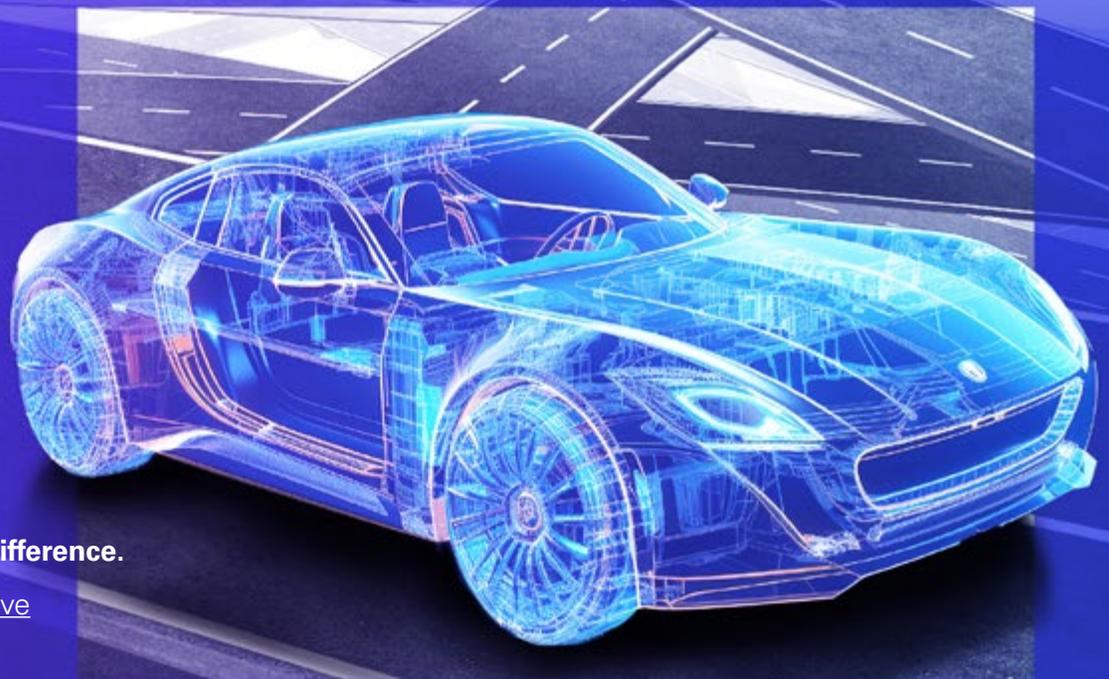




**24<sup>th</sup> Annual Global Automotive  
Executive Survey**

# Automakers getting real about the future of mobility

A European perspective



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# Contents

<b>Foreword</b>	<b>03</b>
<b>Executive summary</b>	<b>05</b>
<b>Main findings</b>	<b>10</b>
The regulatory and supply chain effect	10
Future of Electric Vehicles (EVs)	17
Future of EV charging	22
New business models and revenue streams	26
Future of GenAI in Automotive	29
Tech companies vs. Automotive incumbents	32
<b>What to do now</b>	<b>36</b>
<b>How KPMG can help</b>	<b>37</b>
<b>Respondent profile</b>	<b>38</b>
<b>Authors</b>	<b>40</b>
<b>Contacts</b>	<b>41</b>

# Foreword

Our 24th annual KPMG Global Automotive Executive Survey comes at a pivotal moment for automakers and suppliers. Completed by more than 1,000 executives in 30 countries, the survey results show that the industry is becoming more sober about future market prospects.

Especially in Europe, the survey results indicate that there is a growing pessimism on profitable growth over the next 5 years. This is despite a lowering concern on interest rates, energy prices and inflation, stabilization of commodity prices in the short-term as well as easing of regulatory pressures from the policymakers.

At the same time, though we anticipate that supply chain issues will have a lower negative impact in 2024, medium-term supply chain disruption of key commodities like Battery materials, Oil (and Gas), Rare earths and Semiconductors continues to bother European automakers, given the ongoing geopolitical tensions.

Global automotive executives anticipate new battery electric vehicle (BEV) sales to be 30 percent of all vehicle sales in Europe by 2030 and latest market projections show Europe slowly closing the gap with China in terms of new BEV sales by 2030. With easing of "Euro 7" norms and the continuity of fossil-fuel powered vehicles running on e-fuels beyond 2035, we believe that growth of Hybrid EVs will also pick up pace in Europe. However, with the IRA (Inflation Reduction Act) regulation in the US, and the Chinese influx of cheaper EVs in Europe, European OEMs are already facing the heat when it comes to EVs.

When it comes to EV charging, consumers across regions are getting more comfortable with the behaviors required for ultra-rapid charging, including those in Europe. "Charging Network Operators" and "Electric Utilities" are best positioned to own and operate these EV charging stations, especially in North America and Europe. While both slow and fast charging networks are expanding rapidly, Europe has a tall target to achieve by 2030 in terms of EV public charging infrastructure (6.8 million publicly available EV charging points and \$70 billion in investments). Globally as well as in Europe and the US, the most anticipated EV charging location for consumers remains their own family home or garage.

"Brand image," "Infotainment," and "Self-driving" are no longer the top considerations for buying vehicles in Europe – instead, "Driving performance," "Seamless experience," "Electric mobility" and "Vehicle connectivity" are top vehicle purchasing criteria, among European consumers. At the same time, while the European executives are much less confident about majority of vehicle purchases completed online by 2030, the vehicle retail & distribution model will increasingly shift towards Direct-to-Consumer sales by automakers, the agency model, and pure-play digital e-commerce players.

Automotive companies across regions also seem to be less prepared and ready for advanced manufacturing technologies, including GenAI (Generative AI). Artificial Intelligence (AI) and Autonomous Vehicle (AV) software engineering skills seem to be the most important to automakers compared to advanced manufacturing,

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# Foreword

and electronic hardware skills. We believe even as automakers are less prepared right now when it comes to GenAI, the future of GenAI holds great potential as many of them have already invested in such capabilities or on the way to do so. GenAI will likely supplement traditional AI systems in automotive organizations, with higher predictive, optimization and creative power.

Given the advent of software-defined vehicles, big tech companies and tech startups will likely shake up the future of mobility, and increase their share coming from new revenue streams, especially within infotainment systems, cybersecurity, motor insurance, EVs and autonomous vehicles. Apple and Google feature on top as the ones most likely to enter the automotive market with their own branded vehicles while also being best positioned to capture the revenue streams from software-defined vehicles, second only to existing OEMs. Tesla is also seen as a clear leader, among other emerging companies, in autonomous vehicles by the European automotive executives.

As automakers grapple with these disruptive forces, they also need to free up capital to invest in emerging growth areas. Corporate restructuring will likely pickup pace as many automakers and suppliers divest their non-strategic assets especially those which are dependent on fossil fuel powered vehicles. But even after freeing up funds for the next generation of capital and R&D investments, automakers should continue to cooperate and collaborate with big tech companies and tech start-ups as it will lead to not just gaining expertise but hedging risky bets in emerging, unproven areas.

Our 24th annual survey examines the above insights in great detail and shows how executive sentiment has changed and how concerns and challenges have made global and European automotive leaders more cautious. To help ensure companies end up as winners, not losers, executives should rethink their strategies and ask themselves some important strategic questions. Finding the right answers to these strategic questions will help determine how automotive companies succeed in the coming years. We believe that a dazzling future for the automotive business—with amazing products, more delighted consumers, and a positive impact on the planet—is still in view. But getting there will require overcoming near-term challenges.



**Goran Mazar**  
EMA & German Head of  
Automotive and ESG

# Executive summary



## The regulatory and supply chain effect

- Among European executives surveyed, only a fourth (25%) are optimistic about profitable growth in the next five years.
  - European automakers will likely witness a decline in their operating margins in 2024 and 2025 (vs. 2023), compared to American, Japanese, and Chinese automakers.
- Future growth outlook remains flat with European automotive sales not witnessing pre-covid figures of 20.7 million units (2019) until 2031, despite easing of energy prices and inflation rates.
- Softening of “Euro 7” emission norms and gradual phasing-in of ESG-related regulations indicate that regulatory pressures on automakers are wearing off.
  - Only 12 percent of European automotive executives believe that cost and complexity of tariffs, trade rules and regulations will significantly increase in the next 5 years.
  - However, some regulations like the new “Batteries Regulation”, and “UN155 cybersecurity regulation” will add a certain cost, compliance, and resource burden on the automotive companies across the value chain in Europe.
- Though the impact of geopolitical conflicts lingers on, commodity prices – especially that of battery raw materials and rare earths - have declined and stabilized in 2023 giving some relief to automakers and suppliers alike.
  - A high percentage of European executives (49% to 52%) seem to be very or extremely concerned about the medium-term (next 5 years) continuity of key commodities/components such as Battery raw materials (Lithium, Cobalt, Nickel, etc.), Fossil fuels (Oil, Natural Gas), Rare Earths (Neodymium), and Semiconductors.
  - There will be likely be a lower negative impact on the European automotive sector stemming from supply chain issues as European OEMs and suppliers adjust their supply chain strategies to focus more on “Direct sourcing of raw materials” and “Re-sourcing or Dual-sourcing”.



## Future of Electric Vehicles (EVs)

- Global executives expect European new Battery Electric Vehicle (BEV) sales to be around 30 percent by 2030.
- Despite a recent compromise on Euro 7 standards and permitting the sale of ICE vehicles after 2035 provided they run on carbon-neutral fuels (e-fuels or synthetic fuels), European automakers seems to be unhappy and uncertain about a profitable future.
  - A lower percentage of executives (58%) in Europe (compared to those in other regions) believe in BEVs reaching cost/affordability parity with ICE (Internal Combustion Engine) vehicles without any subsidies by 2030. This pessimism may stem from the rollback of EV subsidies in many European countries.
- Hybrid EVs might also see an uptick in growth equivalent to BEVs as almost 50 percent of European automotive companies in our survey will likely increase their capital expenditure and R&D investments into hybrids.
- We will likely witness more capital and R&D expenditure pouring into new battery chemistries.
  - 71 percent of European automotive executives foresee an increase in capex and R&D investments in battery electric vehicles with them allocating a higher proportion of any additional R&D funding to “Advanced batteries” rather than “Li-ion batteries”
- Threat of foreign entrants looms large in the minds of European automotive OEMs.
  - Chinese OEMs gained a market share of 7.5 percent in the European passenger and commercial EV market in 2023 from 2.5 percent in 2018.
  - Apart from the Chinese OEMs, the threat also looms large from American automakers like Tesla which is ranked as the future BEV market leader in 2030 by European automotive executives, ahead of BMW and Audi.
  - Many automakers, including those from Europe, have announced big EV projects to take advantage of subsidies under the \$400 billion US IRA (Inflation Reduction Act) plan which will enable them to build competitive scale, reduce the prices of their EV models, and import cheaper EV components/models into Europe.



