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Allianz Research

Global auto outlook: Steering through turbulence

Executive Summary

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- **The automotive market is expected to normalize this year. On the one hand, we expect car registrations to slow down following a strong rebound in 2023. On the other hand, car manufacturers face reduced pricing power and contracting margins amid intensified competition and an uncertain environment.** We expect new auto sales to grow by +1.9% this year due to subdued consumer spending – especially in China and Europe – and sub-par global economic growth. EVs remain in a relative sweet spot despite major headwinds. We forecast the sale of new EV passenger cars to exceed 18mn (+32.8% y/y) in 2024, with Europe leading the way (+41.2%). On the production side, we anticipate a decline in gross and EBIT margins to 18.7% (-28pps) and 5.2% (-164pps), and an accelerated consolidation. The expected uptick in the R&D ratio (4.5%, +14pps) and CapEx-to-sales ratios (5.4%, +33pps) shows that automakers are likely to diversify their investments and stay agile. The industry is poised to see a rise in intra-regional collaboration among automakers and stakeholders across the supply chain to gain an edge in the reshuffling.
- **More importantly, the global auto industry is going through a significant transformation towards electric vehicles (EVs) but the path ahead will be turbulent, shaped by geopolitical tensions, slowing demand and regulatory uncertainties. Regionally, the tectonic shift has already started.** The China has risen as a disruptive force, challenging traditional auto leaders. Europe and the US, wary of their dependence on Chinese components and the impact on local industries, have responded with increased trade barriers and scrutiny. The recent deceleration in EV demand, coupled with the uncertain regulatory and economic climate, further complicates the industry's near-term trajectory. We look into regional specificities below.
- **First, European automakers and especially German ones are losing ground.** The car industry has been the backbone of the European economy (6% of regional output), serving as an innovation (32% of EU's R&D) and export hub (2.8% of EU's export value) while employing a vast workforce (6.5mn direct employment). However, having long focused on their established strengths, European auto incumbents arrived late to the EV game and are struggling to produce affordable models profitably (EVs still cost 27% more than gasoline cars). Consequently, European automakers are experiencing a notable decline in market share. The transformation has already had visible impacts on the business landscape in terms

of insolvencies (+13% in 2023) and employment, putting 730,000 jobs at risk, with Germany being especially affected. To catch up in the new race and boost market uptake, Europe should provide more carrots than sticks and take immediate actions on building up an eco-system around the EV production.

- **Second, Chinese EVs are on course to conquer the global market yet they face formidable hurdles.** Chinese EVs have risen at an astonishing pace, with sales and production jumping almost eightfold from 2019 to 2023. Government support plays a critical role in establishing China's undisputed dominance in the industry today. Chinese EV makers have strong cost advantages thanks to their early-mover position, lower labor costs and economies of scale, but they also excel at quality. However, several factors present potential risks that could undermine China's current leading position, including an escalating price war, issues of overcapacity, rising geopolitical tensions and the advent of next-generation battery technologies.
- **Third, industrial policy is propelling the shift to EVs in the US auto industry but cost challenges and political uncertainties remain.** Pragmatic industrial policies have been implemented across the supply chain. While they have boosted the EV transition and attracted significant investment (USD66bn battery and EV investment post-IRA), the high cost of EVs remains a challenge, exacerbated by increasing labor costs (25% wage increase over the next four years) and a domestic preference for larger vehicles (70.5% market share). Political dynamics stand as the largest variable in the future of US auto industry – a potential second Trump presidency could set the path on an alternate course given the divergence in the two parties' positions on green transformation.

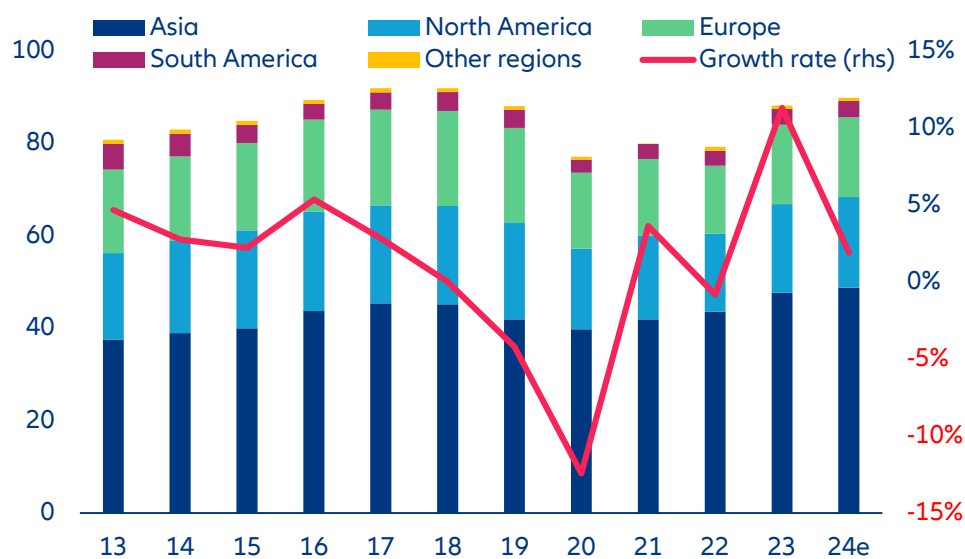


Speedbumps on the road to electrification

The automotive market is expected to normalize this year: As demand loses momentum following a strong rebound in 2023, we expect the growth of new auto registrations to slow down to +1.9%. New auto registrations saw a significant recovery in 2023 as Covid-induced supply-chain disruptions eased and pent-up demand released. Additionally, resilient economic growth and strong, albeit slowing, growth in EVs fuelled car sales – total global auto registrations increased by +11.3% to nearly 88mn, though is still below pre-pandemic levels. The three largest auto markets – China, the US and Europe – all recorded strong growth in 2023, at +11.9%, +12.5% and +17.2% respectively. However, looking ahead, we expect overall growth to normalize to +1.9% this year (Figure 1) due to subdued consumer spending – especially in China and Europe – and sub-pal global economic growth. Geopolitical tensions could also hit overall demand with the prospect of higher tariffs. But EVs still remain in a relative sweet spot despite major headwinds (Figure 2). We expect the sale of new EV passenger cars to exceed 18mn (+32.8% y/y) in 2024, with Europe leading the way (+41.2%).

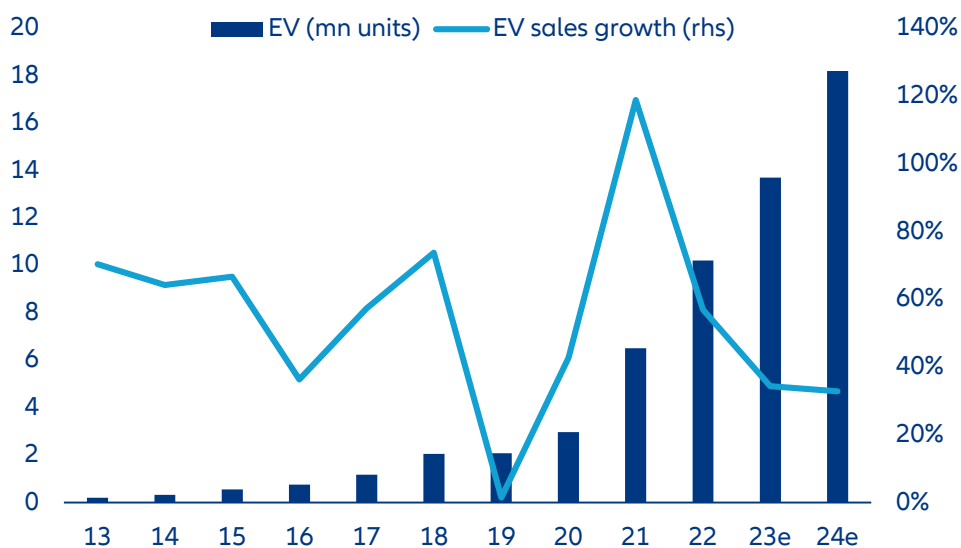
With intensified competition and an uncertain environment, automakers are likely to face diminishing pricing power and contracting margins in 2024 across all regions. We expect auto companies to diversify their investments across ICE vehicles, hybrid models and fully electric models in order to stay agile in the evolving market, resulting in increased R&D and CapEx spending. The R&D ratio and CapEx-to-sales ratio of the top 30 automakers should reach 4.5% (+14pps) and 5.4%(+33pps) in 2024 (Figure 3). On the other hand, the heightened competition, which is particularly intense in the EV segment and in China, will hurt automakers' pricing power. We expect an accelerated consolidation as automakers face a margin squeeze and laggards struggle to survive. Gross and EBIT margins are likely to decline to 18.7% (-28pps) and 5.2% (-164pps) this year (Figure 4). We also expect a rise in intra-regional collaboration among automakers and stakeholders across the supply chain to gain an edge in the reshuffling.

Figure 1: New auto registrations by region (mn units)



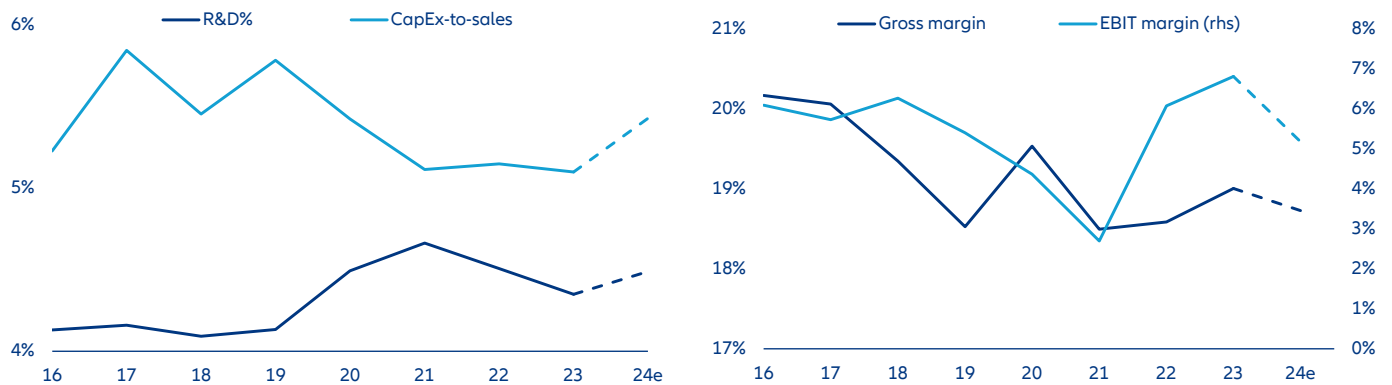
Sources: national associations, OICA, Wards, ACEA, Allianz Research

Figure 2: EV sales and growth



Sources: IEA, Allianz Research

Notes: the data only includes passenger vehicles

Figure 3 & 4 : Investment and margins of top 30 auto companies by sales

Sources: Bloomberg, Allianz Research

More importantly, the global auto industry is undergoing its most significant paradigm shift since the advent of vehicles powered by internal combustion engines (ICEs).

