KOPINT-TÁRKI
KONJUNKTÚRAKUTATÓ INTÉZET ZRT
WWW.KOPINT-TARKI.HU

# Present state and future prospects of cooperation between the People's Republic of China and Central and Eastern Europe in the field of automotive and related industries

## Summary of the preliminary results of the research prepared for China-CEE Institute

Budapest
June 2026

Prepared by:
Bogó, Rozália,
Kerényi, Ádám
Matheika, Zoltán,
Nagy, Katalin
Palócz, Éva
Pénzes, Petra
Vakhal, Péter

**Present state and future prospects of cooperation between the People's Republic of China and Central and Eastern Europe in the field of automotive and related industries**

## Introduction

The automotive industry plays a prominent role in the economies of Central and Eastern Europe (CEE)[1]. Although they had their own automotive industries prior to 1990, during the last decades the rapid development of the sector was primarily driven by the influx of foreign direct investment (FDI) into the region. The vast majority of vehicle manufacturing capacity in CEE was created by foreign multinational companies, both original equipment manufacturers (OEMs) and their traditional Tier1, Tier 2 and Tier 3 suppliers. Nevertheless, a multi-level supplier pyramid of local companies serving them has also developed over the decades. Between 1990 and 2010, mainly West European (first of all German) and Japanese companies created automotive production capacities in CEE through both greenfield investments and takeovers. Recently Chinese and South Korean new investments have become dominant in the region.

Since the emergence of electric vehicles (EVs) in the early 2000s, China has played a dominant and transformative role in the global production of EVs and the battery industry. As the world's largest EV market, China leads both in manufacturing electric cars and supply chain development for key components, especially lithium-ion batteries. Chinese companies invest heavily in battery technology innovation, raw material sourcing, and large-scale production facilities, making China the world's biggest producer of EV batteries. This leadership is supported by government policies promoting clean energy and electric mobility, substantial subsidies, and a well-established domestic market. In line with international trends, new capacities for internal combustion engine (ICE) vehicles in CEE have gradually been replaced by the production of EVs.

Recent trends of cooperation between China and the CEE region have largely focused on the EV and battery production. This sector plays a leading role in Chinese foreign direct investment in the region, mainly in Hungary and in Poland (to a lesser extent). Although the share of China in automotive industry in CEE is still moderate, its role in EV production is growing rapidly.

Another important aspect of the Chinese success is the early acceptance of the opportunities offered by Industry 4.0. The Chinese automotive industry combines advanced manufacturing, the Internet of Things (IoT), and artificial intelligence (AI) to drive the rapid growth of the country's EV market. China was able to shift the focus from labour-intensive mass production to high-tech, flexible "smart factories" that accelerate innovation and global competitiveness.

Chinese investments may play an increasingly important role in stimulating Industry 4.0 adaptation in the CEE region, as well. The high automation level of Chinese manufacturing plants serves as a benchmark for local partners, and Chinese

[1] In this research, CEE refers to the four Visegrad countries (Czechia, Hungary, Poland and Slovakia) and Romania, as they face similar challenges. The automotive industry refers to manufacture of road vehicles designed for transporting people or goods (NACE 29) and manufacture of batteries and accumulators (NACE 27.2).

companies often support their suppliers with training programs, technological consulting, and engineering cooperation.

Our research has analysed the current situation of the cooperation between China and CEE in EV manufacturing, its main challenges, and their possible consequences. We have examined in detail

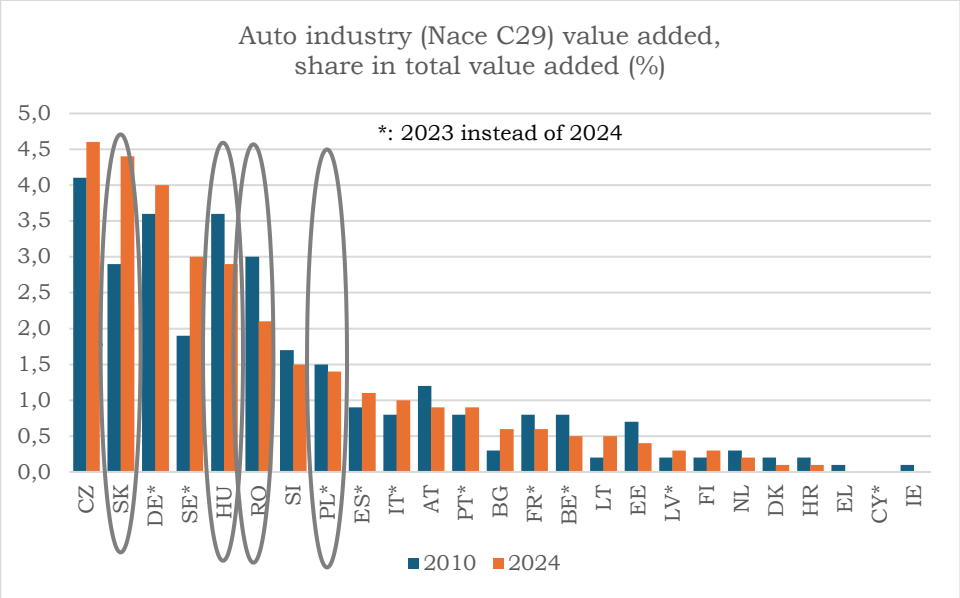
- the size and dynamics of the Central and Eastern European automotive industry, with a particular focus on electric vehicle production and related industries, and the role of Chinese investment in these industries (Chapter 1)
- Characteristics of trade in automotive products and components between China and Central and Eastern Europe (Chapter 2)
- Chinese direct investments in CEE in EV production and in battery industry (Chapter 3)
- The role of China and the Central and Eastern European region in global value chains in the automotive industry, with a special focus on the production of electric vehicles (Chapter 4)
- Opportunities and challenges of scientific cooperation between China and Central and Eastern Europe in the field of automotive and related industries (Chapter 5)
- The European policy actions aimed at strengthening the competitiveness of the automotive industry – facing challenges from China (Chapter 6)
- The envisaged role of China in implementing the circular economy concept in the automotive industry of the CEE (Chapter 7).