## Future of EV charging

- Fast charging public networks to expand at a rapid pace than slow EV charging infrastructure.
  - Consumers are getting more dependent on access and availability of ultra-rapid charging – a greater percentage (32%) of European automotive executives believe that EV owners will be willing to wait for 20 minutes for 80 percent or greater EV recharge (vs. 17% in 2022).
  - “The Alternative Fuels Infrastructure Regulation” or AFIR has led to increased interest and funding in developing new fast and ultra-fast EV charging stations within Europe.
- European automotive executives foresee “Electric Utilities” and “Charging Network Operators” as best positioned for owning and operating EV charging points, closely followed by the “Tesla Supercharging Network”.
- The EV charging ecosystem remains fragmented and is ripe for consolidation as many companies belonging to varied adjacent sectors (and not just Automotive) eye smaller competitors or seek an entry into this space through acquisitions.
- However, the medium-term concern among these many competitors is the availability of prime locations to build and operate profitable EV charging points.
  - Public or private charging stations are the second-most anticipated charging location preference for EV owners globally, only preceded by single family homes or garages.
- Challenges to rapid expansion of EV charging infrastructure remain as EU-27 countries need to have 6.8 million publicly available charging points by 2030.
  - Varied permitting regulations in different EU countries - from federal to municipal levels – are delaying the development and operationalization of EV charging stations.
  - There are payment or billing related issues faced by EV owners at public or private charging stations.
  - Service integration between electric vehicles, charging infrastructure (different apps), household electricity systems, and other mobility solutions, and electricity grid congestion are the other key challenges.



## New business models and revenue streams

- Vehicle purchasing witnessing a massive shift as consumer preferences undergo a change.
  - European consumers will be willing to splurge on OEMs whose vehicles demonstrate great driving performance, enable seamless or hassle-free experience, and embed zero emission or sustainable mobility as well as excellent vehicle connectivity features.
  - “Brand image”, “Infotainment” and “Self-driving” no longer feature as the top purchasing criteria for European consumers.
- Many European consumers will be willing to pay for monthly subscription services like software services, maintenance, charging, Advanced Driver Assistance Systems (ADAS).
- Vehicle insurance might just prove to be a lucrative new revenue stream for European automakers, and in this area, they are more than willing and confident to compete with incumbent motor insurance companies.
- While a lower percentage of European automotive executives (52% vs. 73% in 2022) believe that majority of vehicle purchases will be completed online by 2030, the share of non-traditional channels in selling vehicles will substantially go up (to two-thirds).
  - Direct-to-Consumer sales by automakers, agency model, and pure-play e-commerce portals will increasingly compete with traditional dealerships.
  - Though the agency model has picked up quite a traction among European automakers, switching to this new retail & distribution model is not without its challenges.



## Future of GenAI in Automotive

- Automotive companies seem less prepared for advanced technologies like GenAI but consider GenAI skills to be the most important.
  - Only 32 percent of European automotive executives think their company is very or extremely prepared for these advanced technologies – compared to 59 percent in 2022.
  - Companies may feel less prepared to implement new technology this year because of the proliferation of new AI systems, especially GenAI.
  - Automotive companies place the highest importance on AI/AV software engineering skills for ensuring their future business success.
- Use cases abound for GenAI in Automotive and will act as a supplement to traditional AI systems.
  - Application of GenAI in the automotive sector can range from vehicle design/R&D and production to supply chain and consumer experience, which further improve optimizing and predictive abilities of traditional AI systems.
  - The application of GenAI within the EV ecosystem can open new innovation-related opportunities. Besides usage of GenAI to optimize EV design taking into consideration the engineering, safety and raw materials constraints, GenAI can reduce time-to-market of incorporating new EV components and novel battery chemistries.
  - With the application of GenAI, autonomous vehicles can be commercialized in a quicker timeframe. Testing autonomous vehicles in exceptional driving scenarios created by GenAI can make them more capable of navigating complex driving conditions.



## Tech companies vs. Automotive incumbents

- Big tech companies are more likely to compete with traditional automakers in vehicle production, especially in EVs.
  - Most European executives believe more tech companies will enter the industry with their own branded vehicles (preferably EVs). Apple remains the number one choice, but it is now followed very closely by Google.
  - Among Chinese big tech companies, Huawei and Xiaomi feature on top compared to other Chinese tech companies.
  - 73 percent of global executives surveyed believe that these new automakers will likely succeed in pursuing asset-light strategies using third parties to manufacture their vehicles.
- Apart from launching their own branded vehicles and competing to capture new revenue streams in software-defined vehicles, the emerging area of autonomous vehicles will likely be another flashpoint between big tech companies and automakers.
  - When it comes to autonomous vehicles, 61 percent of European executives believe that Tesla will be the market leader, same as the previous year, likely reflecting the company's success in winning approval for its autonomous driving technology in many countries. However, many new automakers might continue to face hurdles with regards to regulations, safety and consumer perception while trying to test and launch their own autonomous vehicles and robotaxi services.
- A majority of European executives (58%) will consider investments, acquisitions or partnerships with tech startups only on an opportunistic basis.
  - An overwhelming majority of these European executives (72%) believe that only a few tech startups will find success in the industry and will either be bought out by established automakers or continue to operate in niche segments.
- EV transition and the beginning of a decline in sales of ICE vehicles will involve corporate restructuring.
  - Close to half of European executives (48%) are very or extremely likely to divest non-strategic parts of their businesses in the next several years, little changed from the year before (51%).

# Main findings



## The Regulatory and Supply Chain Effect

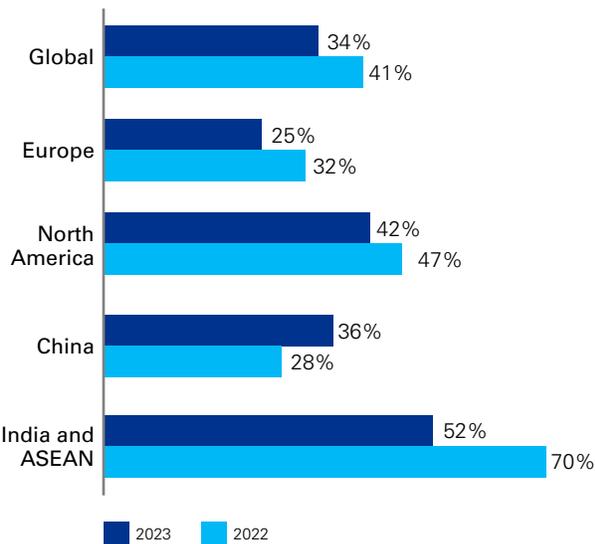
### Growth in profitability remains a pipe dream for European automakers!

Global sentiment on profitable growth over the next 5 years has dipped with only 34 percent of Global automotive executives extremely confident that the automotive industry will achieve more profitable growth over the next 5 years vs. today (compared to 41% in 2022). Exceptionally, a higher percentage of Chinese automotive executives (36%) are extremely confident about profitable growth compared to those in 2022 (28%).

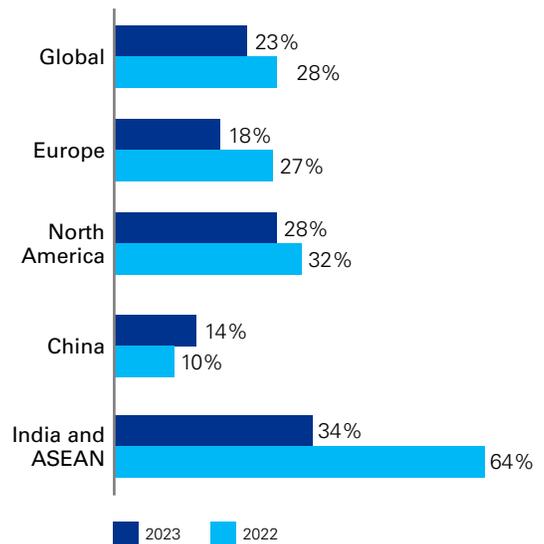
While among European executives, only a fourth are optimistic about profitable growth (vs. a third in 2022), these percentages are highest among Indian & ASEAN executives (52%) followed by North American executives (42%). Forecasted operating profit margins of top European automakers also reflect this trend - they will likely witness a **decline in their operating margins** in 2024 and 2025 (vs. 2023), compared to American, Japanese, and Chinese automakers.<sup>1</sup>

**Figure 1: Global sentiment on profitable growth over the next 5 years has dipped. However, a lower percentage of executives is concerned about increasing interest rates, energy prices and inflation.**

Percent of executives who are extremely confident that the industry will achieve more profitable growth over the next 5 years vs. today



Percent of executives who are extremely concerned that increasing interest rates, energy prices and inflation rates will adversely affect their business



Source: KPMG's 24th Annual Global Automotive Executive Survey, December 2023

<sup>1</sup>Though European Automakers will continue to experience the highest operating margins compared to other regional automakers. "[Global Autos 2024 industry outlook: Profit paths to diverge](#)," Bloomberg, December 2023.