To reach their ambitious climate targets and achieve carbon neutrality, governments around the world are actively promoting green energy over fossil fuels. The auto industry will play a pivotal role in this transition, which will depend on driving up the number of electric vehicles (EVs) in use. In this context, the defining attribute of a car is gradually shifting from engine capacity — a domain where European, US, Japanese and South Korean automakers excelled during the ICE era — to battery and software capabilities. Amidst this structural shift, China has risen as a disruptive force, having invested in battery and software capabilities for more than a decade and secured a leading position. As a result, it is reshaping the global auto landscape with its rapid development in EVs and dominance over the entire supply chain (Figure 5).

But the deteriorating political landscape has paved a turbulent path for this pivot.

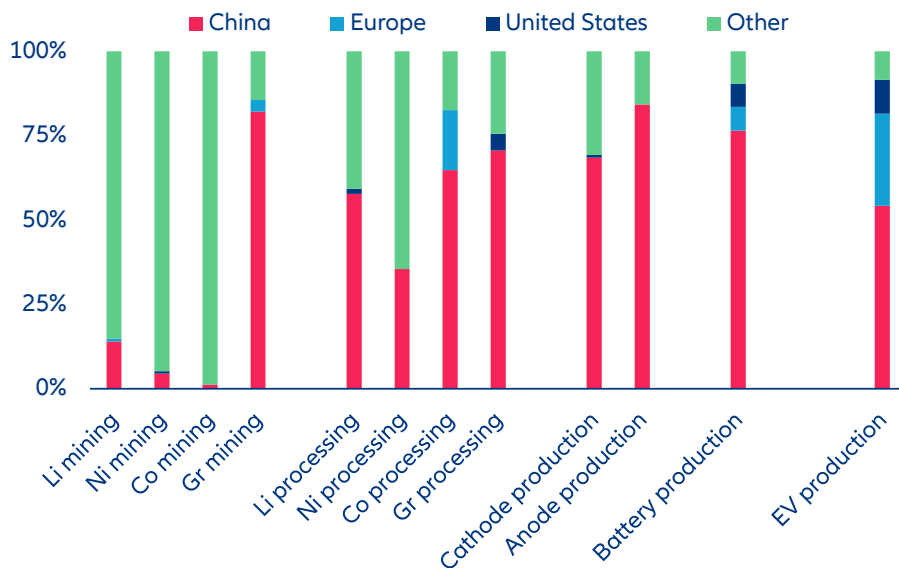
Amid elevated geopolitical tensions, Europe and the US are growing increasingly wary of their dependence on Chinese supplies, as well as the impact of the growing popularity of Chinese EVs on their local industries. For instance, batteries represent the single largest expense in the production of an EV, typically accounting for around 40% of the total cost. Six of the top 10 global manufacturers of batteries are based in China, with the remaining four also in Asia, together accounting for 92.1% of the world's total battery capacity installation in 2023 (Figure 6). In response, governments

have been tightening restrictions and scrutiny over Chinese auto imports. Trade barriers on auto and auto-related products have been increasing above their historic levels since 2019 (Figure 7). Biden's Inflation Reaction Act (IRA), for example, offers up to USD7,500 in tax credits for the purchase of new EVs but excludes those with Chinese components. And the EU launched an anti-subsidy investigation into Chinese car makers last year, which could potentially lead to a further increase in tariffs. These geopolitical tensions are adding to the uncertainty of the path to electrification. Since Chinese companies can produce EVs at much lower cost, thanks to the well-established local supply chain, cheaper labor costs and scale economies, the influx of cheaper Chinese EVs could bridge the gap in the lack of mass-market models in the West, thus accelerating the EV transition. But policymakers face a dilemma between going green cheaper and quicker and the risks this poses to local industries and employment, adding to the uncertainty.

The uncertain regulatory climate further complicates the industry's near-term trajectory.

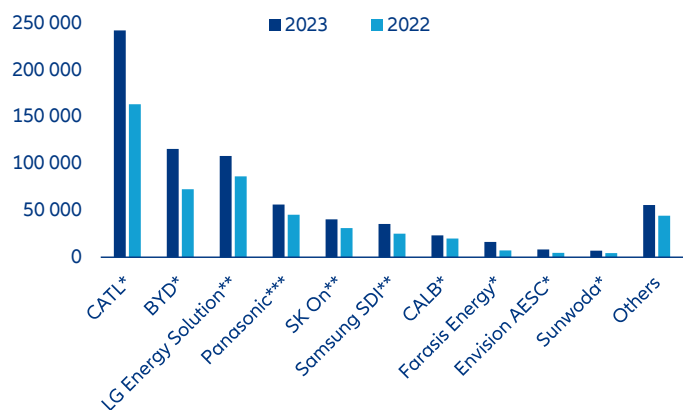
The EU has carved out an exemption for e-fuels in its 2035 ban on the sale of new fossil-fueled vehicles, while the UK has pushed back its similar ban from 2030 to 2035. Looking across the Atlantic, the potential return of Trump to the White House could also have implications for the EV transition in the world's second-largest auto market. These developments underscore the intricate interplay between regulatory decisions, market dynamics and geopolitical factors that will shape the global auto industry's green transformation.

Figure 5: Regional distribution of the EV battery supply chain



Sources: IEA, Allianz Research

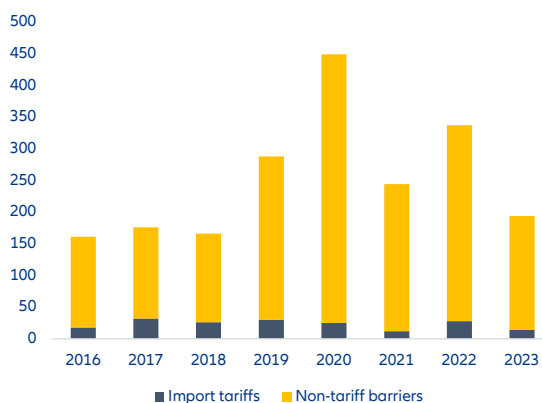
Figure 6: Installed capacity of major battery makers (MWh)



Sources: CleanTechnic, Allianz Research

Notes: * refers to Chinese companies, ** refers to South Korean companies, *** refers to Japanese companies

Figure 7: Trade barriers on cars and related products



Sources: GTA, Allianz Research

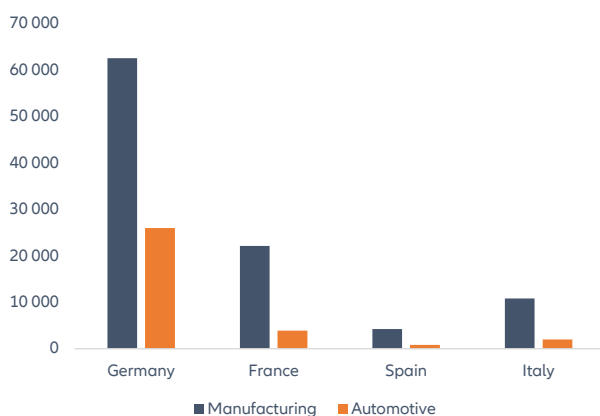


European automakers are losing ground fast

The auto industry has been the backbone of the European economy, not only driving industrial innovation and technological advancements but also creating substantial employment opportunities. The EU auto sector contributes to around 6% of the region's output, accounts for close to 950,000 firms and employs 6.5mn people. Some estimates that include indirect jobs count as much as 13mn people, which would represent 7% of total employment in the EU. The sector also serves as an innovation hub as the EU's largest investor in research and development, contributing 32% to the region's annual R&D investment (nearly EUR73bn in 2022, Figure 8). Additionally, the auto sector also plays a crucial role in the region's export market as European, especially German,