The research paints a mixed picture of China-CEE relations in the automotive industry. Although the analysis treats the CEE region as a single entity, significant differences can be observed among individual countries. The importance of the automotive industry itself varies from country to country, and the approach to managing relations with China also differs.

Due to the great geographical distance and differences in size, there are few organic and direct links between domestically owned CEE companies and Chinese firms. Therefore, the significance of individual countries' economic relations with China (trade, FDI) is determined partly by the foreign trade regional preferences and strategies of CEE governments, and partly by the global corporate level decisions of multinational companies established in these countries.

## 1. The Size and Composition of Automotive Industry Capacity in Central and Eastern European Countries

A significant automotive industry developed in the five countries examined during the 2000s, which expanded further in the 2010s. In most of the countries, automotive manufacturing has gained a notably prominent role within the national economy compared to other EU member states.




However, the sector is dominated everywhere by large foreign-owned corporations, and these have largely established the lower-value-added stages of car manufacturing in the countries examined to exploit the combination of low wages and relatively high productivity. Domestic companies are predominantly small and medium-sized enterprises and play a subordinate role in the industry's value chain.

According to Eurostat's *national accounts* statistics, the automotive industries of the Czech Republic and Poland are the largest in the region. In terms of *the* automotive industry*'s share of GDP*—that is, the degree of automotive orientation—the Czech Republic and Slovakia lead the way, while Poland has the *lowest* automotive orientation among the countries examined.

*The volume of value added* in the automotive industry rose significantly in most countries through 2019. The growth rate was highest in Slovakia and Romania during this period, but output in the Czech Republic also expanded steadily. The downturn caused by the Covid crisis and the subsequent recovery varied across the three countries.

*In Hungary,* however, after an initial sharp increase in performance, the automotive industry has been able to do little more than tread water since 2016. *Poland*, meanwhile—though subject to fluctuations within a relatively wide range—has remained virtually stagnant.

An important and unfavourable factor is that the automotive *industry's value-added content* stagnated or declined slightly. The decline was most significant *in Hungary*. The fact that no improvement was achieved in terms of value-added content reflects

the region's automotive industry's unfavourable position within international value chains.

*The number of employees* in the sector increased until 2018 and then declined. In three of the five countries, employment growth was more modest than the growth in value added, resulting in a significant increase in *labour productivity* in the Czech Republic, Slovakia, and Romania. At the same time, in Hungary, the rate of employment growth approached that of value added growth, resulting in modest cumulative growth in real productivity. In Poland, meanwhile—amid more or less erratic fluctuations in output—sectoral employment rose substantially through 2018, then, after a few years of moderation, rose sharply again after 2022. Consequently, value-added-based real productivity was significantly lower in 2023 than in 2010.

According to Eurostat's *Structural* Business Statistics (SBS), *the proportion of automotive companies* within the manufacturing sector is negligible compared to the sector's weight in employment or output, due to the dominance of large enterprises. In the Czech Republic, Hungary, and Romania, the numerical weight of large enterprises in the sector is particularly prominent by EU standards. The dominance of large firms is also reflected in the fact that in 2023, 88% of the sector's value added was attributable to large enterprises.

The automotive industries of all countries in the region are dominated by foreign companies to an even greater extent than is typically the case for the manufacturing sectors of Eastern European countries. Foreign companies are typically larger than domestic ones. In passenger car manufacturing, all OEMs in the region's countries are foreign, and the same is true for the vast majority of Tier 1 suppliers.

The productivity (value added per employee) of foreign companies is higher than that of domestic companies. However, within gross output, the *share of value added* is lower for foreign companies —in other words, these firms rely more heavily on capital and other (non-labour) inputs than domestic ones.

Regarding *the national affiliation of* foreign-controlled companies, the top five countries for the region as a whole remained unchanged during the period under review. Based on value added, German companies were consistently the most significant, followed by the United States, with France, Italy, and Japan sharing the next three positions in varying order. China moved up to sixth place by 2023, after—based on incomplete data—Chinese companies significantly increased their activity in the region starting in 2017.

According to Eurostat's Structural Business Statistics (SBS), based on the number of employees, value added, and sales turnover in **the battery and accumulator industry** (NACE 27.2), only Poland and Hungary have shown a marked increase since 2018. The relevant Polish data series ends in 2019, but it is known that Poland has risen to the forefront of Europe in battery manufacturing. In Hungary, following rapid growth, the industry hit a wall starting in 2023, and the sector's performance declined significantly. In addition to overly optimistic expectations regarding the pace of the transition to electromobility, a problem often encountered by early adopters also played a role: the post-2018 boom was partly driven by battery manufacturers whose operations were based on technologies and product types destined to become obsolete due to rapid technological transformation.