## Subdued vehicle demand predicted in 2024 despite easing of energy prices and inflation rates!

Though European automotive sales have picked up significantly in 2023 (17.4 million new light vehicles sold in 2023 vs. 14.8 million sold in 2022) on the back of increased demand, **future growth outlook remains flat** with European automotive sales not witnessing pre-covid figures of 20.7 million units (2019) until 2031.<sup>2</sup> This is despite the easing of energy prices and consumer inflation rates from the peaks witnessed in 2022, though the interest rates remain high, depressing consumer sentiment and supply chain concerns continue to bother

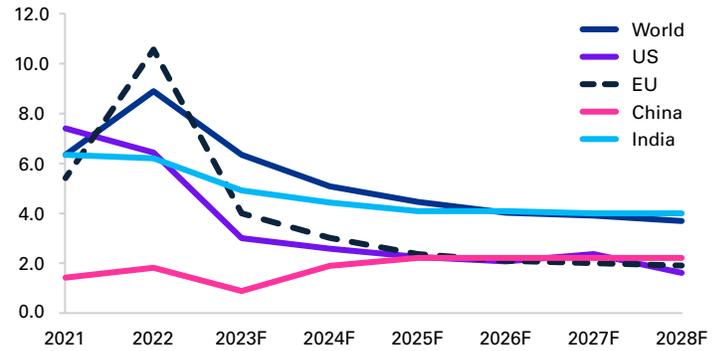
the European automakers. This subdued vehicle demand is also reflected in various projections done by the rating agencies. For instance, **S&P Global Mobility** forecasts a 2.9 percent automotive sales growth in Western/Central Europe (in 2024) compared to 12.8 percent growth in 2023.<sup>3</sup> Others like **Fitch ratings**<sup>4</sup> and **EIU**<sup>5</sup> also predict a subdued year in 2024, with vehicle demand well below pre-pandemic levels (though they don't anticipate a sales decline).

**Figure 2: Despite easing of energy prices and inflation rates, 2024 is expected to be muted (vs. 2023) in terms of vehicle demand with top European automakers struggling to maintain or increase their profit margins.**

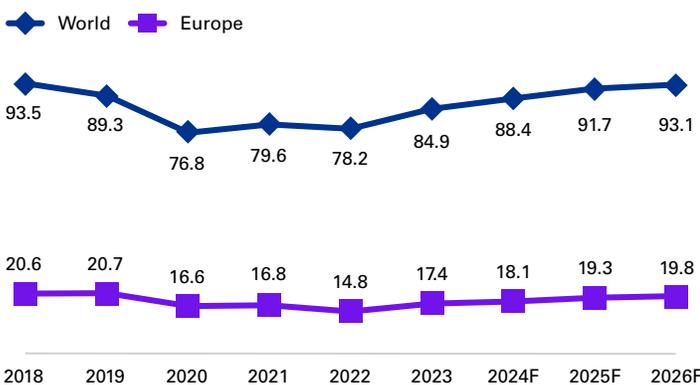
Global energy price index, 2018 to 2023



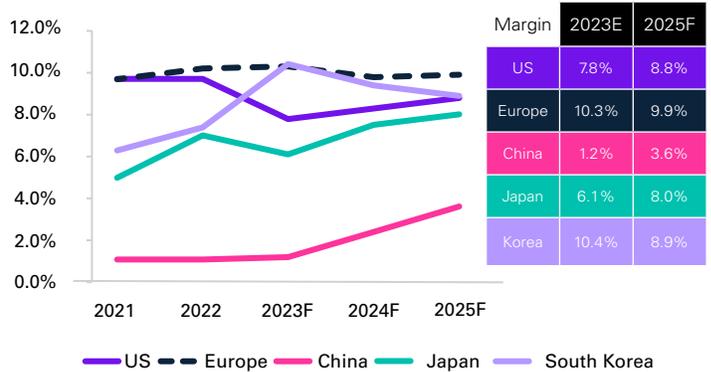
Consumer inflation rate (%), 2021 to 2028F



New light vehicle sales (in million units), 2018 to 2026F



Operating margin of top automakers by country/region of origin, 2021 – 2025F



Sources: Federal Reserve Bank of St. Louis; World Economic Outlook, IMF, GlobalData; Bloomberg

<sup>2</sup> Automotive Light Vehicles sales database, GlobalData

<sup>3</sup> "S&P Global Mobility forecasts 88.3M auto sales in 2024," S&P Global, December 2023.

<sup>4</sup> "Global Auto Manufacturers and Suppliers Outlook 2024," Fitch Ratings, December 2023.

<sup>5</sup> "Automotive outlook 2024," EIU, December 2023.

## Regulatory pressures on automakers seem to be wearing off!

Though the European automotive industry remains the most regulated (with 150 regulations and 30 directives), 2022 was the year with lower number of such regulations or directives compared to that in 2019 when more than 80 such regulations/directives were issued.<sup>6</sup> In late 2023, there has been a **softening of “Euro 7” emission norms** with easing of restrictions on pollutants like nitrous oxide, and extension of implementation timeline. This indicates a temporary relief to car manufacturers heavily dependent on fossil-fuel powered vehicle sales, especially those from Italy and Czech Republic.<sup>7</sup>

European automakers also seem to be more prepared w.r.t government policies, thanks to the implementation timeline of many such regulations which are being gradually phased-in like the **Corporate Sustainability Reporting Directive** (CSRD - starting in 2024), **Carbon Border Adjustment Mechanism** (CBAM – to be fully implemented in January 2026), and **Corporate Sustainability Due Diligence Directive** (CSDDD – may be adopted into law by 2027). This is also reflected in

the way executives in our survey responded - Only 12% of European automotive executives believe that cost and complexity of tariffs, trade rules and regulations will significantly increase in the next 5 years (vs. 16% of Global automotive executives).

However, the new **Batteries Regulation** is already in place (since 17 August 2023) which puts the burden on automakers and battery manufacturers to make automotive batteries more sustainable - from the sourcing of materials to their collection, recycling, and repurposing.<sup>8</sup> Additionally, the **UN155 cybersecurity regulation** will be applicable to all vehicles produced from July 2024 onwards and will require the entire automotive value chain - from OEMs to suppliers and sub-suppliers – to adopt a cybersecurity management system.<sup>9</sup> All these regulatory developments will add a certain cost and resource burden on the automotive companies across the value chain in Europe – especially on vehicle/component manufacturers and importers from outside the EU.



Increased regulatory burdens coupled with challenging market conditions in Europe have resulted in difficulties for automakers to reduce prices and achieve growth in profitability, especially for Electric Vehicles. Automotive OEMs need to address real customer needs while considering regulatory compliance and changed market circumstances. This will require a fundamental shift from product sales to customer-centric solution offerings, consisting of services, products, and a flexible business model setup.

**Daniel Szirányi,**

*Partner and Head of Management Consulting in Automotive, KPMG in Sweden, Latvia and Lithuania*

<sup>6</sup> “[The Automotive Regulatory Guide](#),” ACEA, May 2023.

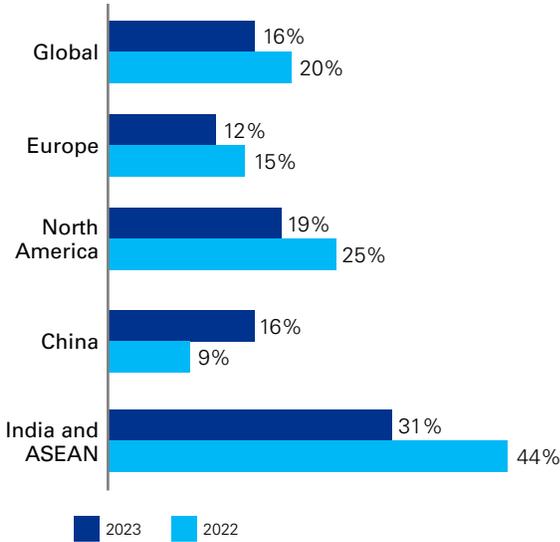
<sup>7</sup> “[EU set to weaken Euro 7 pollution standards after parliament vote](#),” Automotive News Europe, November 2023.

<sup>8</sup> “[Batteries](#),” European Commission, 2023.

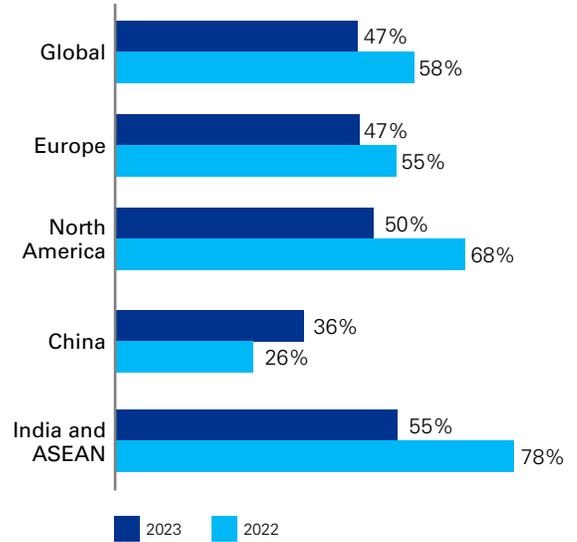
<sup>9</sup> “[What Lies Ahead for Auto Industry in 2024](#),” WardsAuto, December 2023.

