eye view, including the views of member companies. Key findings from these discussions:

- **Security.** Risk minimisation will play a key role in companies' strategies. Companies are now placing much more importance on supply chain security. Globalisation will not disappear, but will take a more local form. The conflict in Ukraine is driving the shortening of supply chains, while economically there are staff shortages in the transport and logistics industry and shortages of container ships.
- **Inventory.** Many companies are changing their approach to stocking products and raw materials. The „just in time" model, has changed to a „just in case" model.
- **Rising costs.** Strong cost pressures were evident in almost all sectors. The war in Ukraine drove additional increases in energy prices.
- **New suppliers.** German and Scandinavian companies want to shorten their supply chains and are looking for partners in Central and Eastern Europe, but this is a lengthy process. High freight costs further argue for closer markets.
  - There are already examples of transferring part of the production from China to Poland (e.g. the manufacturer of forklift trucks KION).
  - German companies were moving production to Poland in search of savings.
  - Chinese and Japanese companies, based in Germany, open plants in Poland.
- **Dependence on single markets.** The pandemic and war have strongly demonstrated the need to diversify supply and reduce dependence on China and Russia.
- **According to AHK, German companies are focused on:**
  - **Renewable energy sources,** including the use of hydrogen
  - **semiconductor manufacturing.** America's Intel recently announced that its new factory will be located in Germany. This is crucial for the automotive industry.
  - **circular economy** and a rigorous approach to recycling.
  - Sometimes creating a new supply chain requires developing a new technology (RES, grid modernisation, LNG). The attractiveness of investing in Poland requires accelerating the energy transition!
- **According to SPCC, Scandinavian companies have been focusing on sustainable chains for years and are involved in Poland, among others:**
  - Energy storage systems (Northvolt) and electromobility (Garo)
  - waste management (Stena Recycling)
  - car parts (Kongsberg Automotive)
  - energy efficiency equipment (Danfoss)

> Price continues to be the most important factor in decision making, but transport companies are noticing an interest in alternative forms of delivery, such as short sea or ro-ro road deliveries, which can offset some of the negative environmental impact of transport. (...) The pandemic has made companies and their customers painfully aware of the risks involved in a business that relies on suppliers from thousands of kilometers away.

Agnieszka Zielińska,
managing director,
Scandinavian-Polish Chamber of Commerce (SPCC)

> Many companies are looking at alternatives for their supply chains over, say, the next five years. It seems to me that we may be seeing manufacturing return to Europe. This is all the more likely as automation allows production costs to be kept relatively low. Of course, we have to bear in mind delivery times and safety. I think there will be a lot of production plants set up on the Old Continent, which creates excellent prospects for Central and Eastern Europe and Poland in particular.

Lars Gutheil,
Head of the Polish-German Chamber of Commerce,
AHK Poland

What doesn't kill us makes us stronger

Thanks to a diversified structure of the economy, flexibility, and with public support - the Polish economy reached its pre-pandemic GDP level relatively quickly. Polish companies emerged from the pandemic with new experience and resilience. Compared to other EU countries, industry accounts for a relatively large share in the structure of value-added. Additionally, the industry itself is relatively diversified, especially compared to other countries in the region, such as the Czech Republic or Hungary, which are more like a car monoculture.

During the pandemic, Poland strengthened traditional and revealed new export specialisations, both in low-tech industries (food, furniture), as well as in high-tech industries (production of household appliances, rail vehicles, batteries for electric cars electric cars). The latter category has experienced a boom - due to earlier foreign investments and the construction of large factories of LG Chem or Daimler in Poland.

Investment in safer chains should be built into EU priorities, which often matches with strategies of global companies. A typical response of Polish companies to supply problems has been to seek more subcontractors in the country or the EU, in addition to those available in distant markets.

Digital and green transformation are priority areas of the EU economic strategy (megatrends #1 and #2). They largely influenced the shape of the Union Industrial Strategy of March 2020, the Pharmaceutical Strategy for Europe of November 2020, and the announcement of a more assertive EU trade policy in February 2021.

In US policy, attempts to reduce dependence on China began several years ago and took the form of trade wars. The Biden administration has not changed this stance, and in the context of disruption to global supply chains, a review of them has been commissioned and vulnerable product groups have been identified (February 2021). These included semiconductors, batteries (including batteries for electric vehicles), critical minerals including rare earth elements, pharmaceuticals, and active substances, among others. In February 2022, the administration released a plan to revitalise US industry and secure key supply chains.

The EU, too, is strategically setting out to seriously reduce its dependence on non-EU suppliers in key areas. These include semiconductors, raw materials, hydrogen, cloud technologies, active substances (important in pharmaceuticals) and batteries. It is also expected to accelerate the so-far slow „new industrialisation" of Europe.

The several-fold increase in freight (sea and air) and energy prices is prompting people to move production closer to home, diversify suppliers and increase the security of supply. With digitisation and robotization and greater use of remote work, regionalisation can be a cost-effective process in some industries. It creates a decoupling from the low labor costs that for decades have been a major factor in favour of unbridled globalisation. We see recent changes as a corrective to the excessive „push" of manufacturing to distant markets in many sectors.

The option to relocate production to Poland is different in different industries, which can be seen in the opinions of companies. While there is a lot of room for diversification, moving production closer to home, e.g. in the pharmaceutical industry or production of batteries for electric cars, the motivation of companies to make such changes, e.g. in the textile or footwear industry, is significantly lower. However, this results from the specific situation of these sectors - in the conditions of global competition.

Ideally, the processes of globalisation should be corrected to be greener, more digital, and more socially just than has happened so far.

In this new environment, processes contrary to offshoring will be cost-effective and will progress towards right-shoring. This is due to the changing model of work (increasing role of remote work), digitalisation and automation of internal processes, as well as complex sales channels (e-commerce, omni-channel). It is driven by economics, but also by politics - significant adjustments to the liberal trade policies of the EU and the US. **Right-shoring** can be seen as a kind of compromise between far-reaching globalisation in search of low costs above all, and protectionist pressures. Perhaps a new balance in international trade.

Russia's invasion of Ukraine has been met with a response from the West in the form of sanctions that will lead to the country's isolation in global trade and investment. Depending on their increasing scale, the sanctions could further marginalise Russia's economic role. The response of foreign business was also decisive - many companies withdrew from Russia.

It seems that the war will have more structural effects on the Polish economy than the pandemic. It is unclear how long the hostilities and sanctions against Russia will last. In the context of the risk of a conflict of superpowers or a new version of the Cold War, there will probably be a process of deglobalisation and restrictions in international trade.

Although the Polish economy is based on a relatively large internal market, it has remained an open economy. Foreign trade and investment have raised the level of competition and have become an important channel of diffusion of technological progress and productivity growth.

The forced reallocation of capital from the East may benefit Poland as a „frontier area," although this entails a greater risk for external security (but also raises concerns of potential investors). Rising prices of energy and raw materials - not just energy - may make it more difficult to access key components from war-torn Ukraine and financially and economically sanctioned Russia.

We are facing another great test of the resilience of Polish business. After the shock of the pandemic, which affected mainly services, the war in Ukraine will affect mainly industry and - indirectly - the whole economy.

A new balance in international trade.