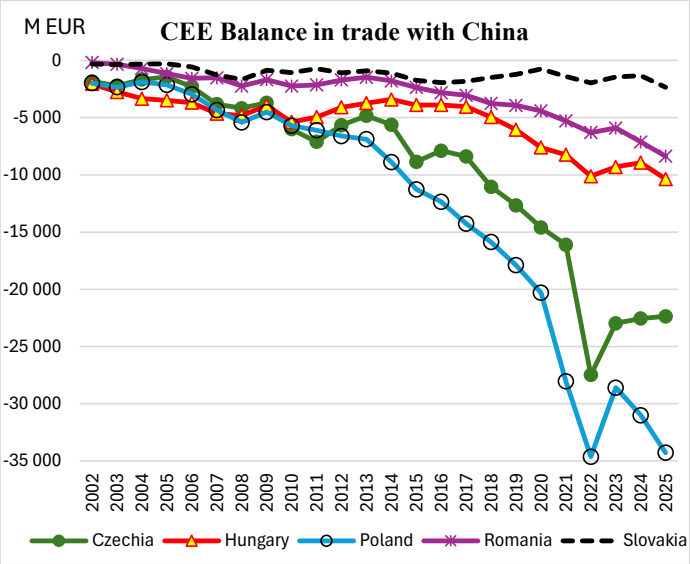
Following the Hungarian and Polish examples, ***the development of the battery industry*** in Romania, Slovakia, and the Czech Republic ***began with much less intensity*** through 2024 than in Hungary and Poland—although significant initiatives and projects exist in all three countries. It remains to be seen whether this relatively late start will prove to be an advantage or a disadvantage for the countries in question. It could be an advantage that, at a somewhat more mature stage of the industry—after some of the competing technologies have been weeded out—they can join the electromobility trend with greater certainty—if the countries' leadership and potential investors ultimately decide to get on board.

## 2. Trade in automotive and related products between China and CEE

Trade between China and the Central and Eastern European countries has grown dynamically since the 2010s. However, this growth has not been continuous, with some years showing exceptional values. This can be explained in part by the relatively low value of trade, which means that any large trade item may cause a significant change in annual turnover.

At the same time, trade is characterized by serious imbalances. Imports from China to CEE grew much faster between 2010 and 2025 than exports from CEE to China. CEE exports are greatly hampered by the disparity in size between China and CEE countries. Small CEE countries are typically unable to generate the volume of exports required by the Chinese market.

Due to differences in the size and dynamics of imports and exports, trade between CEE countries and China is characterized by a growing deficit, albeit to varying degrees in individual CEE countries. The deficit of Poland and the Czech Republic have grown exceptionally rapidly since 2010, while those of Hungary and Romania have grown more slowly. The Hungarian and Romanian deficits grew almost continuously, while the Polish and Czech deficits fluctuated sharply. Slovakia is an exception: its trade deficit with China barely increased and remained low.

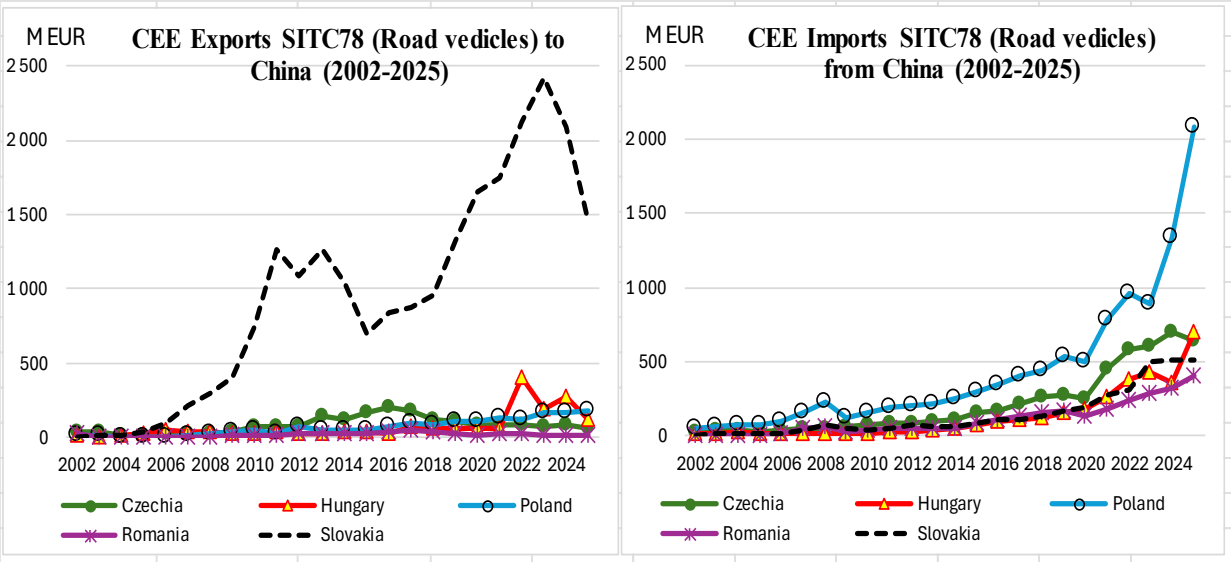



The "Machinery and equipment" product group (SITC 7) accounts for a significant share of CEE trade with China, a higher proportion than in CEE's total trade. This product group plays a decisive role in CEE's **trade deficit** with China: 85% of the Czech Republic's trade deficit with China stems from SITC 7; the corresponding figures for other countries are as follows: Hungary 87%, Poland and Romania 60–65%, and Slovakia 40%.