**Figure 3: While less than 20 percent of executives believe in significant increases in cost and complexity of tariffs, trade rules and regulations, less than half of executives are concerned about commodity price volatility (except those in India & ASEAN).**

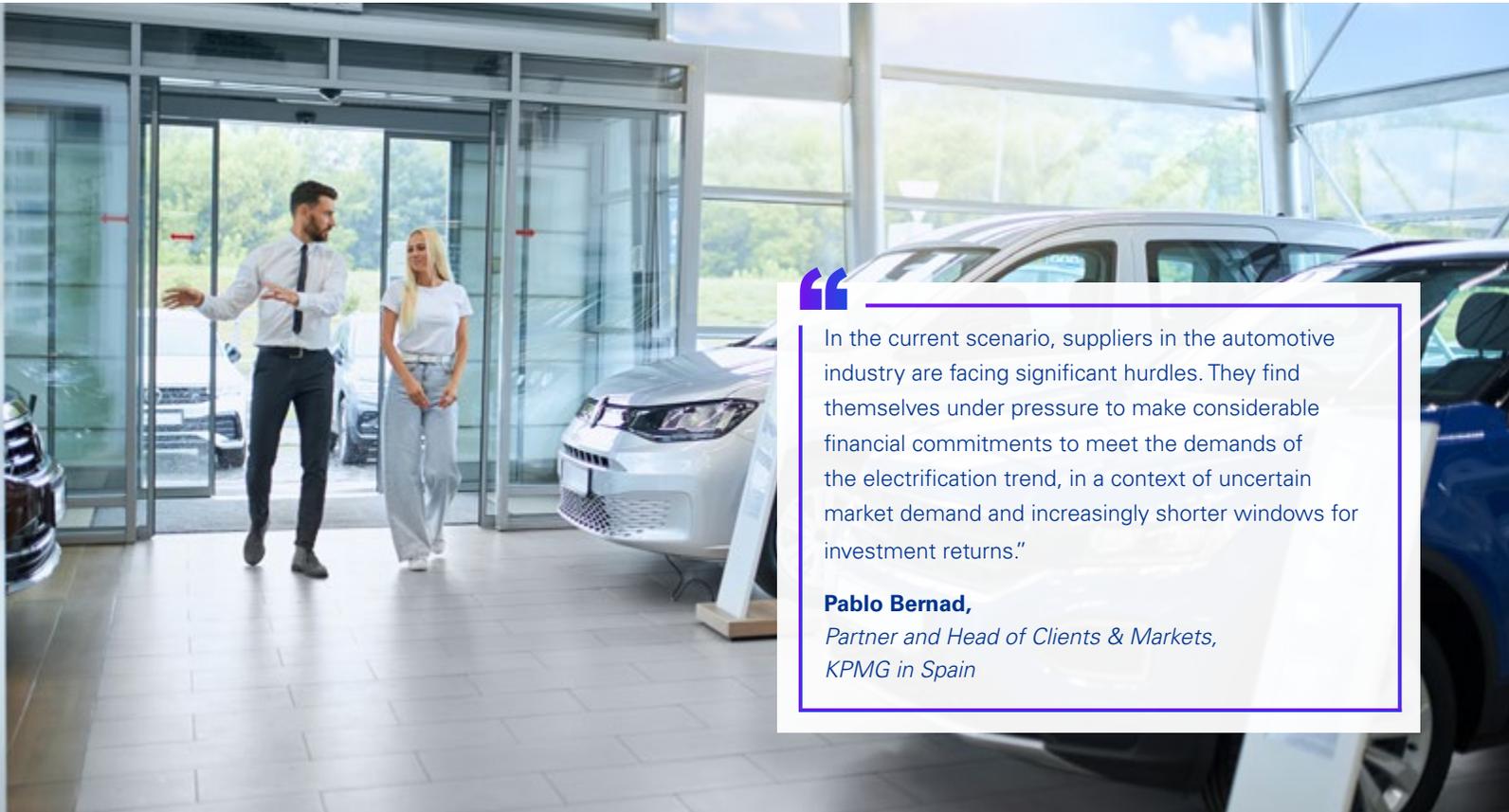
Percent of executives who believe that cost and complexity of tariffs, trade rules and regulations will significantly increase in the next 5 years



Percent of executives who are very or extremely concerned about recent commodity price volatility adversely impacting their business in the next 12 months



Source: KPMG's 24th Annual Global Automotive Executive Survey, December 2023



In the current scenario, suppliers in the automotive industry are facing significant hurdles. They find themselves under pressure to make considerable financial commitments to meet the demands of the electrification trend, in a context of uncertain market demand and increasingly shorter windows for investment returns."

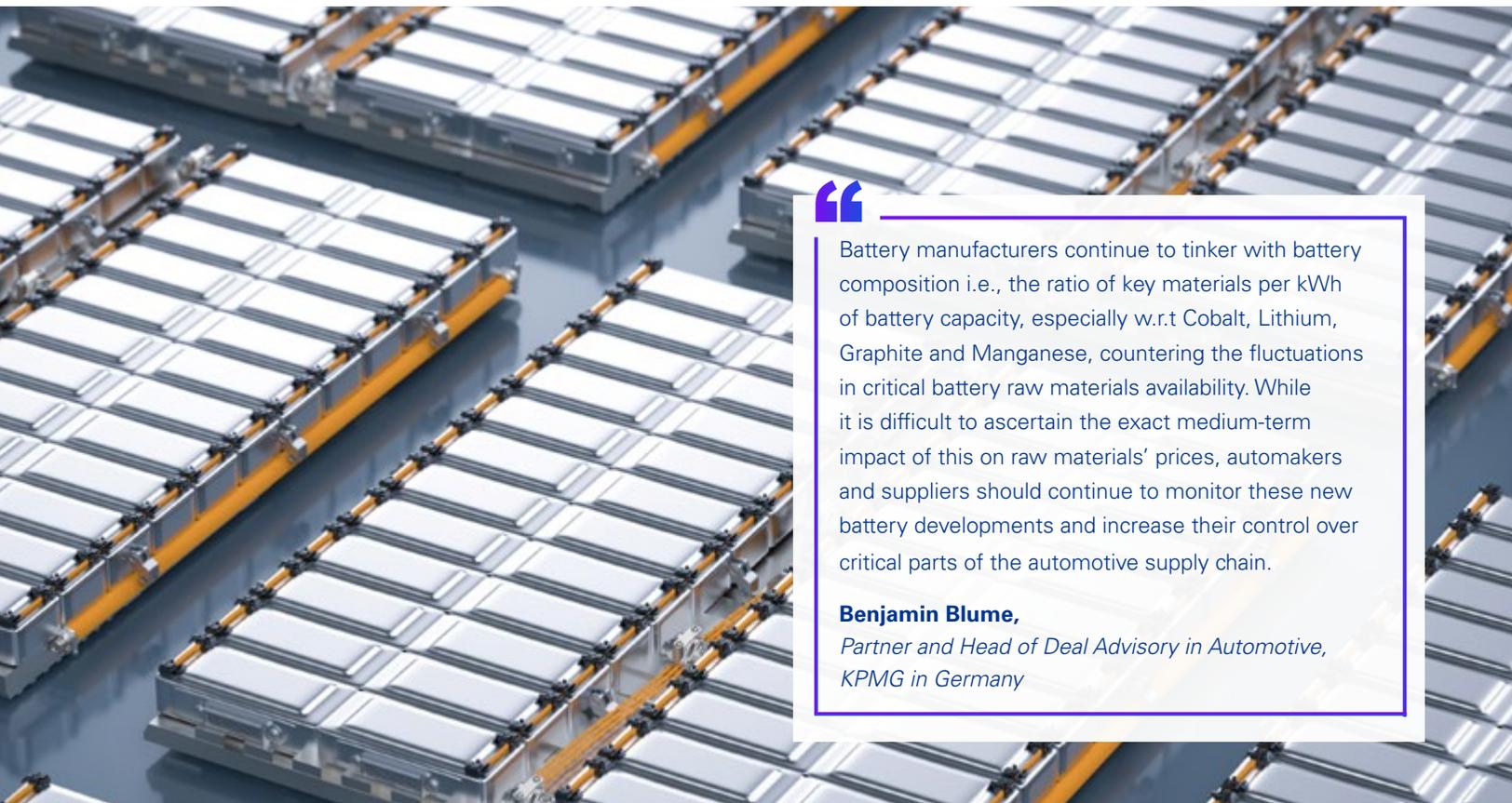
**Pablo Bernad,**  
*Partner and Head of Clients & Markets,  
 KPMG in Spain*

## Supply chain challenges to remain in 2024 but will likely create lower negative impact!

The automotive supply chain has been negatively impacted by Covid-19, geopolitical conflicts, and semiconductor shortage crises since 2020. Though the effects of Covid-19 and semiconductor shortages have somewhat dwindled, the **impact of geopolitical conflicts lingers** in the form of Russia-Ukraine war and the Israel-Hamas war disrupting well-established trading routes. Due to such supply chain disruptions, though there was an **estimated production loss of more than a million vehicles in Europe** – roughly 1/3rd of global vehicle production loss in 2023, it was much less than that experienced in 2021 and 2022.<sup>10</sup>

At the same time, **commodity prices – especially that of battery raw materials and rare earths - have also declined and stabilized in 2023** giving some relief to automakers and suppliers alike. This explains why a lower percentage of automotive executives is very or extremely concerned about short-term (over the next 12 months)

commodity price volatility in 2023 (vs. 2022) across major regions, including Europe. However, compared to Chinese executives (34% to 36%), a higher percentage of European executives (49% to 52%) seem to be very or extremely concerned about the medium-term (next 5 years) continuity of key commodities/components such as Battery raw materials (Lithium, Cobalt, Nickel, etc.), Fossil fuels (Oil, Natural Gas), Rare Earths (Neodymium), and Semiconductors. This medium-term (rather than short-term) concern stems from the fact that Europe continues to lack domestic capacity for critical commodities, most of which is controlled by China – from mining to refining. And with the geopolitical conflicts raging in the Middle East and Borders of Eastern Europe, the uninterrupted supply of oil and natural gas remains a question which many are afraid to answer confidently.



Battery manufacturers continue to tinker with battery composition i.e., the ratio of key materials per kWh of battery capacity, especially w.r.t Cobalt, Lithium, Graphite and Manganese, countering the fluctuations in critical battery raw materials availability. While it is difficult to ascertain the exact medium-term impact of this on raw materials' prices, automakers and suppliers should continue to monitor these new battery developments and increase their control over critical parts of the automotive supply chain.

**Benjamin Blume,**  
*Partner and Head of Deal Advisory in Automotive,  
KPMG in Germany*

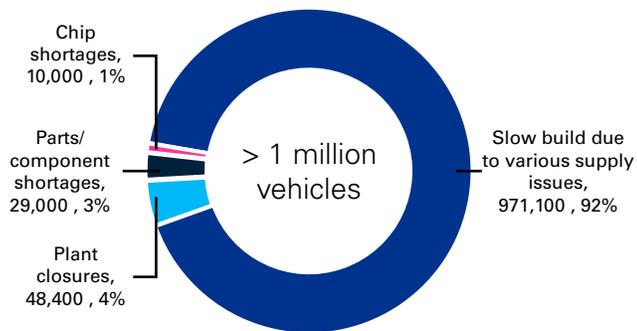
<sup>10</sup> Global disruption tracker, GlobalData.