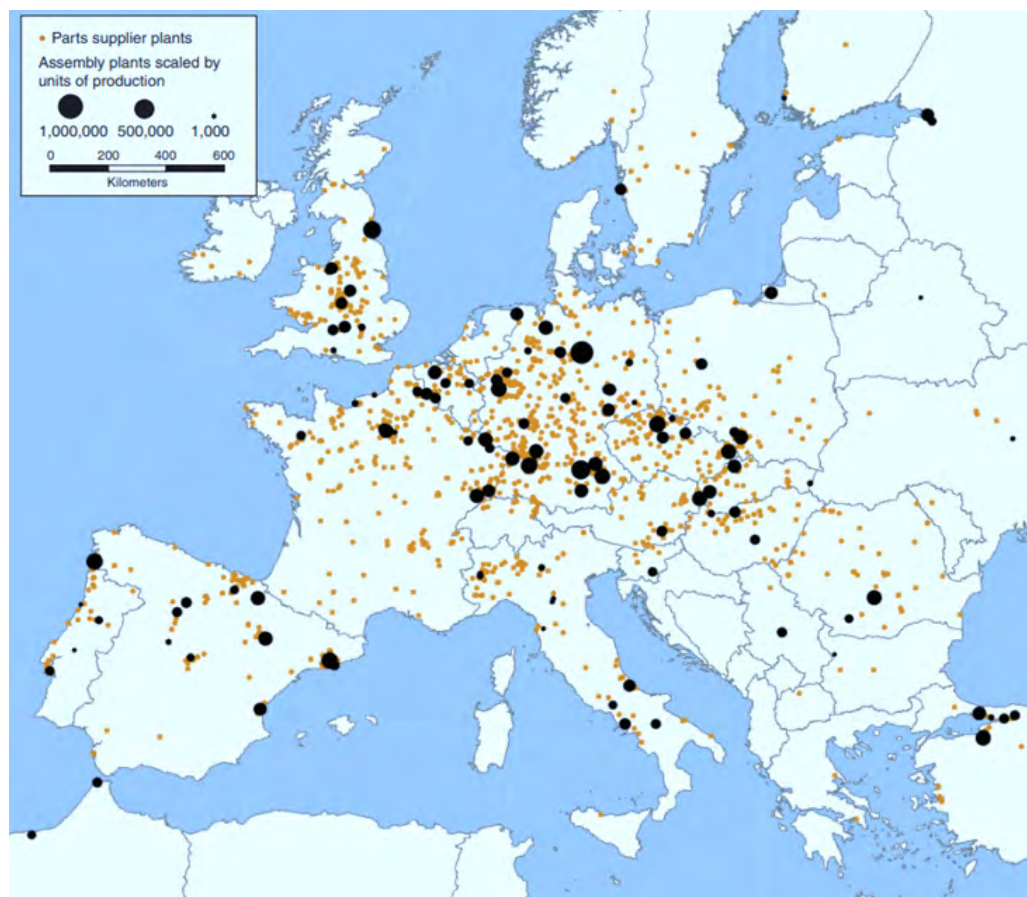
carmakers have been renowned for their engineering prowess, design and performance. In 2022, the EU exported EUR158bn worth of cars, which accounted for 2.8% of the bloc's total export value. Germany clearly dominates the sector in the EU, accounting for 12% of the number of firms in the EU, 28% of the persons employed and 34% of the turnover. It is also worth noting that the auto industry in Germany is concentrated in the western part of the country, which has been historically home to some of the largest manufacturers (Figure 9).

Figure 8: R&D spending in Europe (EUR mn)



Sources: Eurostat, Allianz Research

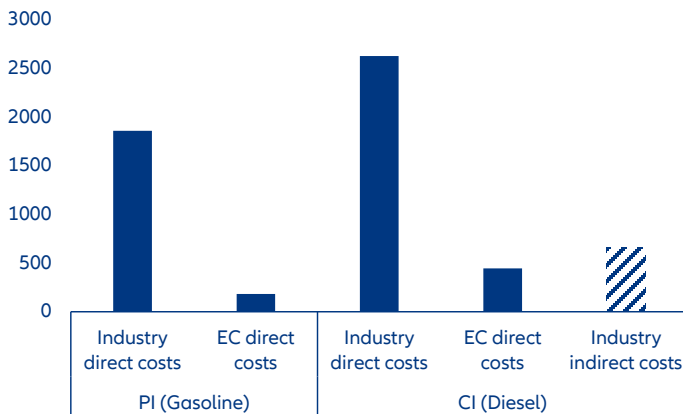
Figure 9: Auto plants in Europe



Sources: Klier and Rubenstein (2016)

However, having long focused on their established strengths, European auto incumbents arrived late to the EV game and are struggling to produce affordable models profitably. Affordability remains the biggest factor holding consumers back from an EV purchase, according to a survey by S&P Global Mobility, with nearly half of respondents considering EVs to be too expensive. Though car makers are racing to cut their costs, elevated energy and labor costs have made it difficult to maintain profitability while selling at affordable prices. Consequently, European carmakers have focused predominantly on the premium segment, leading to a lack of affordable models in the market. The average price of EVs in Europe was EUR55,821 in 2022 – 27% higher than that of gasoline cars – and almost all EV

offerings were priced above EUR20,000. In comparison, EVs cost EUR31,829 on average in China, a third lower than the price of gasoline cars in 2022. While grappling with the high costs and low profitability of EVs, European automakers are also facing potential profitability squeezes on ICE vehicles. Last year, the EU reached a provisional agreement on Euro 7, an updated regulation to include additional rules for vehicle emissions and impose stricter requirements for vehicle lifetimes. The new legislation is estimated to increase the direct cost by EUR2,000 per ICE car/van (Figure 10).

Figure 10: Average incremental costs of Euro 7 for cars/vans (EUR/vehicle)

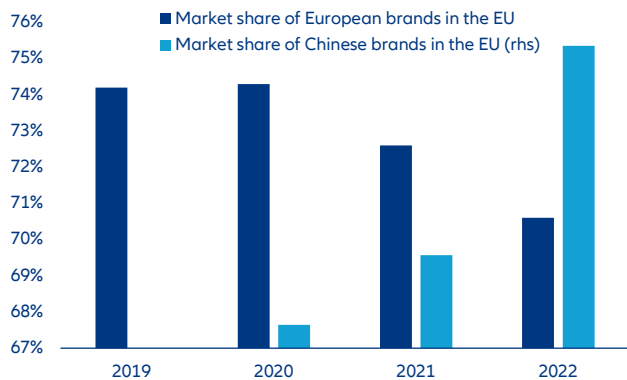
Sources: Frontier Economics, ACEA member data, Allianz Research

In addition, Europe, particularly Germany, is facing significant challenges in retaining investment within the region amid growing protectionism. The US is emerging as a highly attractive investment destination for European companies, driven by generous federal tax credits and state subsidies. This impact is especially pronounced among German companies, which committed a record USD15.7bn to US projects in 2023, nearly double the amount from 2022. Meanwhile, the gap between inbound and outbound investment has widened, reaching a record high in 2022, with more than USD135bn in foreign direct investment leaving Germany and only USD10.5bn entering. The auto sector is emblematic of this trend as Volkswagen, Mercedes-Benz and ZF Friedrichshafen spearheaded the three largest US projects by German companies in 2023. Their combined investment totals USD4.4bn and is expected to create 6,300 jobs. Notably, Volkswagen earlier decided to prioritize a battery plant in North America over a previously planned facility in Eastern Europe, enticed by the prospect of receiving up to USD10 bn in US incentives. This trend is likely to continue given the high production costs, shortage of skilled labor and lack of comparable incentives in the EU. According to a survey by the German American Chambers of Commerce, 96% of German companies in the US plan to expand their investments by 2026.

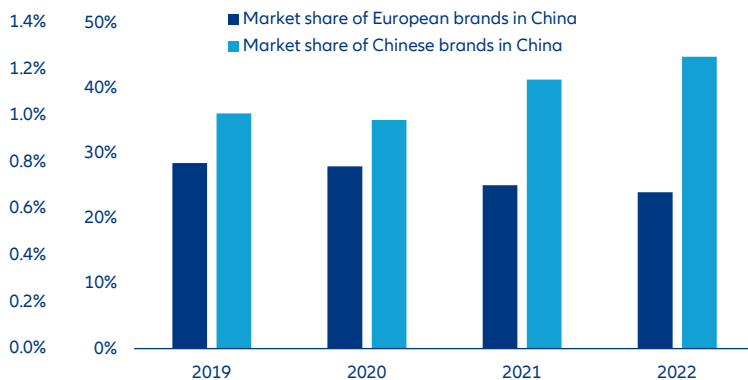
Consequently, European automakers are experiencing a notable decline in market share in their home turf, a trend largely attributed to China's evolving role from a major importer to a formidable competitor. This shift is particularly impactful for some of Europe's most renowned automakers that have traditionally depended on the Chinese market for a significant portion of their sales and profits. As a result, European brands are losing ground in both the EU and China, with their market share decreasing by 3.6pps and 4.5pps, respectively, between 2019 and 2022 (Figures 11&12). These decreases correspond with the rise of Chinese automakers, which have not only solidified their position in the domestic market – where there is a growing preference for local brands – but have also made significant inroads into Europe, bolstered by their EV offerings. Consequently, European automakers are becoming increasingly pessimistic about their competitiveness, as evidenced by the downward trend in the perceived competitiveness of automotive companies in Germany and France, which have long been considered powerhouses in the European auto industry (Figure 13).

Figure 11 & 12: European carmakers are losing market share

Market share of auto in the EU by region

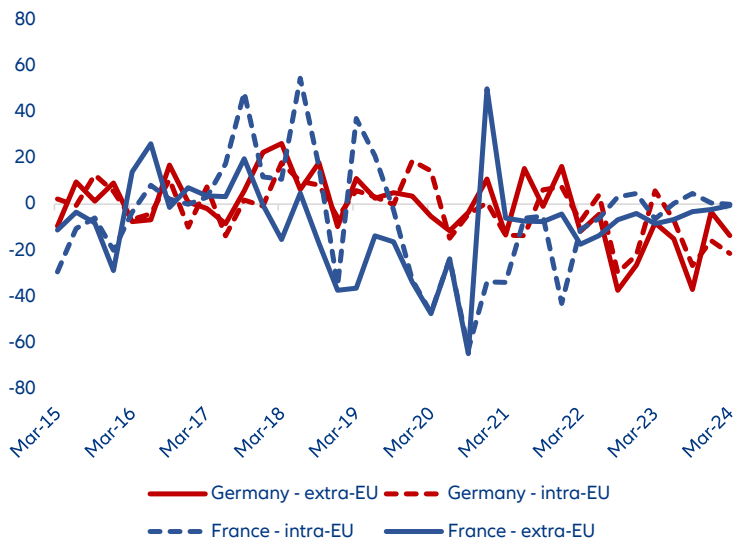


Market share of auto in China by region



Sources: ACEA, Allianz Research

Figure 13: Perceived competitiveness on foreign markets by firms in the auto industry



Sources: European Commission, Allianz Research

The transformation of the sector is already pushing up insolvencies and threatening employment, with 730,000 jobs at risk, especially in Germany.