Within this group, exports of **road vehicles and components** (SITC78) to China from four out of five CEE countries barely reach 250 million euros and have grown only slightly over the past two decades. The only exception is Slovakia, which has exported road vehicles to China worth between 1.5 and 2.5 billion euros in recent years.

Imports of road vehicles and components from China have grown more rapidly; in 2025 they reached 500 million euros in four Central and Eastern European countries

and 2.2 billion euros in Poland. Between 2020 and 2025, the value of motor vehicle imports from China more than quadrupled in Poland and increased by two and a half to three times in the other four countries.




In terms of share, road vehicle exports from Central and Eastern European countries to China account for less than 10% of the total value of Chinese exports in four countries and it has not changed over the last two decades. The only exception is Slovakia where road vehicles account for about 80% of exports to China. Regarding imports from China to CEE, the share of road vehicles in total imports fluctuated around 1–3% until 2020. However, starting in 2020, it began to rise, reaching 3–6%, with the latter figure referring to Hungary. In Slovakia, the share of road vehicle jumped to 12 percent in total imports over the last decade.

It should be noted that the above analysis captures only direct export-import turnover, while CEE countries are integrated into global production chains at numerous points. Consequently, **indirect exports** – through integration into the production chains of major European exporting countries – play a greater role, which will be addressed in Chapter 4.

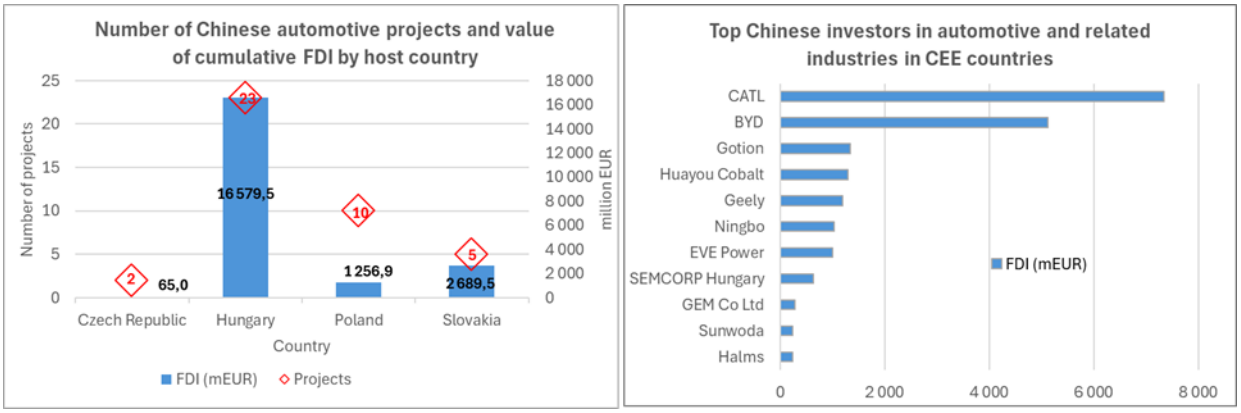
.

## 3. The State of Chinese Investment in the Central and Eastern European (V4) Electric Vehicle and Battery Industry

For decades, the Central and Eastern European (Visegrad) region has been the "integrated periphery" of the European automotive industry, where German, Japanese, and South Korean companies have extensive manufacturing bases. In recent years, however, Chinese foreign direct investment (FDI) has emerged and become dominant during the transition to electromobility, bringing new dynamics and challenges to the region.

Between 2018 and 2025, the total value of investments in the electric vehicle and battery industries from East Asian (Chinese, South Korean, Japan) regions in the V4 countries exceeded 38 billion euros, according to data available in the CEIAS EV Nexus Tracker database created as part of the Visegrad Fund project. **China plays a prominent role in this competition: it is implementing or planning investments worth approximately 20.6 billion euros in the region across 40 projects**, significantly ahead of South Korea (14.3 billion euros) and Japan (3.2 billion euros).

Within the investment structure, **China's dominance is particularly evident in battery and battery component manufacturing, as well as in electric vehicle manufacturing**, which is largely attributable to investments by two major companies, CATL and BYD.