In 2024, however, we will **likely see a lower negative impact on the European automotive sector stemming from supply chain issues** as European OEMs and suppliers adjust their supply chain strategies. In fact, a higher percentage of European executives consider **“Direct sourcing of raw materials”** and **“Re-sourcing or Dual-sourcing”** as extremely important to their future supply chain strategy in 2023 rather than “Making

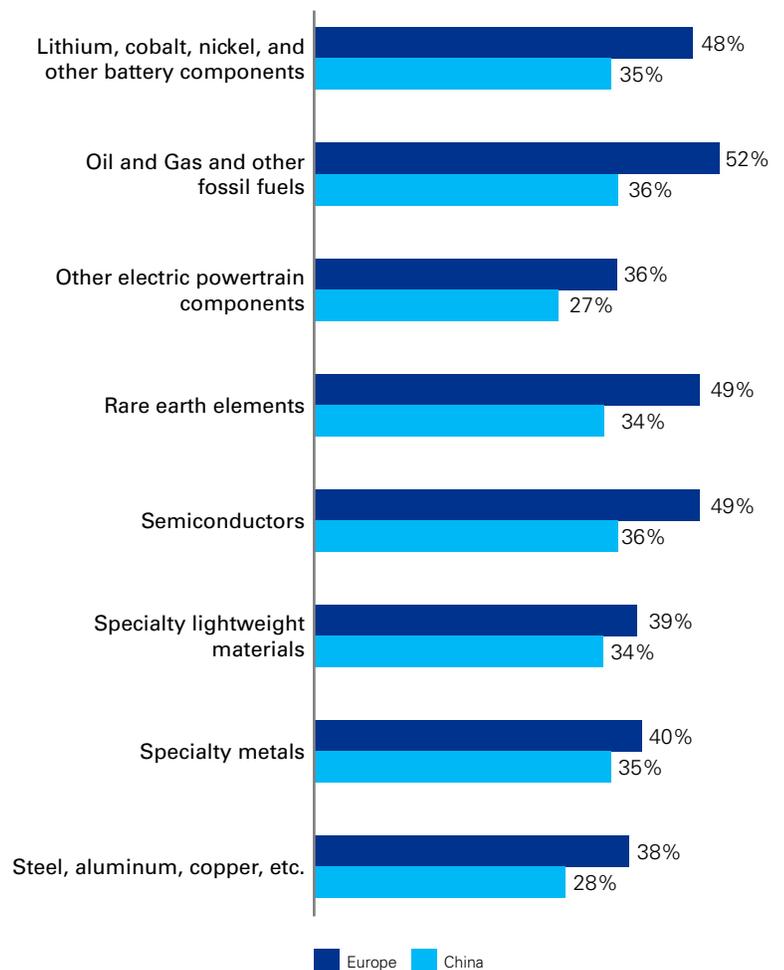
direct investments in suppliers/JVs”, “Internalizing more production” and “Holding more inventory or safety stock” which were their top strategies in 2022. It’s also good news that issues like labor shortages or wage increases and price inflation are less of a concern among European executives now, giving them leeway to experiment with their supply chain strategies.

**Figure 4: With vehicle production loss of more than a million units in Europe due to supply chain issues (in 2023), medium-term supply chain disruption of key commodities like Battery materials, Oil (and Gas), Rare earths and Semiconductors continues to bother European automakers.**

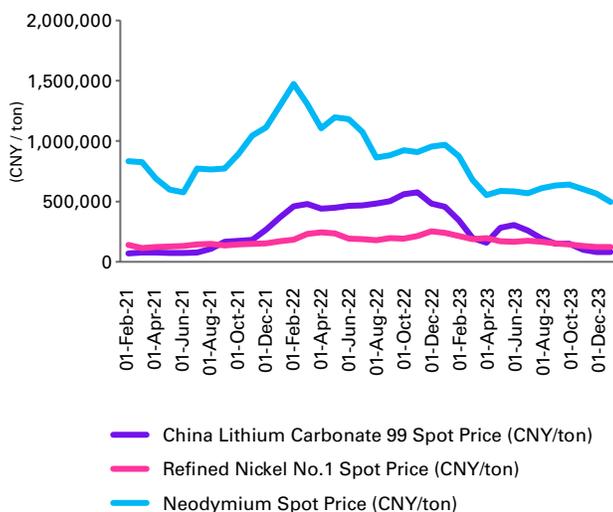
Estimated vehicle production loss (in units), Europe, 2023



Percent of executives who are very or extremely concerned about continuity of key commodities/components over the next five years



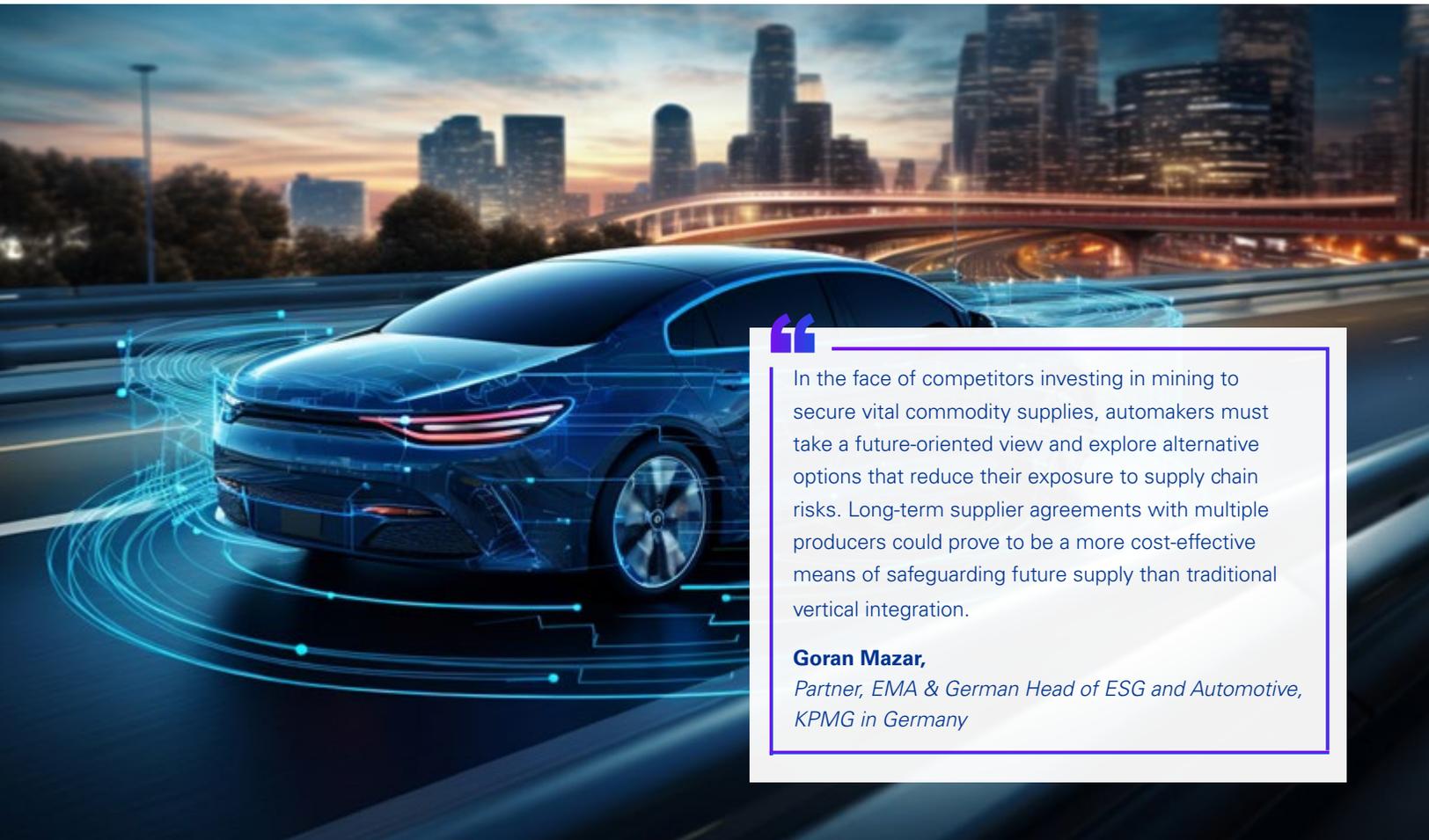
Price trends of Lithium Carbonate, Nickel and Neodymium, Feb 2021 to Jan 2024



Sources: Global disruption tracker, GlobalData; Investing.com, Refinitiv; KPMG’s 24th Annual Global Automotive Executive Survey, December 2023

EU's "**Critical Raw Materials Act**" also helps in this regard, which not only aims to secure the extraction and refining capacity of critical battery raw materials for use in the EU, but also presents a roadmap for EU countries to navigate the geopolitical puzzle concerning critical raw materials. Furthermore, for securing supplies of Lithium, the EU has secured a new sourcing agreement with Chile. Major EU countries like Germany are following in this wake to ink partnerships in South America to secure Lithium mining, supply, and circular economy.

"**Stockpiling**" of critical raw materials through international cooperations, securing domestic production in Portugal (having significant Lithium reserves), and Sweden (having significant reserves of rare earth metals), as well as monitoring raw materials supply chain (to have a transparent view of the supply-demand balance of raw materials) are also included as important strategies to reduce dependence on China under the "Critical Raw Materials Act".<sup>11</sup>



In the face of competitors investing in mining to secure vital commodity supplies, automakers must take a future-oriented view and explore alternative options that reduce their exposure to supply chain risks. Long-term supplier agreements with multiple producers could prove to be a more cost-effective means of safeguarding future supply than traditional vertical integration.

**Goran Mazar,**

*Partner, EMA & German Head of ESG and Automotive, KPMG in Germany*

<sup>11</sup> "[The EU imperative: Securing EV batteries and raw materials](#)," KPMG International, April 2023.