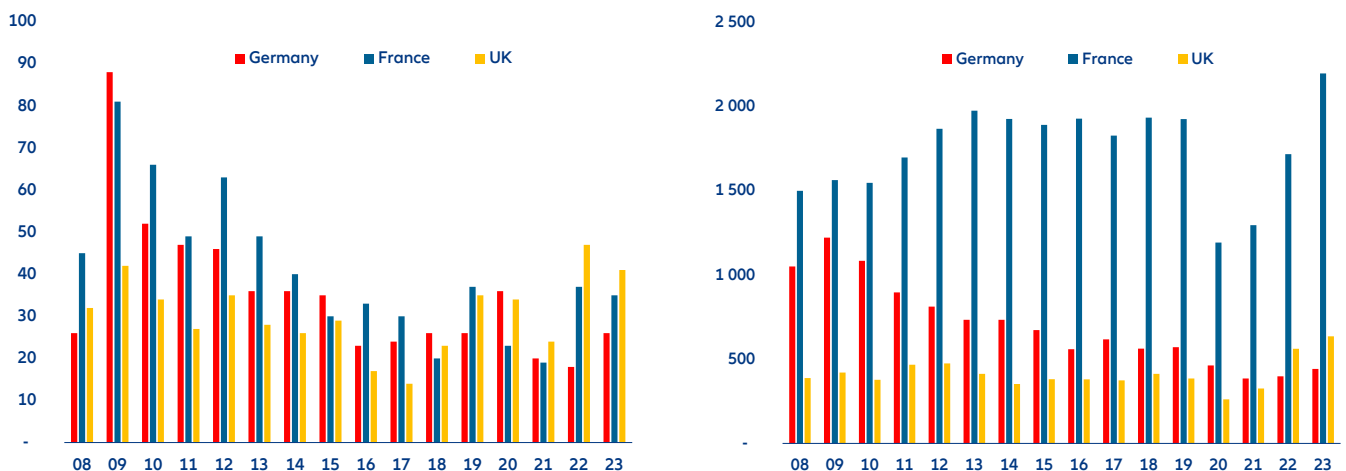
In Germany, the ongoing transition is leading to fewer firms, with diverging trends among sub-sectors: an increase in the number of firms in manufacturing (indicating that the structural changes in the sector are also fostering new businesses) that has been more than compensated by the decrease in the trade/maintenance segment. The number of auto sector insolvencies in Germany has remained relatively moderate so far, compared to other countries such as France and the UK, as well as compared to other sectors within the country. However, the upward trend (+13% y/y in 2023) confirms that more firms are struggling to adapt to the changes in the sector. With regard to employment, since an EV is made up of fewer parts, we estimate that companies in the manufacturing segments could operate with 30% fewer people. This would mean 730,000 jobs at risk in the EU, including at least 260,000 in Germany. These numbers could even be higher, especially if EU automakers lose further market shares and/or decide to offshore production. Germany is particularly exposed as the sector is (i) both highly export-oriented, and therefore more exposed to competition from foreign brands, notably Chinese ones, and (ii) much more labor-intensive, and therefore exposed to the risk of outsourcing/subcontracting to low-wage countries, notably Eastern European countries where unit wage costs are significantly lower (between 60-70%).

To catch up in the new race and boost market uptake, Europe should provide more carrots than sticks.

Among the three largest auto markets, the EU has set the most ambitious emissions-reduction goal by effectively banning the sale of new fossil-fuel vehicles

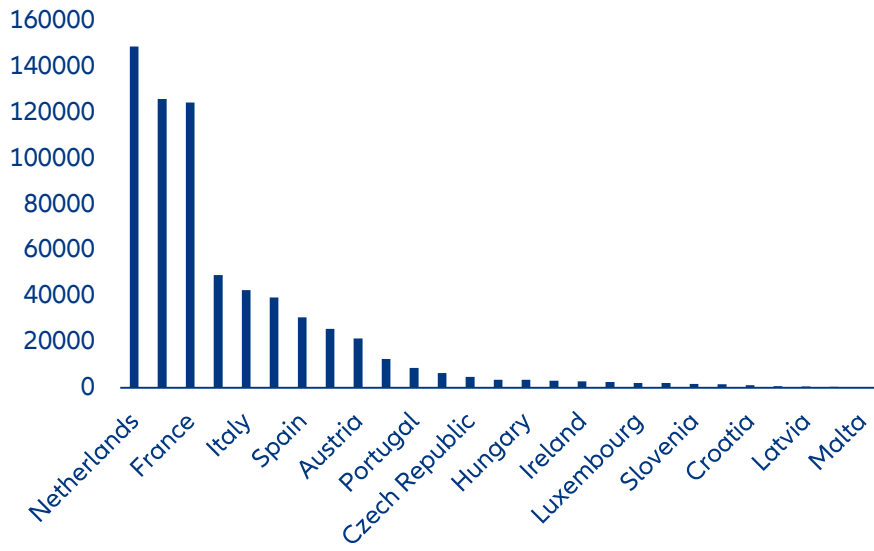
by 2035. However, in comparison to the US and China, the EU's approach lacks coordinated support and a comprehensive strategy. By mid-2023, 20 EU countries did not provide any infrastructure incentives and seven offered no subsidies for EV purchases. Incentives are scaling back even further entering into 2024, with Germany terminating the handouts earlier than originally planned and France curbing subsidies due to budget constraints. The availability of charging stations, which is crucial to address EV buyers' range anxiety, is uneven within the region, with 60% of all charging stations concentrated in the Netherlands (149,025), Germany (125,997) and France (124,526, Figure 15). Policy makers should step up their support for the expansion of charging networks and provide more incentives to encourage the switch to EVs. Furthermore, keeping an edge in the EV competition is more than just expertise in car manufacturing. It also requires a robust supply chain as well as advancements in battery and software technology, which are crucial for managing costs and enhancing driving performance and experience. Hence policy makers should take actions to attract investments across the entire supply chain, ensuring access to essential raw materials, improving refinery infrastructure and advancing battery technology to navigate the crossroads.

Figure 14: Insolvencies in the manufacturing (left) and trade/maintenance (right), number of cases, annually



Sources: DeStatis, ONS, Allianz Research

Figure 15: Distribution of charging stations in the EU



Sources: European Commission, Allianz Research

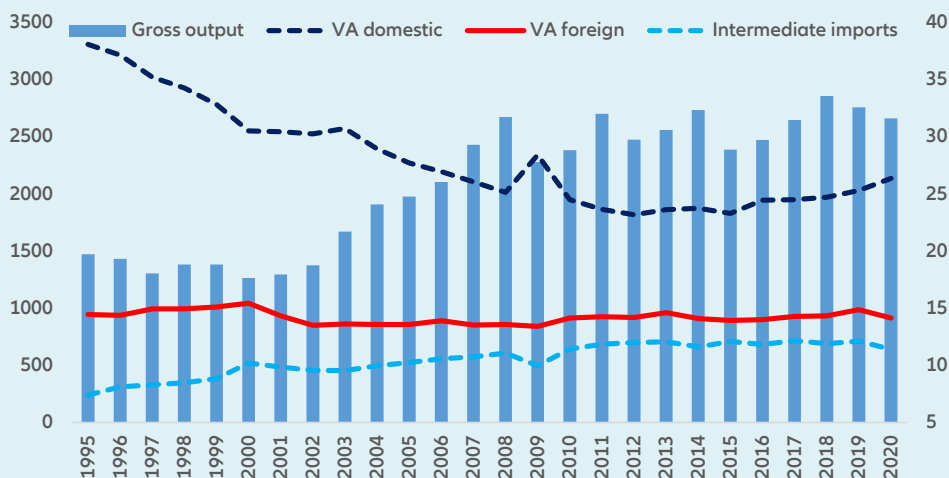


Box 1: Shifting international value creation structures in the German automotive industry

The automotive sector plays a pivotal role in Germany, the leading market and producer in Europe. The industry serves as a global export powerhouse and driver of innovation in mobility. Companies active in the sector range from large auto manufacturers to a network of small- and medium-sized suppliers. Notably, around 85% of auto industry suppliers fall within the medium-sized category. In 2020, the industry's production reached USD433bn, over a third of this amount representing the value added (VA) generated by the German automotive industry. Out of the goods manufactured, USD96bn were consumed domestically in Germany, while an additional USD156bn were exported to foreign markets. The remaining nearly USD286bn was utilized as intermediate consumption by sectors both at home and abroad.

The automotive industry has traditionally relied heavily on domestic value creation – but the landscape is changing. From 1995 to 2020, there has been a notable increase of one-quarter in German domestic VA within the automotive sector, while foreign VA has surged by more than three-quarters. Concurrently, intermediate imports have nearly quadrupled. However, despite the steady rise in foreign VA and intermediate imports, the growth in domestic VA has shown signs of stagnation since 2018. When comparing these trends to gross output, a different picture emerges. The share of domestic VA as a proportion of gross output has declined by 11.7pps, dropping from 38.1% in 1995 to 26.4% in 2020, while the proportion of foreign VA has remained constant (Figure 16). Meanwhile, the share of intermediate imports has increased from 7.4% to 11.4%. This indicates that the higher level of international interconnectedness within value creation structures has enabled increased output within the industry.

Figure 16: Gross output (in USDbn, left), domestic and foreign VA and intermediate imports (in % of gross output, right) in the German automotive industry, 1995-2020



Source: OECD TiVA, Allianz Research

The domestic market continues to stand out as the primary buyer. In 2020, two-thirds of final demand production in the sector was directed towards the domestic market. Notably, China was the most important foreign market for German automotive products, holding a share of 3.2%, followed by the US at 3.1% and France at 2.3% (Table 1). Despite this strong focus on domestic sales, the German automotive industry boasts a robust international network. While it imported a total of USD304bn in intermediate goods and services, it also exported nearly USD500bn worth of intermediate goods and services to markets abroad.