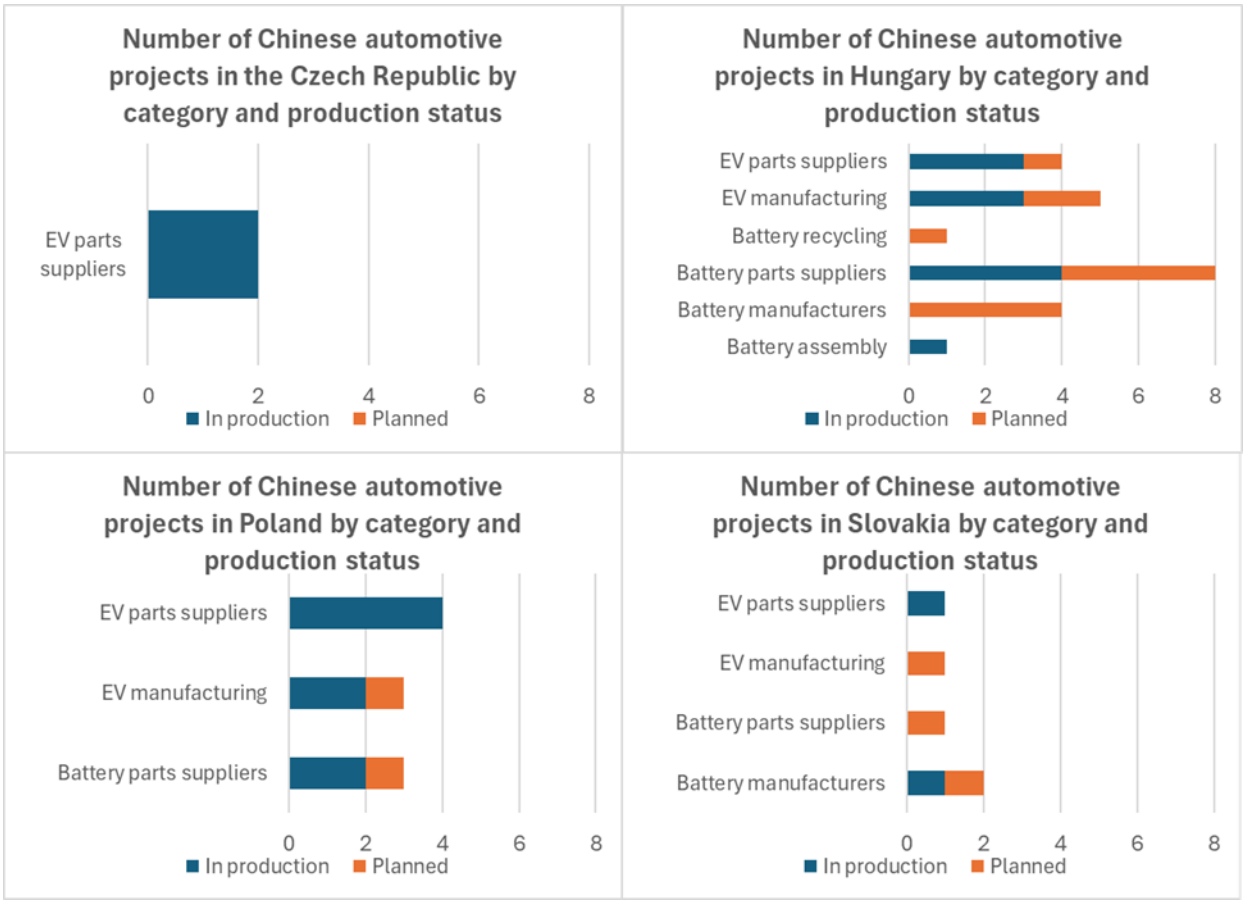

Note: Cumulative FDI values are based on publicly disclosed investment data only. Projects with undisclosed investment values are excluded from the aggregation.

Source: CEIAS EV Nexus Tracker, press releases and news articles collected by the author

Among the countries in the region, **Hungary is the primary destination for China**, hosting the overwhelming majority of the Chinese projects examined. This is due not only to the country's favourable logistical location and existing automotive cluster, but also to the Hungarian government's economic policy, which has so far been extremely open and has employed generous state incentives. In contrast, the other V4 countries (the Czech Republic, Poland, and Slovakia) adopt the European Union's general, more cautious approach, resulting in far fewer Chinese projects being implemented there.

Although the volume of Chinese investments is enormous, some of the projects are in the preparatory phase, awaiting the start of mass production. Most battery

industry projects—especially in Hungary—are still only in the planning, permitting, or construction phase.




Note: The data includes information on projects reported in the database. This means that a single company may be associated with multiple projects, and these are listed in separate rows; for example, BYD's investments in Hungary are listed in five rows as five projects, four of which fall under the electric vehicle manufacturing category and one under the battery assembly category.

Source: CEIAS EV Nexus Tracker (https://evnexustracker.ceias.eu/map/49), press releases and news gathered by the author

To ensure future success and the smooth launch of production, the following risks must be proactively managed:

1. **Strengthening of institutional and regulatory controls:** Regulatory compliance is critical during the pre-operational phase. In Debrecen, the local government has already tightened inspections and initiated direct consultations with investors (including CATL and Semcorp), as deficiencies were identified during the construction and commissioning of the factories.
2. **Social acceptance and environmental concerns:** Public mistrust can pose a serious obstacle. Although occupational safety and environmental issues (such as soil and water pollution) in the region have typically been associated with South Korean companies, these issues tarnish the industry's overall reputation, which also affects Chinese investments. The best tool for prevention is transparent public information, for which EVE Power's open communication strategy serves as a good example.
3. **Political dimension:** In Hungary, the issue of battery factories has become a focal point of domestic political debates; the new government plans stricter controls

and environmental accountability, which could complicate permitting processes in the future.

4. **Structural weaknesses in the value chain:** In the current structure, manufacturing and assembly with lower added value dominate. From the perspective of the region's long-term development (and avoiding the "semi-peripheral trap"), political and economic pressure to integrate research and development (R&D) activities and facilitate technology transfer will continue to grow.

In **the** next phase of Chinese companies' presence in Europe, **mere capacity expansion will no longer be sufficient on its own**. For lasting success, the successful integration of investments into the local economy and society, strict compliance with European regulatory standards, and the development of a local supplier base and knowledge-intensive functions are essential.