# Future of Electric Vehicles (EVs)

## Europe to lag China in terms of EV sales even as the clamor for relaxed regulations grows louder!

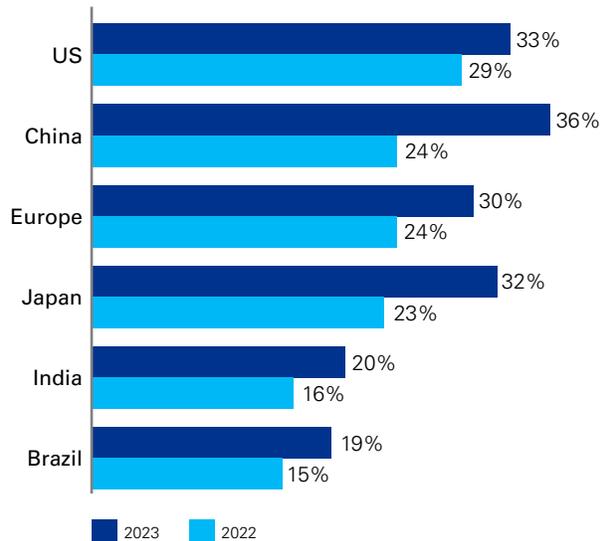
Global executives expect **European new Battery Electric Vehicle (BEV) sales to be around 30 percent by 2030** – a far cry from 36 percent in China, 33 percent in the US and the expected EV sales target of 65 percent (in the EU). And even before the regulation banning the sales of new Internal Combustion Engine (ICE) vehicles in Europe by 2035 (and promote higher adoption of EVs) came into effect, there was stiff resistance among many leading European countries to adopt this into law. But despite a recent compromise on Euro 7 standards and permitting the sale of ICE vehicles after 2035 provided they run on carbon-neutral fuels (e-fuels or synthetic fuels), European automakers seems to be unhappy and uncertain about a profitable future.

A possible reason for this pessimism may stem from the **rollback of EV subsidies in many European countries** as they battle out mild economy-wide recessionary fears dampening EV demand. That's why we see that a lower percentage of executives (58%) in Europe (compared to those in other regions) believing in BEVs reaching cost/affordability parity with ICE vehicles without any subsidies by 2030.

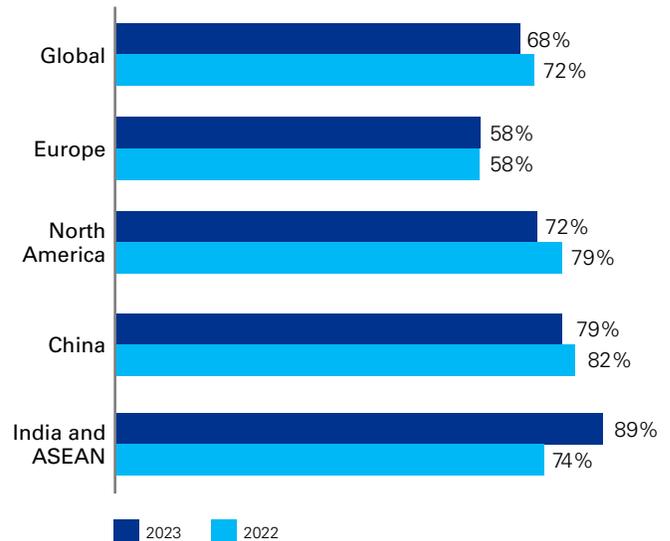
Because of these reasons, in 2024, we might witness almost the same growth rate in BEVs as in 2023 (~30% y-o-y)<sup>12</sup> in Europe – far lower than that witnessed in the period 2019-2021 (> 65% y-o-y).<sup>12</sup> **Hybrid EVs might also see an uptick in growth** equivalent to BEVs as almost 50 percent of European automotive companies in our survey will likely increase their capital expenditure and R&D investments into hybrids.<sup>13</sup>

**Figure 5: While Global executives are more optimistic for increased share of Battery Electric Vehicles (BEVs) by 2030, Europe will likely lag China when it comes to BEV adoption. EV subsidies are more likely to be demanded by European automakers to achieve the EV price parity with ICE vehicles.**

Percent of new vehicles sales to be battery-electric (excluding hybrids) by 2030 in each key market\*



Percent of executives who believe that BEVs will reach cost/affordability parity with ICEVs without any subsidies by 2030



\*Global average based on survey responses

Source: KPMG's 24th Annual Global Automotive Executive Survey, December 2023

<sup>12</sup> GlobalData

<sup>13</sup> KPMG's 24th Annual Global Automotive Executive Survey, December 2023



The growth in EV sales is crucial for the integration of renewables energies in Europe. The flexible energy storage solution provided by EV batteries can help balance the electricity grids and thereby drive energy self-sufficiency for customers.

**Keywan Ghane,**

*Partner and Decarbonization expert,  
KPMG in Germany*

## EV battery chemistries and costs need a relook even as commodity prices have stabilized!

While the **average Li-ion EV battery pack prices have consistently come down** from \$780/kWh in 2013 to \$139/kWh in 2023 (in real 2023 dollar terms), and are further set to decline to \$113/kWh in 2025 and to \$80/kWh in 2030, batteries still account for 30-40 percent of the total EV price.<sup>14</sup> As automotive OEMs battle out to further lower these battery costs and pass on the benefits to the end-consumers (and expect to gain market share), we **will likely witness more capital and R&D expenditure pouring into new battery chemistries.**

In fact, according to our survey, 71 percent of European automotive executives foresee an increase in capex and R&D investments in battery electric vehicles with them allocating a higher proportion of any additional R&D funding to “Advanced batteries” rather than “Li-ion batteries.”<sup>15</sup>

This is already happening to some extent. There is a **huge hype and optimism around Sodium-ion and Solid-state batteries** partly replacing NMC (Lithium-Nickel-Manganese-Cobalt) batteries – the most common EV battery chemistry. While automakers like Toyota, Hyundai, Kia and Honda are heavily researching on making solid-state batteries commercially viable (on their own), others like Volkswagen, Ford, BMW, and Mercedes-Benz are collaborating with external partners to make this a reality. In fact, Toyota has announced (as part of its advanced battery technology roadmap) that its solid-state batteries ‘ultimately will have a range of >1,200km, and go from 10% – 80% charge in 10 minutes or less’.<sup>16</sup>

<sup>14</sup> “[Lithium-Ion Battery Pack Prices Hit Record Low of \\$139/kWh](#),” BloombergNEF, November 2023.

<sup>15</sup> KPMG’s 24th Annual Global Automotive Executive Survey, December 2023.

<sup>16</sup> “[Could Solid-State Batteries Supercharge Electric Vehicles?](#),” Forbes, November 2023.

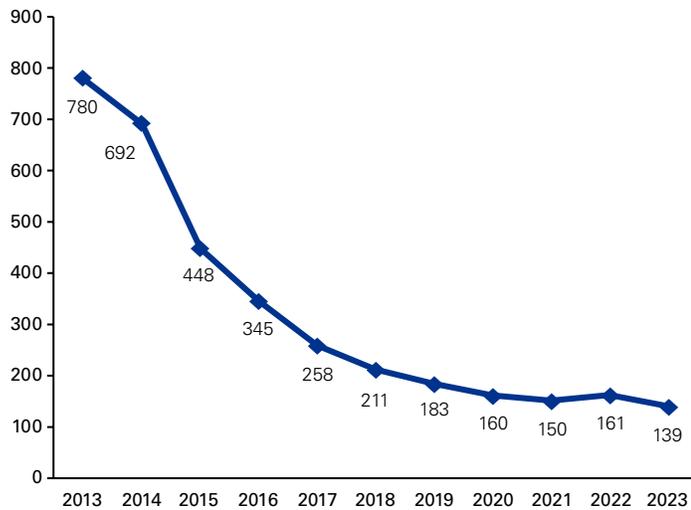


Others like several Chinese automakers, Chinese battery manufacturers and US Automakers like Tesla **have wagered on LFP (Lithium-Iron-Phosphate) batteries** – and this has now caught the fancy of several other automakers and Korean battery manufacturers to setup their own LFP battery plants.<sup>17</sup> Though LFP batteries do

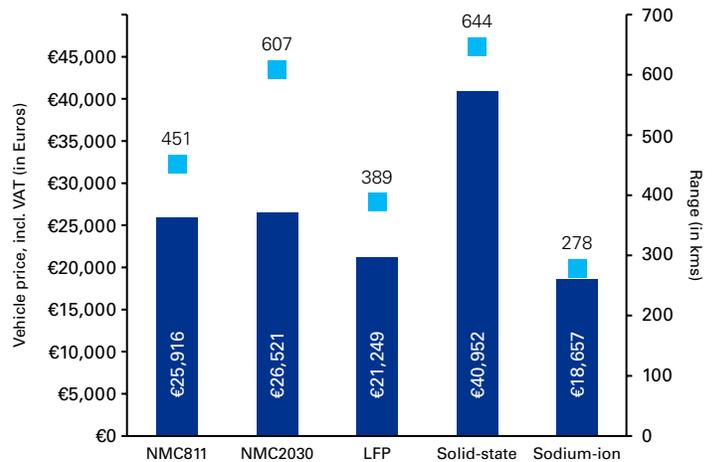
have their limitations in terms of range and energy density, they are 30 percent cheaper than NMC batteries. And this has allowed automakers like Tesla to lower the prices of its Model 3 and Model Y EVs, capture more market share, and trigger a price war in Europe.<sup>18</sup>

**Figure 6: Even with Li-ion battery prices declining rapidly, potential future cell chemistries will likely veer towards LFP, Sodium-ion and Solid-state batteries dictated by vehicle segment, competition, battery production capacity and supply challenges.**

Volume-weighted average Li-ion battery pack price (in real 2023 \$/kWh), 2013-2023



Potential future cell chemistries: Vehicle price and the calculated range of a vehicle in the small passenger vehicle segment



Sources: BloombergNEF; Techno-Economic Analysis of Different Battery Cell Chemistries for the Passenger Vehicle Market, MDPI, July 2023

<sup>17</sup> "Korea's Battery Makers Embrace LFP Cells as China Strides Ahead," BloombergNEF, May 2023; "Ford to build \$3.5B LFP battery factory using China tech," Techcrunch, February 2023.