Table 1: Top 10 countries of final demand for products from the German automotive industry, 2020

	Volume in USDmn	Share in %
Germany	702.5	65.1
China	34.9	3.2
USA	33.1	3.1
France	25.3	2.3
Poland	24.1	2.2
Netherlands	22.7	2.1
Italy	19.3	1.8
Austria	15.5	1.4
Switzerland	15.4	1.4
Spain	14.3	1.3
UK	13.4	1.2
Rest of the World	158.8	14.7

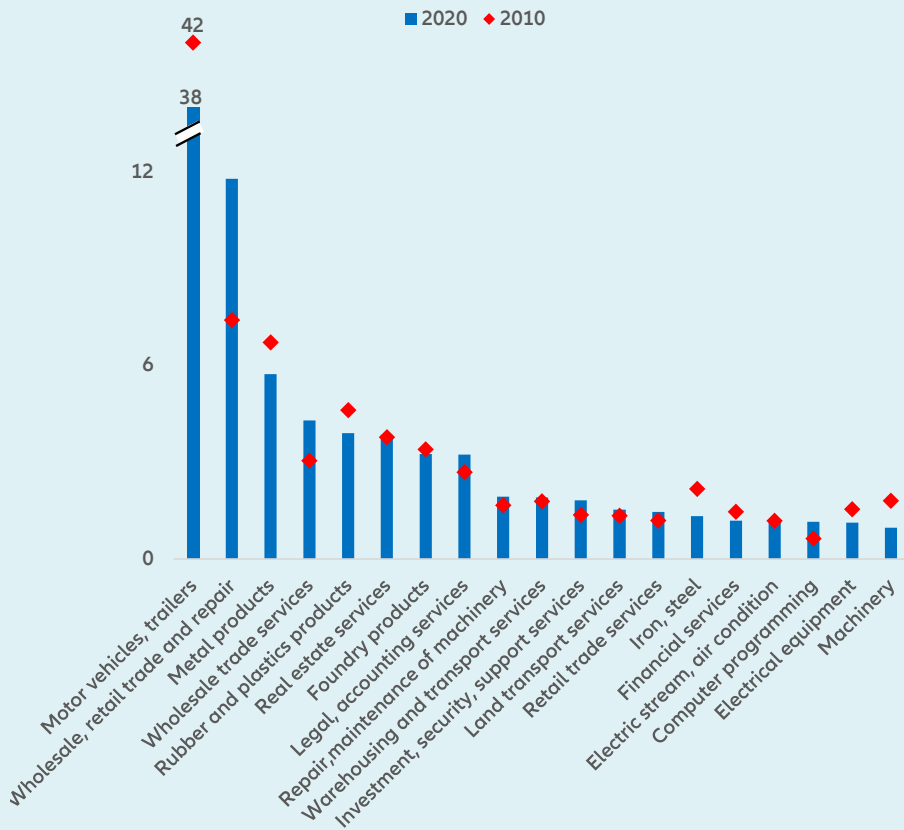
Sources: OECD TiVA, Allianz Research

China is not only a key market for German cars but also stands out as the top contributor of foreign value added in the automotive sector. The sector's global interconnectedness is further highlighted by the significant increase in foreign VA contributions to final demand, which surged by 77% between 1995 and 2020. China's position has risen from USD1.8bn to USD34.9bn, with the US nearly doubling their VA contribution and France experiencing a 5% increase. Additionally, European value creation structures play a prominent role, with Poland witnessing a remarkable 322% increase in VA over the same period, followed by the Netherlands at 49%, Austria at 37%, Switzerland at 94%, and Spain at 40%. Conversely, Italy (-8%) and the UK (-3%) have experienced declines in their VA contributions. The robust supply chain interaction with other Eastern European economies has also been strengthened within the sector.

Direct intermediate supplies and VA contributions in the automotive industry are distributed across various sectors. The primary contributor to domestic production is the manufacturing of motor vehicles, trailers and semi-trailers themselves. In 2020, input deliveries from this sector accounted for 38% of total domestic production (Figure 17), slightly lower than the 41.8% share in 2010. Following closely is wholesale, retail trade and repair, which saw its contribution rise by 4.4pps between 2010 and 2020 to reach 11.8%. However, the shares of several other sectors have decreased as production has shifted abroad, including metal production, rubber and plastics products, iron and steel, electrical equipment and machinery. These changes indicate a shift in the structure of the automotive industry and the changes will continue more strongly towards suppliers in non-auto sectors such as the chemical industry or software programming due to the rise of electric mobility.

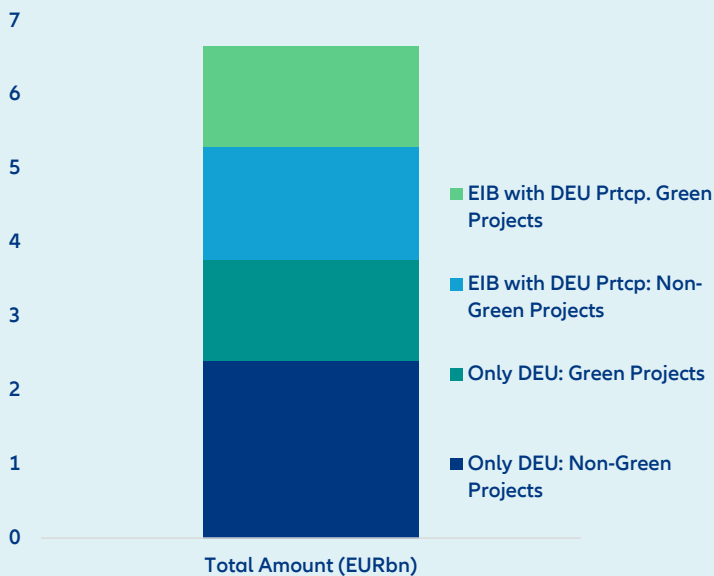
While government support for consumers is waning, the automotive industry can still leverage industrial policy to advance towards net-zero goals. Recent developments have seen a sudden end to support for the sale of EVs as part of German budgetary constraints for 2024 related to the Climate and Transformation Fund (KTF). Additionally, the diesel privilege, which subsidizes fossil fuels, undermines climate protection efforts by reducing incentives for energy-efficient practices. However, phasing out this subsidy could signal a shift towards more environmentally friendly vehicle options. In the realm of subsidies, Germany and the EU face competition from China and North America. From 2020 to 2023, the German automotive sector received close to EUR7bn (some funds are distributed across projects up to 2025) to facilitate its transition towards electro mobility and sustainable practices. A significant portion of these funds supported German projects (56%), with 44% allocated to EU-wide initiatives involving German participation. Notably, projects prioritizing carbon reduction make up 40% of all projects, with half of them being funded by the European Investment Bank (EIB) and the remaining half supported by German national initiatives (Figure 18).

Figure 17: Domestic contributions to final demand production of the German automotive industry for selected sectors, 2010 and 2020 in %



Source: Destatis Input-Output accounts rev. 2019, Allianz Research

Figure 18: Total amount of German corporate subsidies for the automotive sector by level of government award and carbon-reducing activity, between 2020 and 2023, in EURbn



Source: Destatis Input-Output accounts rev. 2019, Allianz Research



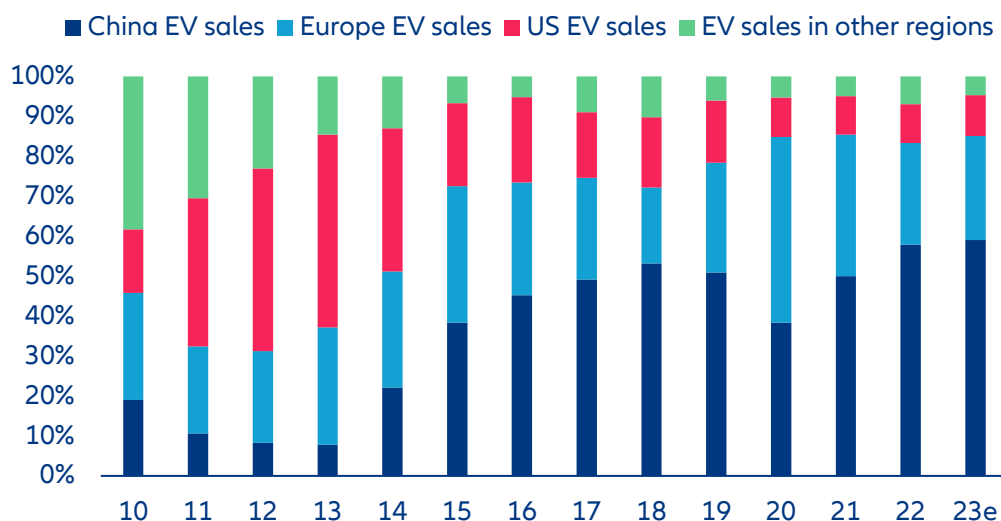
Chinese EVs are on the course to conquer the global market

Chinese EVs have risen at an astonishing pace, with sales and production jumping almost eightfold from 2019 to 2023. The EV market has been a significant catalyst for China's automotive industry, with Chinese EVs commanding nearly 60% of global sales (Figure 19) and contributing to over 60% of the world's total EV production in 2023. This dominance in the EV sector underscores China's substantial impact on the future direction of the global automotive industry. Building on this foundation, 2023 marked a pivotal year for the broader Chinese automotive market, as domestic brands secured more than half of the total market share for the first time. The international reach of Chinese automakers has also expanded drastically, fueled by intense competition within the domestic market. This competitive drive has led to a remarkable surge in the export of passenger cars, with figures leaping from under 1mn units in 2020 to 4.4mn units in 2023. This exponential growth has vaulted China over Japan, establishing it as the world's largest passenger car exporter and reinforcing its critical role in shaping the global automotive landscape.

Generous government subsidies and state-led efforts to direct massive investments across all stages of the supply chain have been instrumental in building the industry from scratch and establishing China's undisputed dominance today. As early as 2001, the Chinese government recognized the pivotal opportunity in the EV industry, a time when China struggled to compete with established auto leaders in ICE technology and failed to develop competitive local brands. By leveraging the large domestic market and manufacturing base, the government directed massive investments into the entire supply chain. In the form of subsidies, tax breaks,

public procurement and credits to boost both demand and supply, public financial support amounted to at least EUR115-150bn by end-2022, exceeding the combined government funding of the US (ca. EUR8bn) and Europe (ca. EUR75-80bn). As subsidies gradually decreased, traditional Chinese automakers such as BYD, SAIC and Geely successfully transitioned into becoming major EV manufacturers, and startups such as NIO, Li Auto and XPeng have risen to prominence as the new powerhouses in China's EV market.