## 4. Economic Ties Between Hungary and China and the Transformation of the Automotive Industry Value Chain (GVC)

The dynamics of the 21st-century global economy are fundamentally shaped by the international fragmentation of production processes and the rise of global value chains (GVCs). In this complex system, Hungary and China, although sharply diverging in terms of their global weight, find common ground through their deep integration: nearly 60 percent of Hungarian exports, while half of China's foreign trade, can be directly linked to these value chains. In the current geopolitical and technological environment, analysing the relationship between the two countries is critical because it highlights the realignment of positions in the international division of labour and issues of technological exposure.

The primary objective of this chapter is to explore value-added-based trade indicators, with particular attention to the paradigm shift facing the automotive industry and the rise of Chinese suppliers. The study seeks to answer how Chinese expansion is manifesting itself in the traditionally German-dominated Central and Eastern European production bases, and how this affects the domestic economy's room for manoeuvre.

The analysis is based on the premise that the integration models of the two economies are fundamentally different: China has become a predominantly forward-looking player realizing high domestic value-added, while Hungary's position remains anchored in a "backward linkage" model reliant on imported inputs.

The most important measure of success in participating in global value chains is domestic value-added (DVA), which shows the extent to which a country is able to realize its own economic performance during production.

The 2022 data reveal a dramatic difference: while China's DVA indicator for the automotive industry stands at 86%, Hungary's is only 40%. This gap signals the two countries' divergent strategic trajectories. In China's case, the indicator exceeding 80% reflects a successful transition to a knowledge-based economy, where the lower, assembly-phase stages of the value chain have been replaced by domestic R&D and brand design. In contrast, Hungary has remained in a "backward-linked" model, where production relies heavily on foreign inputs and subsidiaries of multinational corporations.

China's spectacular rise from a low of 78% in 2005 rests on three strategic pillars:

- **Import substitution:** Chinese production has systematically replaced imported components with domestically produced intermediate goods.
- **Labor market restructuring:** The successful reallocation of low-skilled labour from the textile industry to high-value-added technology sectors.
- **Shift in competitiveness:** A transition from factor-driven competition (based on cheap labour) toward an innovation-driven economy, led by global giants such as Huawei, Xiaomi, and Lenovo.

Hungary's trajectory has moved in the opposite direction: the 60% FDI ratio in the 1990s plummeted to a low of 37% by 2012 during privatization and integration. Although the small domestic market and lack of raw materials are objective constraints, the current level of around 40% indicates a persistent dependence on

multinational corporations. It is important to note that the presence of Hungarian value added in Chinese exports is extremely volatile, suggesting that the relationship depends solely on the performance of a few large companies (primarily multinational subsidiaries), which poses a structural risk.

The Central and Eastern European automotive industry has reached a critical crossroads: the forced paradigm shift driven by the transition to electric vehicles (EVs) and digitalization is fundamentally reshaping traditional power dynamics.

The data clearly show China's technological advance in regional automotive supply chains, particularly in the field of electronic components (CHN C27 sector).

| Country | Share of the Chinese electronics sector (2011) | Share of the Chinese electronics sector (2022) |
|---|---|---|
| Czech Republic | 0.3% | 1.1% |
| Hungary | 0.4% | 1.2% |

Although the percentage figures are still modest, the trend is clear: China is gradually gaining market share in an ecosystem traditionally dominated by Germany. While the German sector (DEU C29) remains the most important anchor (4.3% in Hungary, 5.1% in Slovakia), China's growth is occurring in modern, EV-relevant segments.

The countries in the region have fallen into a unique competitiveness trap: the model built on low labor costs has run its course, while the lack of infrastructure development limits their ability to move up to higher value-added levels. At the same time, during the EV transition, batteries and electronic components can account for up to 50% of production value. This has elevated China from the level of a "contract supplier" to that of a strategic partner, forcing European manufacturers (OEMs) to increase vertical control and rethink cost arbitrage.

The strategic risks are well illustrated by the plunge in domestic value added. While the contribution of the entire domestic vertical chain appears stable, the direct domestic value-added content of the automotive sector (C29) has fallen dramatically:

- Slovakia: It plummeted from 2.6% to 0.3%.
- Hungary: Just 1.6% (with a 30.4% share of the total vertical).

This trend confirms that the recent inflow of FDI does not deepen domestic integration but, in many cases, increases import exposure. These trends necessitate the in-depth analyses planned for the remainder of the study.

**Further parts of the planned research (I have not yet begun this)**

The main component of the research is a "Value-at-Risk" based supply chain risk analysis. The simulation applies the Hypothetical Removal Method: in theory, this "removes" Chinese inputs from the Hungarian production system to quantify the resulting system-level output shortfall and the actual vulnerability of the Hungarian economy.

This approach has direct policy relevance for the preservation of strategic autonomy.

## 5. China and the R&D activities of the automotive and related industries in the CEE countries

The automotive R&D systems in both China and the CEE countries have developed primarily as a result of investments by multinational corporations. The economies of the CEE countries still specialize mainly in manufacturing functions within global value chains. Consequently, the dominant types of R&D in the region are production process development, product adaptation, testing and validation, and engineering support. True "core" innovation typically takes place at corporate headquarters. The CEE automotive R&D system is closely linked to the Western European, particularly the German, automotive industry.

In China, the breakthrough came from industrial policy programs announced by the government, particularly the ",in China 2025 " strategy, which identified the automotive industry as one of the key sectors for development. In implementing this strategy, the government supports R&D development in the automotive industry through a variety of measures. These include, among other things, direct R&D subsidies, tax incentives, subsidies for the purchase of electric vehicles, and funding for national innovation programs.