<sup>18</sup> "Charging ahead: Addressing EV charging infrastructure challenges in Europe," KPMG International, July 2023.



Clearly, fiscal and policy regulations are a major lever for promoting EV uptake and offering confidence to consumers, automakers, suppliers, and investors. The question remains how to make EVs more attractive than ICE vehicles while decreasing public intervention over time.

**Stijn De Groen,**  
*Director and Country Head of Automotive,  
KPMG in the Netherlands*

## Threat of foreign entrants looms large in the minds of European OEMs!

In particular, the rapid market share gain of Chinese EVs in Europe have flabbergasted many incumbent European automotive OEMs. In fact, China has been able to flood the European automotive market with cheaper, feature-rich EV models that European consumers find affordable, and this has **enabled the Chinese OEMs to gain a market share of 7.5 percent in the European passenger and commercial EV market in 2023** from 2.5 percent in 2018. Primarily, a comprehensive subsidy programme from the Chinese government<sup>19</sup>, automotive import tariffs (in the EU) of 10 percent (vs. 27.5% in the US) and cost competitiveness of Chinese-made EV batteries<sup>20</sup> have enabled Chinese OEMs to import and market cheaper EV models.

The Chinese threat to the EV market dominance of European automakers<sup>21</sup> has led to an **anti-subsidy investigation into Chinese-built passenger BEV imports to the EU**. A possible outcome of this investigation will likely be a substantial increase in import tariffs for “Made-in-China” EVs, but we also expect that the Chinese government might undertake retaliatory actions on European automakers in China (which will further decrease their market share in China) if this increase in import tariffs gets implemented.<sup>22</sup>

A positive development out of this anti-subsidy investigation is that many Chinese automakers like SAIC Motor, BYD, Great Wall Motor and Chery Automobile as well as Chinese battery manufacturers like CATL, Gotion High-tech, and SVOLT have announced plans to establish EV plants in Europe to tide over this crisis.<sup>23</sup>

<sup>19</sup> Chinese state subsidies for electric and hybrid vehicles were \$57 billion from 2016-2022, helping China become the world's biggest EV producer and to surpass Japan as the largest auto exporter in the first quarter of 2023.

<sup>20</sup> Chinese producers in 2022 benefited from EV battery prices of \$130 per kWh against a global price of \$151 kWh which has resulted in their cost advantage of as much as 20% over rivals such as Tesla.

<sup>21</sup> Chinese-built electric vehicles pose a significant risk to Europe's automakers. They could cost European automakers €7 billion (US\$7.7 billion) a year in lost profits by 2030.

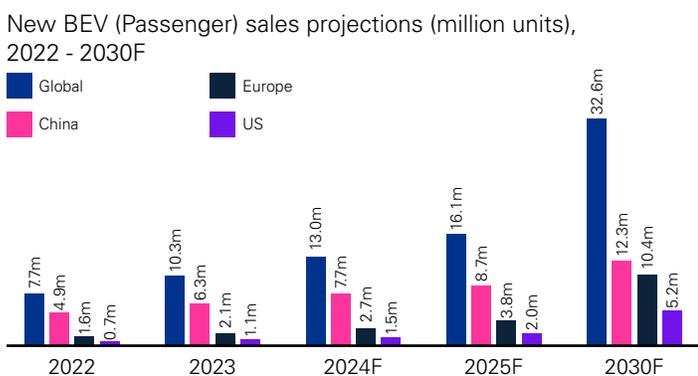
<sup>22</sup> “China's EV Advantage In Europe Hits Unexpected Ship Snag,” Forbes, December 2023.

<sup>23</sup> “Chinese EV makers ramp up European production amid subsidy row,” Nikkei Asia, September 2023.

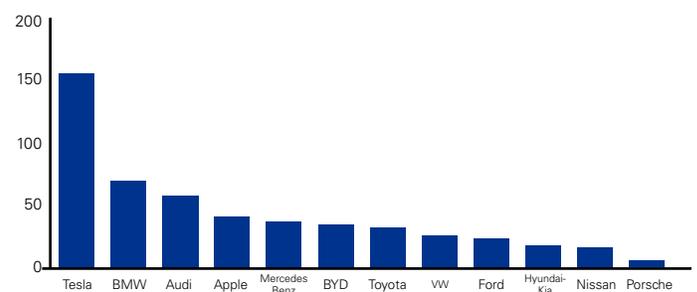
Apart from the Chinese OEMs, the **threat also looms large from American automakers like Tesla** which is ranked as the future BEV market leader in 2030 by European automotive executives, ahead of BMW and Audi.<sup>24</sup> American automakers like Tesla<sup>25</sup> and Ford<sup>26</sup> have announced big EV projects to take advantage of subsidies under the US IRA (Inflation Reduction Act) which will enable them to build competitive scale, reduce the prices of their EV models, and import cheaper EV components/models into Europe.<sup>27</sup> But it's not just them - even European brands like Volkswagen, Audi, BMW and battery manufacturers like Northvolt have announced EV and EV battery plants to capitalize on the \$400 billion US IRA plan.<sup>28</sup>

We believe the threat of foreign entrants is greatly exaggerated among European OEMs. 2030 EV market projections in Europe show European OEMs dominating almost half of the market, with market shares of Asian and American OEMs falling. The threat of Chinese OEMs dominating the market also doesn't seem to materialize as they will likely gain a market share of only 9 percent in 2030 (from 8% in 2023). But nevertheless, it remains a threat not to be taken lightly especially when Europe seems to be unprepared regarding the future of electric vehicles, especially in the light of cost-competitiveness, stricter but piecemeal approach to regulations, and rollback of EV subsidies.

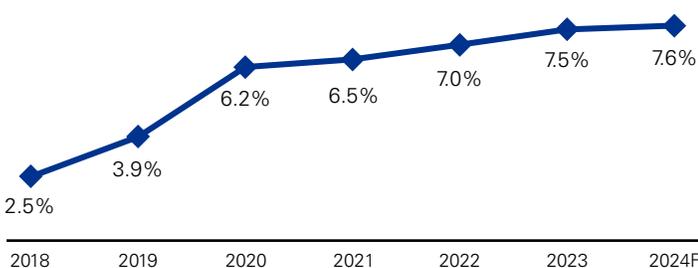
**Figure 7: Latest market projections show Europe slowly closing the gap with China in terms of new BEV sales by 2030. However, with the IRA regulation in the US, and the Chinese influx of cheaper EVs in Europe, European OEMs are already facing the heat when it comes to EVs.**



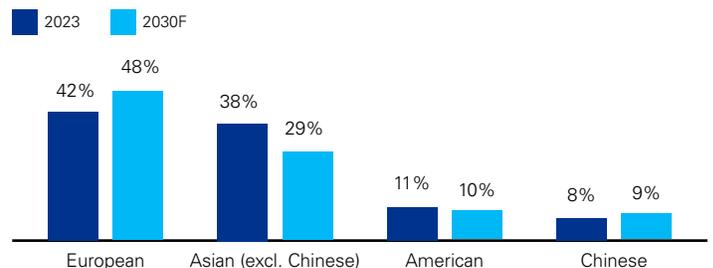
Future market leaders in BEVs by 2030 based on ranking done by European automotive executives



New EV (Passenger + Commercial) sales market share of Chinese OEMs in Europe, 2018 - 2024F



New EV (Passenger + Commercial) market share in Europe by brands of region/country origin, 2023 and 2030F



Sources: GlobalData; KPMG's 24th Annual Global Automotive Executive Survey, December 2023

<sup>24</sup> An outlier here is "Apple" which is ranked substantially higher (at 4th position) as the future BEV market leader in 2030 ahead of many incumbent, well-established automotive brands.

<sup>25</sup> "US Inflation Reduction Act Boosts EV Sales: Tesla up 62%, Volkswagen up 42%". BusinessKorea, October 2023.

<sup>26</sup> "Ford Gets \$9.2 Billion to Help US Catch Up With China's EV Dominance". Bloomberg, June 2023.

<sup>27</sup> "Inflation Reduction Act Drives \$92 Billion Investment In EV Production, 84,000 Jobs In USA". Cleantechica, November 2023.

<sup>28</sup> "How companies are reacting to the U.S. Inflation Reduction Act". Reuters, February 2023.



# Future of EV Charging

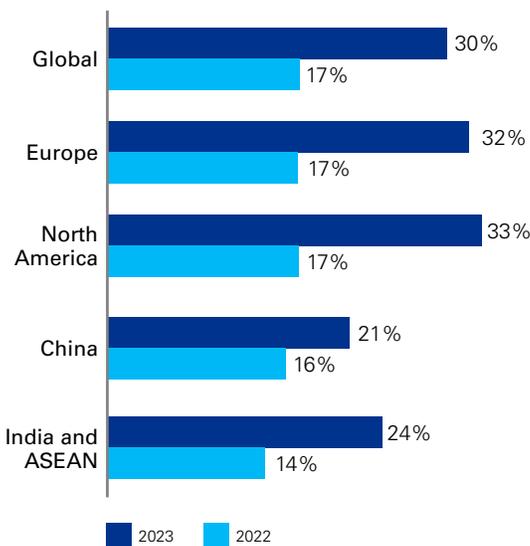
## Fast charging public networks to expand at a rapider pace than slow EV charging infrastructure!

In 2022, **publicly available fast chargers expanded at a higher pace** (55%) than slow chargers (50%) in Europe to reach 70,000.<sup>29</sup> Apart from increasing EV battery ranges, a rapidly expanding EV fast charging network can alleviate range anxiety among EV consumers (and enable longer journeys), enhance adoption of EVs across passenger car segments, and provide alternative charging options to consumers who don't have reliable access to private charging. In fact, **consumers are getting more**

**dependent on access and availability of ultra-rapid charging** – a greater percentage (32%) of European automotive executives believe that EV owners will be willing to wait for 20 minutes for 80 percent or greater EV recharge (vs. 17% in 2022). Apparently, EV owners in North America, and Europe seem to have less patience when it comes to charging compared to those in China or India, and therefore will require a higher percentage of fast chargers in the overall mix.