Chinese EV makers have strong cost advantages, thanks to their early-mover position, lower labor costs and economies of scale, but they also excel at quality. Take BYD, for instance, the global frontrunner in EV exports and a prominent figure in EV battery production. The company significantly reduced its production costs through extensive vertical integration. Given that batteries constitute the most substantial portion of EV manufacturing expenses, BYD's specialization in lithium iron phosphate (LFP) batteries – a cost-efficient substitute for the widely utilized nickel manganese cobalt (NMC) batteries in EVs – places it at the forefront. This expertise allows BYD to achieve one of the highest energy densities at some of the lowest costs globally. Moreover, with the focus of domestic competition increasingly shifting towards the sophisticated vehicle technologies, such as intelligent driving systems and human-machine interface (HMI) capabilities, Chinese EV manufacturers are swiftly advancing in software development. These advancements underscore their strategic focus on not only enhancing vehicle efficiency and safety but also on improving the overall driving experience, positioning them as leaders in the global EV market.

Figure 19: Share of EV sales by region

Sources: IEA, Allianz Research

Notes: the data only includes passenger vehicles

While the Chinese EV industry has emerged as a competitive force globally, several factors pose potential risks that could undermine its current leading position:

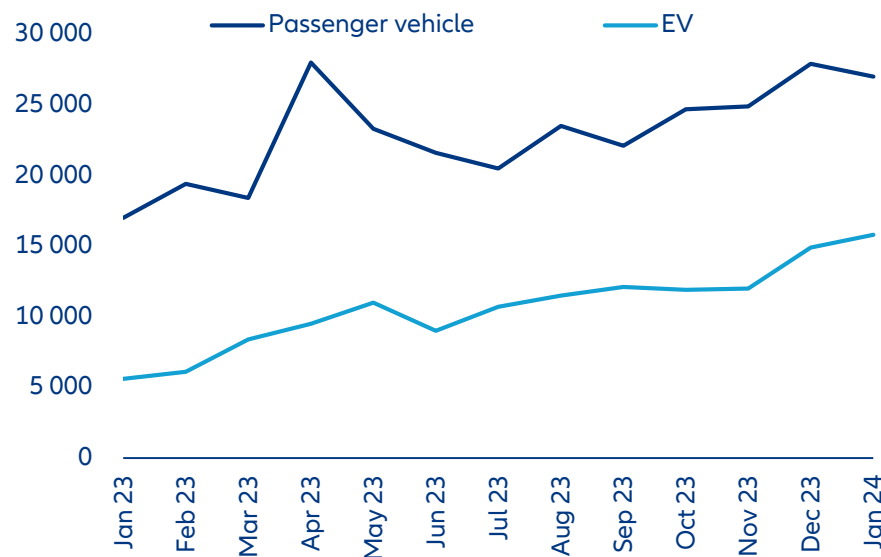
1) The price war, which was triggered by Tesla in 2023, has only intensified entering 2024, significantly weighing on OEMs' profitability. In October 2022 and January 2023, Tesla initiated aggressive price cuts on its Shanghai-produced models with discounts reaching up to 24% after two rounds, prompting at least 30 other automakers, from local EV startups like Xpeng and Nio to established giants such as Mercedes-Benz, Volkswagen and Ford, to lower their prices in response. The mass-market competition has become even more cutthroat with the most recent Tesla price cuts in January. Even more carmakers, including BYD, followed suit and leveled up their discounts. The average discount for passenger vehicles has steadily increased over the past year to CNY27,000/vehicle (c. EUR3,467) as of January 2024, whereas the average discount for EVs surged to CNY15,800/vehicle (c. EUR2,029), marking a 182.14% y/y increase (Figure 20). As the ongoing price war suppresses profits and results in deepened losses for some, we expect an accelerated consolidation of car companies in the Chinese market, which would ultimately lead to a "winners take all" scenario in the industry.

2) From raw materials to autos, the overcapacity problem has spread over the entire supply chain. Chinese firms have made massive investments in EV technology, expanding their manufacturing capabilities from raw material refinement to auto manufacturing, in response to the surging demand for EVs. Yet the overcapacity issue has emerged across the entire supply chain as global demand cools down. Prices of key battery raw materials have continued to decline after the market was hit by excessive levels of supply (Figure 21). This problem is particularly pronounced with lithium, the price of which has plummeted by -70% in the past year. The production capacity for EV batteries in China has far exceeded its domestic demand, with capacity reaching 2,000 GWh in 2023 while domestic production was only about 680 GWh. A similar trend can also be observed among carmakers, where the overall capacity utilization has hovered below 50% since 2019. In 2023, only 20 out of 77 car manufacturers reached a utilization rate above 60%. As competition intensifies in the domestic market and capacity piles up, many Chinese carmakers, including BYD and Geely, have made international expansion their priority. But rising geopolitical tensions could undermine their efforts and weigh on their margins.

3) The rapid evolution of battery technology, notably the advancements of solid-state batteries, sodium-ion batteries and silicon anodes, could shake up China's dominant position in the battery supply chain. The solid-state battery stands out as the most promising game-changer. Unlike current batteries, a solid-state battery uses solid materials as electrolytes instead of liquid ones, thereby reducing the risk of fires. By removing the graphite that is typically used in anodes, it can achieve enhanced energy density and a longer range, and requires a shorter charging time. Battery makers are racing to tackle the technological challenges due to its huge potential, with Toyota announcing the first breakthrough. If mass-produced, the battery could revolutionize the industry and undermine China's current leading position in the lithium iron phosphate (LFP) battery. Other

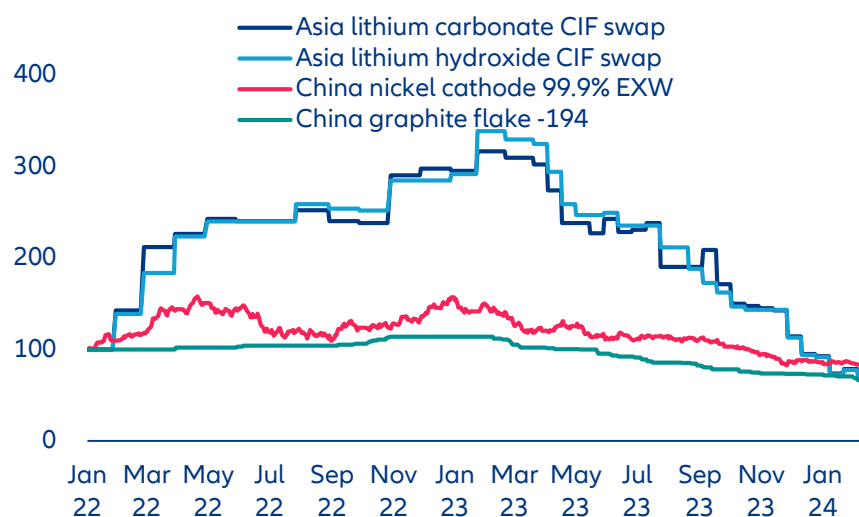
battery technologies, such as the sodium-ion battery that uses low-cost materials without lithium, and silicon anodes that replace graphite with silicon for anodes, leading to increased range and faster charging, are also evolving. These technologies could further challenge China's dominance by reducing their demand for critical materials that are predominantly controlled by China. In this context, Chinese battery makers have stepped up their R&D efforts in next-generation battery technologies. Notably, a government-led consortium that includes the top battery makers and EV manufacturers was established earlier this year with the goal of commercializing solid-state batteries. While Chinese players still hold significant advantages, the competition is intensifying.

Figure 20: Average discount in the Chinese market (CNY/vehicle)



Sources : ISE, Allianz Research

Figure 21: Prices of EV battery materials (index, 03 January 2022 = 100)



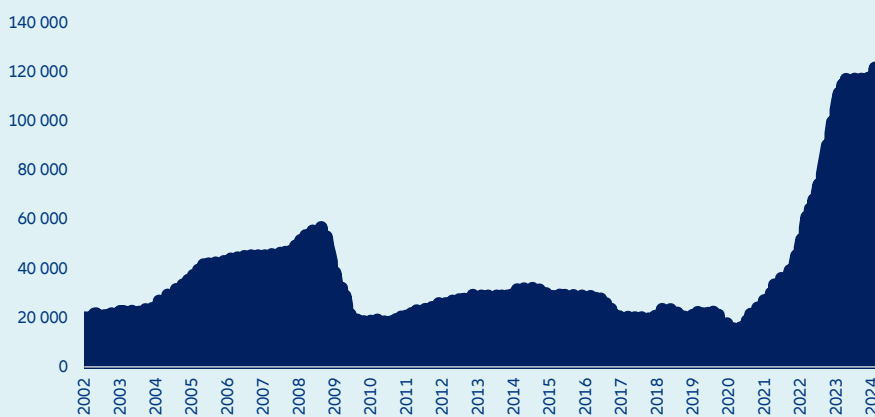
Sources : Bloomberg, Allianz Research



Box 2: Who will win the price war?

The car price war initiated in 2023 – particularly harsh for the Asian EV market – is expected to continue in 2024. How long it will last, and which players will come out relatively unscathed, will depend on the breakeven point. Companies that can diminish their costs as much as possible while still creating profit will gain the most market share through lowering prices. In this regard, Asian automakers are better positioned as they have a historical net profit margin of 7.0% (against 6.2% for US players and 4.7% for Western Europe). Asian OEMs are also better equipped in terms of transport and logistics, essential for expanding and consolidating abroad, particularly in the post-pandemic landscape of extremely volatile freight rates. While shipping rates of bulkers and containerships have declined significantly from the highs observed in 2021-2022, roll-on roll-off (RoRo)¹ vessel rates have continued to climb, reaching a never-before-seen level of around USD115,000 per day.