These measures have significantly contributed to the growth of R&D investments and technological development among Chinese companies. One of the Chinese automotive industry's most important competitive advantages stems from rapid innovation. Compared to traditional conglomerates, Chinese companies employ much shorter development cycles, introduce new technologies more quickly, and follow a so-called "speed-driven innovation" model.

R&D ties related to the automotive vertical between China and Central and Eastern European countries are currently still limited in depth, but they are developing rapidly and are primarily based on ***application-oriented*** collaborations related to investments in the EV and battery industries.

China–CEE automotive R&D ties ***did not*** fundamentally ***originate from independent research centres***, but rather ***emerged*** as a byproduct of battery factories, EV manufacturing, and supplier investments—essentially ***as a "byproduct" of production presence***.

Chinese companies generally do not conduct basic research in CEE, but rather ***manufacturing-related engineering and applied R&D***. Typical areas include battery life optimization and recycling, as well as the adaptation of manufacturing processes to EU standards. In other words, they follow the classic "applied R&D" model rather than the "core platform development" approach.

In terms of their collaboration with universities, ***targeted training of engineers and other specialists*** for their companies operating in the region dominates, while their joint research activities are characterized by joint industry-oriented collaborations. Most development continues to take place in China or Western Europe. The CEE region plays a role primarily in manufacturing, integration, and testing.

China–CEE automotive R&D ties are not bilateral but should be understood as part of ***global value chain integration***. It is particularly important that Chinese investments are often linked to Western European automakers present in the region,

most notably the German automotive presence, which defines the region's automotive structure. This means that China–CEE R&D ties are often realized indirectly, through the supplier networks of Western European automakers.

Regarding technical and scientific cooperation with China, it is important to emphasize that it is managed primarily at the regional level rather than centrally. Chinese industrial policy is decentralized: ***many key automotive industry collaborations are coordinated*** *not directly by the central government, but* ***by provincial governments and provincial companies***. Cooperation between provinces and the Central and Eastern European (CEEC) region, as well as sister-city relationships and technology transfer**,** are actively encouraged**.** To this end, for example, ***the China-CEEC Technology Transfer Virtual Centre*** was established **in Nanjing.**[2]

Another significant step forward in terms of R&D ties is ***BYD's*** decision ***to relocate its European business centre—previously based in the Netherlands—to Budapest***, where, in addition to managing business operations, substantial research activities will soon begin.

Chinese investments are playing an increasingly important role in promoting ***Industry 4.0 adoption*** in the CEE region. The high level of automation in Chinese manufacturing plants serves as a benchmark for local companies, facilitating technological learning, and Chinese firms often support their suppliers with training programs, technological consulting, and engineering collaboration. Chinese companies are increasingly collaborating with local universities, which strengthens human capital, supports applied research, and fosters innovation. Nevertheless, we must not overlook the fact that key technologies generally remain at the headquarters of Chinese companies, which limits deeper knowledge transfer.

Within the framework of cooperation between China and CEE countries, ***an increasing number of joint research projects, university partnerships,*** and mutual exchanges of faculty and students are taking place. Based on inter-university collaborations, mutual scholarship programs are operating, and knowledge networks are strengthening.

Chinese companies with interests in CEE countries are launching various training programs, collaborating with local universities, and contributing to the development of their employees' skills in digital and other cutting-edge areas.

[2] https://cceec.tech/en/about.aspx?ac=1

## 6. The European policy actions aimed at strengthening the competitiveness of the automotive industry – facing challenges from China

The European automotive industry, which is a core engine of European prosperity, faces an existential crisis due to electrification, digitalization, automation, and geopolitical pressures. The European automotive sector faces severe competition challenges, supply chain risks and dependencies on raw materials and battery imports, employment restructuring, loss of market share to Chinese and U.S. manufacturers, and dependency on Asian battery suppliers. The prevailing global conditions, the conflict in the Middle East, the threat of an energy crisis, supply constraints due to the blocking of the Strait of Hormuz, reviving inflation can sharpen competition problems of Europe, especially if the conflict with Iran exaggerates.

Under these circumstances, a common European EV strategy as well as national EV strategies are of outstanding importance in the EEC region. A first step in this direction is the ***Industrial Action plan for the European automotive sector*** based on **five pillars.** The EV strategy of the EU is in a critical phase this year. The era of the combustion engine should become soon history, in line with the ***'Fit for 55'*** legislative package that makes zero carbon emissions mandatory for light passenger vehicles sold in the European Union (EU) from 2035. The so called ***„Fit for 55"*** programme launched in 2023, is a package of EU climate and energy policies aiming to help to achieve the European Green Deals goal of slashing net emissions by 55% by 2030, relative to 1990 levels. This target is a pace-setting milestone ahead of EU member states' commitment to achieve climate-neutrality (net-zero emissions) by 2050. At the same time, it tries to protect the European automotive industry against global competition.

As electric vehicles are rather expensive in all European countries, the national governments implement different ways of support and subsidies to make them more attractive for the population. In some countries the purchase of electric vehicles is directly supported like in Germany or Poland, in other countries the improvement of the related infrastructure and different tax reliefs are used.