Figure 22: Ro-Ro one-year time charter rate trend, (USD/day)



Sources: Clarksons Research, Bloomberg, Allianz Research

High transportation costs are the result of several factors:

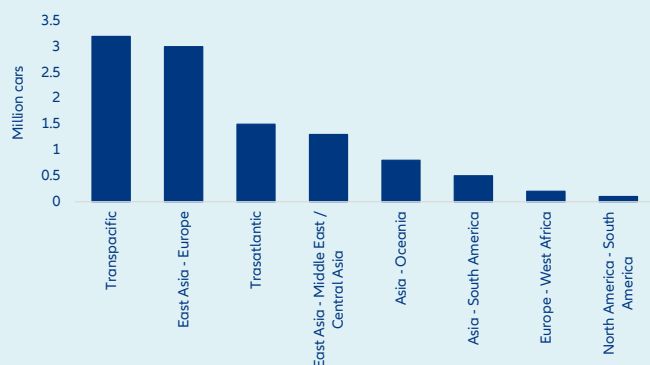
1) An increased volume of auto shipments worldwide: Global vehicle registrations, including passenger cars and commercial vehicles, jumped by +8.6% y/y in 2023 to near 90mn units (+11.2% versus 2020), with Europe recording the highest rise (+13.9% y/y). In parallel, post-pandemic RoRo capacity has not been enough to cope with demand. Because the shipping sector has been facing stricter CO2 emissions regulations, RoRo operators have been demolishing old vessels that were not compliant, while other less-efficient vessels have been retired earlier than usual without any immediate new replacement available. This scarcity issue – which we do not expect to be solved soon – has been driving some automakers to ship their vehicles in containers, which is more expensive given the extra cost of loading and unloading containers with a crane.

2) A switch to longer-haul trade routes: Transit through the Suez and Panama Canals – together responsible for the flow of about 20% of global seaborne trade – has been disrupted for several months. While carriers are avoiding the Suez Canal in response to Houthi attacks on ships crossing the Bab-el-Mandeb strait, a severe drought has caused water levels to plunge in the lakes that feed the Panama canal and its locks. Both situations have altered trade routes, with no visible solution in the short term, doubling transportation times and therefore transportation costs. Figure 23 shows that the largest volumes of cars transported by sea are indeed carried through the Trans-Pacific and the East-Asia-Europe routes, which are the most exposed to the Suez and Panama canals.

3) Port congestion and landside delays: The record volumes of marine auto carriage have been adding pressure on port infrastructure, particularly in Asia. This together with a shortage of inland drivers in Europe has been exacerbating congestion at ports. Though congestion has been softening from the peak of 2022, it remains well above pre-pandemic levels, reducing effective shipping capacity (Figure 24).

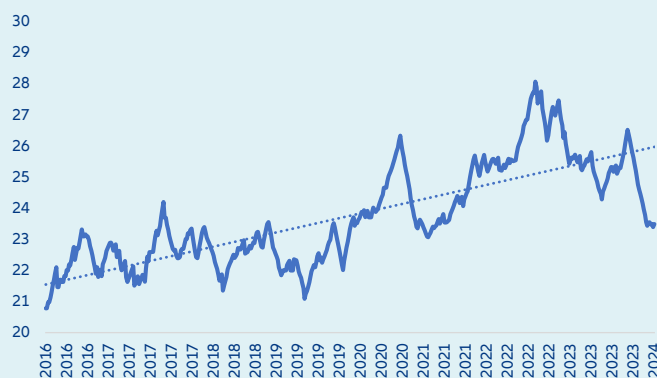
¹ RoRos are specialized vessels designed to carry wheeled cargo such as cars, coaches, trucks, and railroad cars in a safely manner across the ocean or water bodies.

Figure 23: Seaborne car trade volume for major routes in 2022



Sources: Clarksons Research, Bloomberg, Allianz Research

Figure 24: Car carrier port congestion index, % fleet (vehicles)

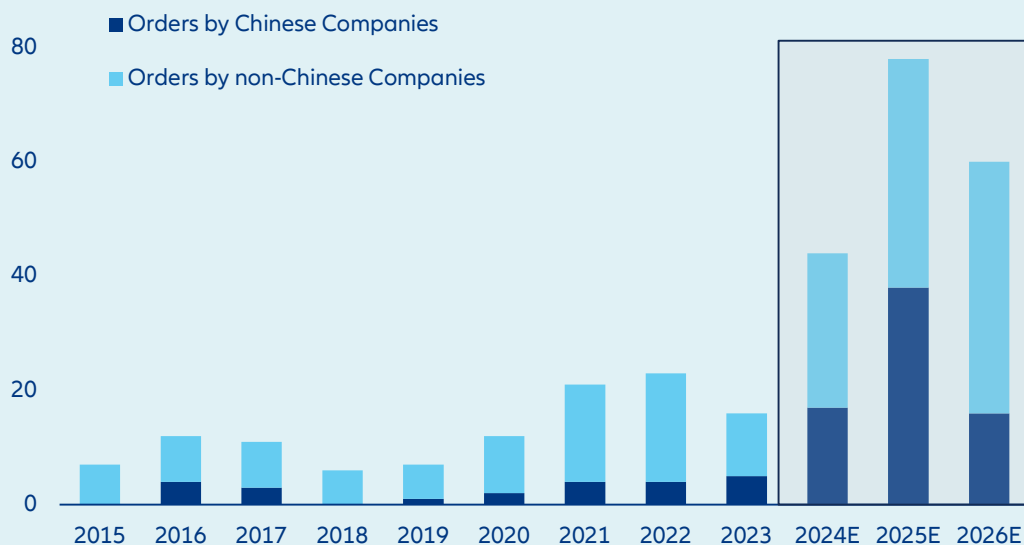


Sources: Clarksons Research, Bloomberg, Allianz Research

In this context, regions less reliant on imported vehicles are likely to see a tougher price war, given that automakers do not have to pass on or absorb higher transportation costs. Car price reductions in China may intensify, given that around 95% of vehicles sold are made locally. In contrast, around 75% of vehicles sold in Europe last year were made locally and 25% were imported, with 48% of coming from East Asia (China, South Korea and Japan), 15% from Turkey, 11% from Morocco and 27% from the rest of the world.

Despite increasing transportation costs, Asian OEMs still have the potential to gain market share in Europe through price reductions. While most European car manufacturers sign long-term contracts with marine carriers, Asian automakers had been buying their own RoRo ships even before the post-pandemic shortages began. By incorporating logistics into their auto or core businesses, they have gained efficiencies and independence, and limited their exposure to external disruptions. As of today, 57% of the global RoRo shipping capacity belongs to Asian companies, notably those from Japan (41%) and South Korea (14%), versus only 2% for China. But Chinese OEMs know that in order to further expand into overseas markets they have to fully enter into the RoRo business. Fortunately for them, China dominates global ship construction, responsible for manufacturing 45% of all vessels currently navigating the oceans. Figure 25 shows that a significant increase in new orders for Chinese RoRo vessels is expected in the coming years. Moreover, while non-Chinese companies are doubling their demand for 2024, Chinese firms are tripling theirs. Investing in RoRo capacity will allow Chinese OEMs to further reduce their prices, facilitating their expansion abroad.

Figure 25: RoRo shipbuilding orders at Chinese shipyards by purchaser



Sources: CSIS China Power Project, Allianz Research

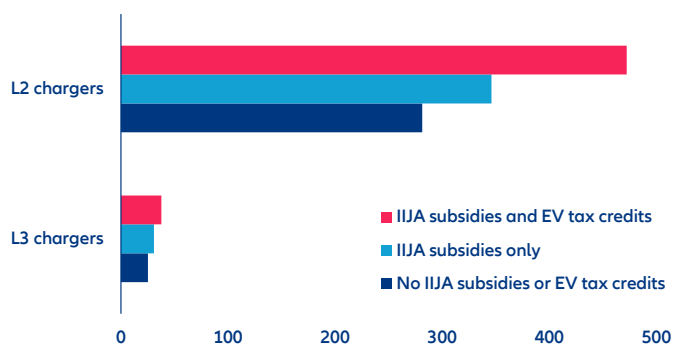
Challenges and political uncertainties remain for the US EV industry

In the US, industry policies have been implemented across the supply chain to boost EV adoption both directly – through tax credits for buyers – and indirectly – by expanding charging infrastructure. The Infrastructure Investment and Jobs Act (IIJA), a bipartisan law to strengthen states’ infrastructure, and the Inflation Reduction Act (IRA), Biden’s signature climate legislation, are the two main policies in the US aiming at accelerating the EV transition. The EV-related subsidies from these two policies total around USD 21.7bn, including USD7.5bn from the IIJA for charging stations and an estimated USD14.2bn in subsidies for EV purchases from 2022-2031. These subsidies have contributed to an uptick of sales – EV sales

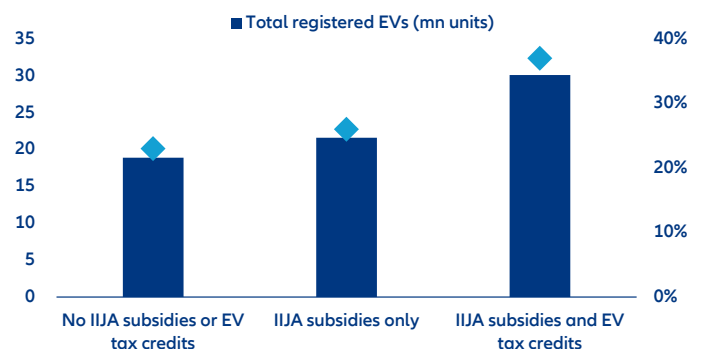
hit a record 1.2mn in 2023, representing 7.6% all vehicle sales in 2023, up from 5.9% in 2022. The combined effect of the direct incentive of up to USD7,500 in tax credits per eligible EV and the increasing supply of EV chargers is estimated to increase EV registrations and the market share of new light EVs by 59.3% and 14pps, respectively (Figure 26&27). Additionally, the policies are estimated to lead to an almost nine-fold increase in the number of EV chargers compared to the end of 2022, significantly surpassing the nearly six-fold increase that would occur without both policies.

Figure 26 & 27: Impact of current industrial policies on the EV sector

Projected supply of EV chargers in the US



Projected demand for EVs in the US



Sources: CBO, Allianz Research

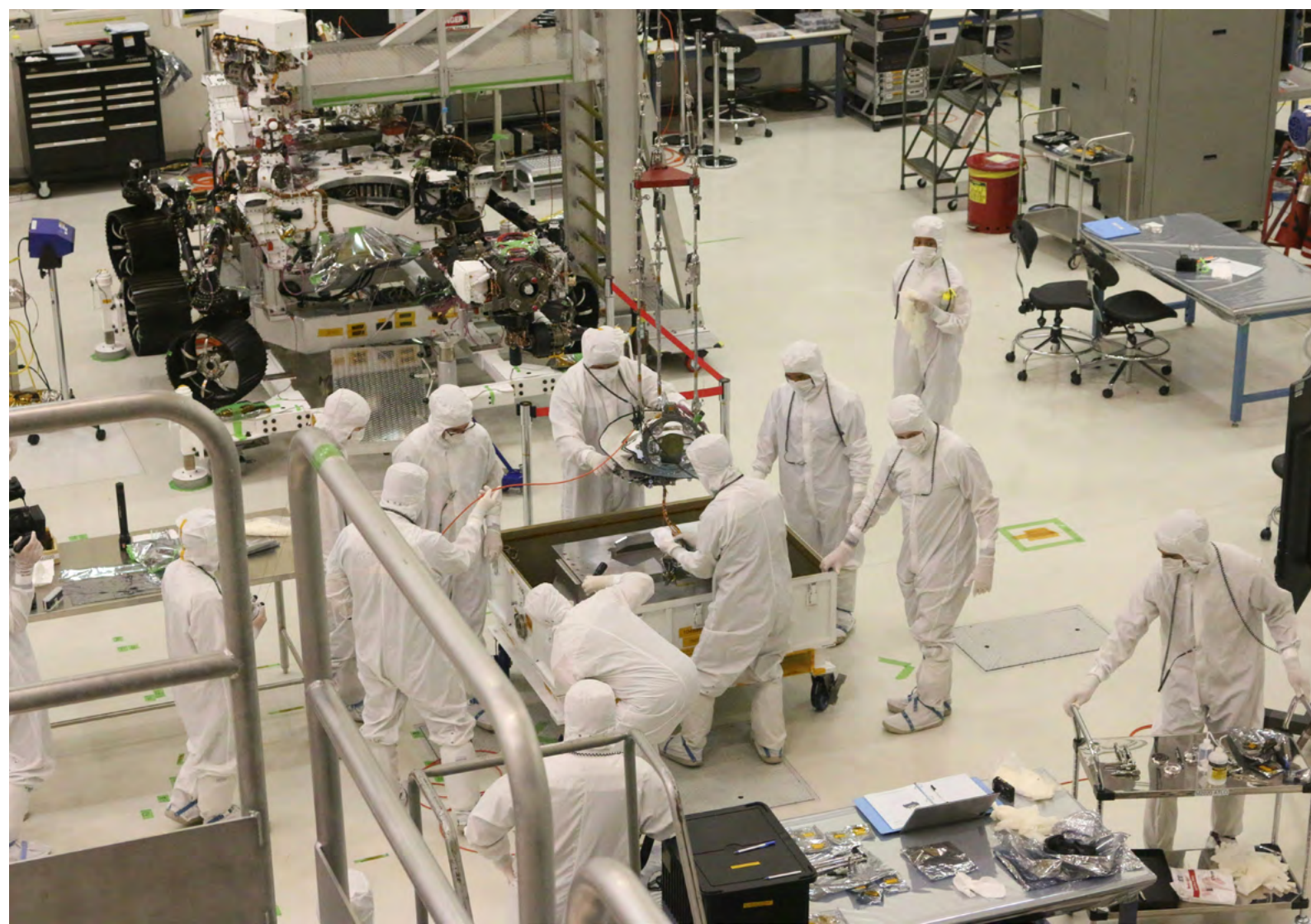
Industry policies have also been put in place to reinvigorate the domestic manufacturing base and recapture jobs from abroad. With the government handing out historic incentive packages, the US has seen a boom in green investment. Since the implementation of the IRA, 189 manufacturing projects on EVs or batteries have been announced, with more than USD100bn in total investment. These are expected to create 66,338 jobs (Table 2). Notably, LG Energy Solution announced a groundbreaking USD5.6bn battery project in Arizona in March 2023, the largest battery investment in the US at that time. The record was later surpassed by Toyota, which

pledged to scale up its battery manufacturing investment in North Carolina by USD8bn, bringing the total investment to USD13.9bn. It is expected to create more than 5,000 jobs in total. This momentum was further bolstered by two major announcements in Michigan: Ford's USD3.5bn battery plant, which will leverage technology from China's battery titan CATL, and a USD2.4bn battery facility by a subsidiary of China's Gotion, highlighting the allure of the US policy environment in attracting key players in the EV and battery sectors.

Table 2: EV and battery investment post-IRA

	Projects	Investment (USD mn)	Job creation (ppl)
EV - post-IRA	79	17 408	21 107
Battery - post-IRA	110	84 314	45 231
Total	189	101 722	66 338

Sources: DOE, Allianz Research

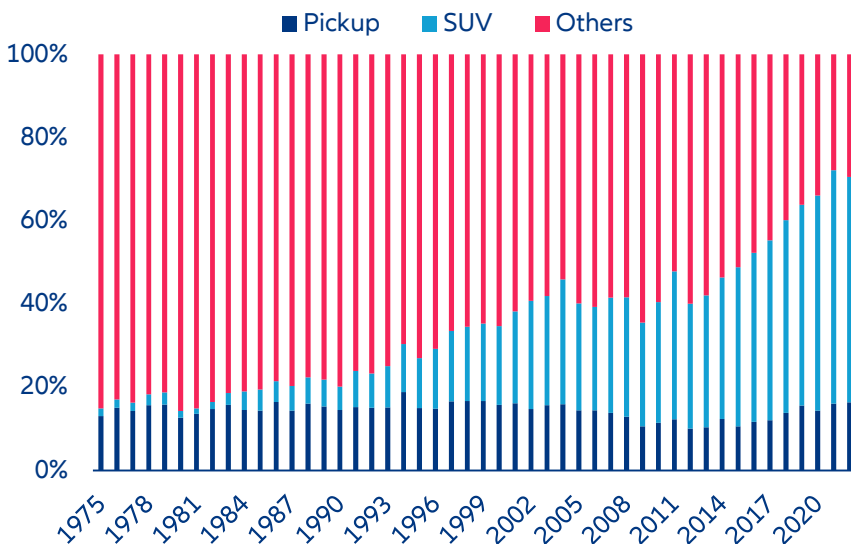


However, EV prices remain high with cost challenges exacerbated by rising labor costs and the domestic preference for larger vehicles. The resolution of the United Auto Workers (UAW) strike in November last year led GM, Ford and Stellantis to agree to a substantial 25% wage increase for UAW workers over the next four years. This agreement, coupled with the extension of union protection to EV battery manufacturing plants, is poised to elevate production costs, potentially impacting vehicle prices. The strong preference of US consumers for large vehicles further compounds these challenges. SUVs in particular have gained increasing popularity, with their share of vehicle production doubling over the past two decades. The combined share of SUVs and pickups has accounted for more than half of vehicle production in the US since 2016 and stood at 70.5% in 2022 (Figure 28) and they accounted for nine of the top 10 best-selling models in 2023. SUVs and pickups require larger batteries and are consequently as expensive to produce as EVs. Ford and GM, which have strategically focused on crafting larger, premium electric SUVs and pickups, have experienced subdued sales. Ford’s statement last October that it would delay USD 12bn in EV investments, along with GM’s decision to abandon some EV targets and the one-year delay in ramping up production for all-electric trucks at its Orion Assembly plant, underscore the challenges US automakers face in balancing consumer preferences and production costs, particularly as they navigate the costly transition to EVs.

Political dynamics will determine the future of US auto industry. A potential second Trump presidency could set the path towards an alternate course given the divergence in the two parties’ positions on green transformation. Biden had previously set out the goal

for half of all new car sales to be EVs by 2030. The manufacturing boom triggered by the IRA has already a visible impact on EV sales, and the new emission rules proposed by the EPA last year are set to expedite this objective, potentially boosting EV sales to two-thirds of all new car sales in the US by 2032. In contrast, Trump has been a strong opponent of green energy and EVs, blaming the existing environmental policies for raising energy prices and causing job losses. If elected in November, he is likely to roll back climate regulations designed to increase EV adoption and channel the funds back to traditional ICE manufacturing. This would result in a significant deceleration of the green transformation in the world’s second-largest car market, where transportation is the largest source of greenhouse gases. International EV makers and their battery-producing partners would be less incentivized to ramp up investment in the country, while local automakers would further pull back from their EV investment plans. In addition, Trump’s pledge to relocate the entire auto supply chain back to the US would imply higher production costs due to the lack of sufficient production capacity, infrastructure and access to critical raw materials. This would weigh on the margins of domestic automakers, many of which are already struggling to reduce costs amid the EV transition. On the other hand, the potential imposition of higher tariffs on imported car parts would come at the cost of domestic consumers’ utility as they would push up the prices of new cars, likely spilling over to the prices of used cars as well, with reduced demand for expensive new vehicles. Thus, the forthcoming election could very well be a pivotal moment for the US auto industry, determining whether the momentum towards electrification continues or takes a significant detour.

Figure 28: Vehicle production by type



Sources: US EPA, Allianz Research

A photograph showing a group of diverse hands stacked on top of each other, resting on a tree trunk. The hands are of various skin tones and are positioned in a way that suggests unity and teamwork. The background is a lush green forest with sunlight filtering through the trees. The text "Our team" is overlaid on the image, with "Our" in white and "team" in yellow.

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