The EU sees China as a partner for cooperation but at the same time as an economic competitor or a strong rival as well. As China is the EU's third largest trading partner, the EU Commission is facilitating regulatory convergence between China and EU competition law and best international practices. The spreading of the use of Chinese e-cars could contribute to the implementation of the EU strategy as they support the acceptance of clean e-cars. The competition on behalf of Chinese producers provides a pressure for technological innovation in Europe. Imposing definitive countervailing duties on imports of new battery electric vehicles from China due to subsidization and injury to the EU industry as decided by the European Commission might not turn out the most efficient way of protecting and supporting European car industry. The same applies to the so-called **Industrial Accelerator Act** which is intended to bolster European industry against cheaper imports from Asia. The European Commission attempts to protect the market from cheap Chinese imports with an industrial policy that favours products *"made in Europe";* thus, several car manufacturers – not only Chinese, but those from the US, UK or Japan – fear that the lack of clarity and strict content rules could undermine their competitiveness.

Companies do not become innovative because the state forces them to. If the conditions are not right, they simply move away, as do well-qualified workers. The protection of the European industry alone cannot remedy the structural disadvantages of the European economy, while overregulation harms precisely those it is supposed to protect.

The **environmental impact** of electric cars is a complex issue that covers the entire life cycle of the vehicle, from manufacturing to recycling. Although their local emissions are zero, their global ecological footprint is influenced by several factors.

In most analysis concerning the **employment effects** within the automotive industry, three relevant perspectives may be identified: the *sectoral dimension*, the *regional dimension,* and the *skills dimension*. While the sectoral and regional dimensions are closely related to the investments and the development policy, the skill dimension is the actual labour market impact. Although the net employment effects are rather small, tremendous structural changes are taking place across all three dimensions, which, ultimately, balance out, giving the overall rather modest effects when viewed generally. The policy issue of the transition policy and the "Just Transition" are important aspects for a successful transformation of the sector.

## 7. Circular Economy

This chapter examines how the circular economy can contribute to sustainable growth, competitiveness, and strategic autonomy in CEE, with particular attention to the automotive and battery industries. The core research question explores how circular economy models and Sino–CEE industrial cooperation can support the transition from linear production systems toward more resilient and sustainable value chains in the context of electrification, decarbonisation, and the green transition. The paper also addresses the broader policy challenge of balancing industrial competitiveness, environmental sustainability, and resource security within the European Union's evolving regulatory framework.

Methodologically, the chapter combines regulatory analysis, comparative regional assessment, and sectoral case studies focusing on battery ecosystems and electric vehicle (EV) value chains in the CEE region. The analysis reviews key EU policy initiatives (including among others the European Battery Regulation, the Circular Economy Action Plan), while also examining investment patterns, industrial cooperation, and emerging business models in countries such as Hungary, Poland, Czechia, Romania and Slovakia. Particular emphasis is placed on the role of Chinese investments, battery recycling technologies, digital battery passports, and second-life battery applications in shaping circular industrial ecosystems.

In CEE, the rapid deployment of battery gigafactories involving Chinese capital or technology forms the backbone of emerging circular ecosystems. In line with the global trend toward electrification, the focus of recent Chinese investment in Europe has shifted to the field of electric vehicles. The largest investment is Contemporary Amperex Technology Co. Limited's (CATL) battery factory in Hungary. One of the chapter's table contains the battery factories in the region by countries.

The findings suggest that the transition toward circular economy models has the potential to significantly strengthen the resilience and competitiveness of the European automotive and battery sectors. Circular business models (including battery-as-a-service and second-life battery applications) can reduce raw material dependency, support strategic autonomy, and create new industrial ecosystems across the CEE region.

The chapter highlights that Sino–CEE cooperation plays an increasingly important role in accelerating technology transfer, recycling capabilities, and integrated battery value chains. At the same time, the paper underlines that the long-term success of this transition depends on effective regulatory frameworks, environmental safeguards, cross-sectoral cooperation, and transparent governance mechanisms.

The chapter investigates how the CEE countries are moving beyond their traditional role as cost-competitive manufacturing locations and by which methods the selected countries are gradually emerging as strategic nodes within Europe's circular industrial transformation.

The chapter concludes that CEE is transitioning from a cost-competitive manufacturing location to a strategic node in Europe's circular automotive value chains. Sino-CEE cooperation is central to this shift, providing capital, technology, and ecosystem integration. Recent developments support key EU objectives,

including: (i) strategic autonomy in critical raw materials, and (ii) the development of a competitive battery value chain under the European Battery Alliance.

If successfully managed, the CEE-region can position itself as a leading hub for circular industrial transformation, where European sustainability goals and Chinese industrial expertise converge to reshape the future of mobility.

## 8. Further research topics

In the remaining phase of the research we will focus on strengthening the analytical and policy-oriented components of the study. A central element will be the development of a scenario-based Value-at-Risk (VaR) modelling framework to assess the exposure and vulnerability of CEE automotive supply chains to potential disruptions, particularly in relation to Chinese inputs. This will be complemented by a systematic mapping and evaluation of government policies, funding instruments, and regulatory frameworks affecting the automotive, battery, and circular economy sectors. At present, policy directions—especially those of the new government regarding battery recycling, industrial strategy, and labour market regulation—remain uncertain, which further underlines the importance of this analysis.

In parallel, the research will incorporate qualitative insights through targeted interviews with key stakeholders, including industry representatives, policymakers, and experts, in order to capture short- and medium-term market expectations. These empirical and analytical strands will be integrated into a comprehensive synthesis aimed at formulating concrete, evidence-based policy recommendations. The ultimate objective is to provide actionable guidance for enhancing the resilience, competitiveness, and upgrading potential of the CEE automotive sector within the evolving China–CEE cooperation framework.