**Figure 8: Consumers across regions seem more comfortable with quicker EV recharge times compared to 2022. "Charging Network Operators" and "Electric Utilities" are best positioned to own and operate these EV charging stations, especially in North America and Europe, closely followed by the "Tesla Supercharging Network".**

Percent of executives who believe that consumers will be willing to wait for 20 minutes for 80% or greater EV recharge



Ranking of entities in the automotive ecosystem who are best positioned to own and operate EV charging stations, based on average survey responses

	Charging Network Operators	Electric Utilities	Tesla Supercharging network	Existing Oil & Gas companies	Individual OEMs / OEM consortiums	Dealers
<b>Global</b>	1	2	3	4	5	6
<b>Europe</b>	2	1	3	4	5	6
<b>North America</b>	1	2	3	4	5	6
<b>China</b>	3	1	4	2	5	6
<b>India and ASEAN</b>	2	1	4	3	5	6

Source: KPMG's 24th Annual Global Automotive Executive Survey, December 2023

The global EV charging infrastructure market attracted \$8.3 billion worth of investments in 2022, a vast majority of which was directed at Europe (77%)<sup>30</sup> towards establishing fast charging networks. Regulatory push in the form of "The Alternative Fuels Infrastructure Regulation" or AFIR has also led to increased interest and funding in developing these fast and ultra-fast EV charging stations. An integral part of the "EU Fit for 55" package, AFIR mandates that from 2025 onwards, "EU Member States

will have to provide access to a fast-charging station of at least 150 kW every 60 kilometers along the trans-European transport network (TEN-T)" and will come into effect from April 2024.<sup>31</sup> This has led to the **granting of million-dollar loans by the European Investment Bank (EIB)** to Charge Point Operators (CPOs) like Zunder and Eldrive, and multinational energy companies like Cepsa and Eni for expanding fast- and ultra-fast EV charging stations along the TEN-T across many countries in Europe.<sup>32</sup>

<sup>29</sup> "Global EV Outlook 2023: Trends in charging infrastructure," IEA, April 2023.

<sup>30</sup> "Accelerated Growth in EV Charging Infrastructure Investment: A Focus on Europe," AFRY, October 2023.

<sup>31</sup> "Alternative Fuels Infrastructure Regulation (AFIR): What you need to know," Virta, September 2023.

<sup>32</sup> "Zunder," February 2023; "Cepsa," October 2023; "Eldrive," January 2024; "Be Charge," May 2023.



Consumers are demanding faster recharging times and a more reliable electric infrastructure to support their needs. Through strategic partnerships and innovation, automakers can cultivate an ecosystem of charging options that serve the needs of consumers, drive customer loyalty, and position themselves for success in the years to come.

**Laurent Des Places,**  
*Partner and Country Head of Automotive,  
KPMG in France*

## The race is on to own and operate EV charging points!

European automotive executives foresee **“Electric Utilities”** and **“Charging Network Operators”** as **best positioned** for owning and operating EV charging points, although a substantial proportion also sees other players such as Tesla, OEMs, fuel retailers and dealers as important. The current situation in Europe also paints a somewhat similar picture. Going by the MW capacity of public chargers installed in Europe, dedicated CPOs like IONITY, Virta, Allego, Mer and Recharge make up half of the top 10 charge point operators, with energy utility companies like EnBW and Enel, Oil & Gas majors like BP (Aral pulse) and TotalEnergies, and automotive companies like Tesla making up the rest.<sup>33</sup> Other Oil, Gas and Chemicals companies like Shell (Shell Recharge), Mitsui & Co. (EVConnect), Eni (Plentitude), Cepsa and Repsol are also making their presence felt in the global EV charging ecosystem. In fact, “Oil & Gas companies” are seen as best positioned for owning and operating EV charging stations in China and India, besides “Electric Utilities” and “Charging Network Operators”.

**The EV charging ecosystem remains fragmented and is ripe for consolidation** as many companies belonging to varied adjacent sectors (and not just Automotive) eye smaller competitors or seek an entry into this space through acquisitions. Motivation for such acquisitions or purchasing major equity stake might stem from a variety of reasons like:

1. Entering a specific geographic market
2. Entering a niche segment
3. Expanding capabilities to cater to a market beyond passenger EVs
4. Acquiring critical real-estate/infrastructure to expand their own EV charging network
5. Adding new revenue streams
6. Integrating further vertically across the value chain

However, the medium-term concern among these many competitors is the **availability of prime locations to build and operate profitable EV charging points**. That’s why we see leading retailers like Lidl, Aldi and Sainsbury’s setting up EV charging stations at their own supermarket sites<sup>34</sup>, and often in partnership - such as InstaVolt working with McDonald’s to build EV charging stations at their sites in the UK.<sup>35</sup> These partnerships offer many corporates the ability to access revenue-sharing upside from the growth in global EV charging demand, although some may decide to develop public charging internally as a strategic capability. Public or private charging stations are the second-most anticipated charging location preference for EV owners globally, only preceded by single family homes or garages.

<sup>33</sup> [“How oil majors penetrated the EV charging market,”](#) EnergyMonitor, November 2023.

<sup>34</sup> [“Commercial EV charging stations set to triple in 2024,”](#) The Brussels Times, November 2023.

<sup>35</sup> [“EV charger station firms battle for prime locations in Europe, US,”](#) Reuters, December 2023.

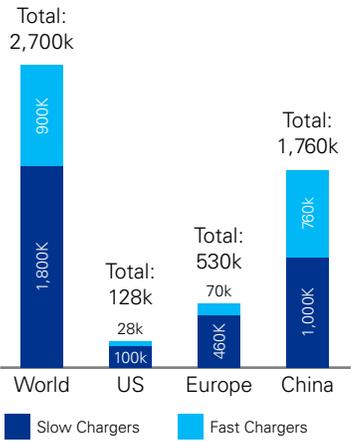


The race to acquire the most lucrative locations for EV charging has been one of the most interesting cross-sector plays, attracting many players from segments such as energy, utilities, as well as OEMs and financial services. As average charge point utilization increases across many markets in Europe, there is more confidence than ever in public charging, and we expect to see more activity from new entrants, as well as consolidation amongst existing players to drive scale. Automotive players will need to decide whether they need to own (or partner to deliver) part of this ecosystem to underpin their core EV sales, deliver a brilliant customer experience and secure future recurring revenues.

**Yuan Zhang,**  
Associate Director and EV strategy expert,  
KPMG in the UK

**Figure 9: While both slow and fast charging networks are expanding rapidly, Europe has a tall target to achieve by 2030 in terms of EV public charging infrastructure. Globally as well as in Europe and the US, the most anticipated EV charging location for consumers remains their own family home or garage.**

Number of installed public slow and fast chargers (stock, in thousand units), 2022



Future targets according to European EV Charging Infrastructure Masterplan, Europe

Aspects related to passenger EVs	2025	2030	Investments until 2030
EV Public Charging Points (millions)	1.0-2.4	2.9-6.8	€30-70 bn
Grid Upgrade Investments (€ billions)	13.3	29.7	€30 bn
EV Charging Energy Demand (TWh)	40	113	€49 bn

Ranking of anticipated charging location preferences for EV owners, based on average survey responses

	Single family home / garage	Public or private charging station	Apartment garage or parking lot	At work	On the street
Global	1	2	3	4	5
Europe	1	2	3	4	5
North America	1	2	4	3	5
China	2	1	3	4	5
India and ASEAN	3	1	2	5	4

Sources: Global EV Outlook 2023, IEA; European Electric Vehicle Charging Infrastructure Masterplan, ACEA; KPMG’s 24th Annual Global Automotive Executive Survey, December 2023

## Challenges to rapid expansion of EV charging infrastructure remain!

The EU-27 countries need to have **6.8 million publicly available charging points by 2030** to cater to the rapidly expanding EV share, requiring a **direct investment of nearly \$70 billion**, according to the European Electric Vehicle Charging Infrastructure Masterplan. Additional multi-billion-dollar investments also must be done for grid upgrades and scaling-up renewable energy production to manage the power demand from the rapidly expanding EV charging infrastructure.<sup>36</sup>

However, achieving this tall ambition is not without its hurdles. **Varied permitting regulations in different EU countries** - from federal to municipal levels – are delaying the development and operationalization of EV charging stations.<sup>37</sup> This has led to increase in the time to establish fast charging stations from six months to 2 years, on an average.

Then, there are **payment or billing related issues faced by EV owners** at public or private charging stations. Prevailing payment mechanisms for EV charging require various apps, memberships, and charge cards across multiple CPOs throughout Europe, though this interoperability challenge will begin to be addressed once the AFIR (The Alternative Fuels Infrastructure Regulation) comes into force in 2024.

Other challenges also prevail like **service integration** between electric vehicles, charging infrastructure (different apps), household electricity systems, and other mobility solutions.<sup>38</sup> **Electricity grid congestion** issues also remain due to requirement of additional charging points and network capacity – though this challenge might be partially addressed in the next 18 months through EU's recently announced **electricity grid action plan** which will modernize Europe's obsolete electricity grid and make it more decentralized, digital and flexible.<sup>39</sup>



Reinventing our mobility system in order to be zero-emission necessitates a strategic alignment between renewable energy utilization and EV charging. By synchronizing local charging needs with surplus renewable energy availability on a local level, grid limitations can be transcended. This paradigm shift will not only optimize energy usage but also foster the emergence of innovative business models at the intersection of mobility and energy.

**Stijn De Groen,**

*Director and Country Head of Automotive,  
KPMG in the Netherlands*

<sup>36</sup> [“European EV Charging Infrastructure Masterplan”](#), ACEA, March 2022.

<sup>37</sup> [“EV charging growth plans slowed by EU’s power grid problems”](#), Reuters, December 2023.

<sup>38</sup> [“Charging ahead: Addressing EV charging infrastructure challenges in Europe”](#), KPMG, July 2023.

<sup>39</sup> [“EU Commission announces electricity grid action plan”](#), Reuters, November 2023.

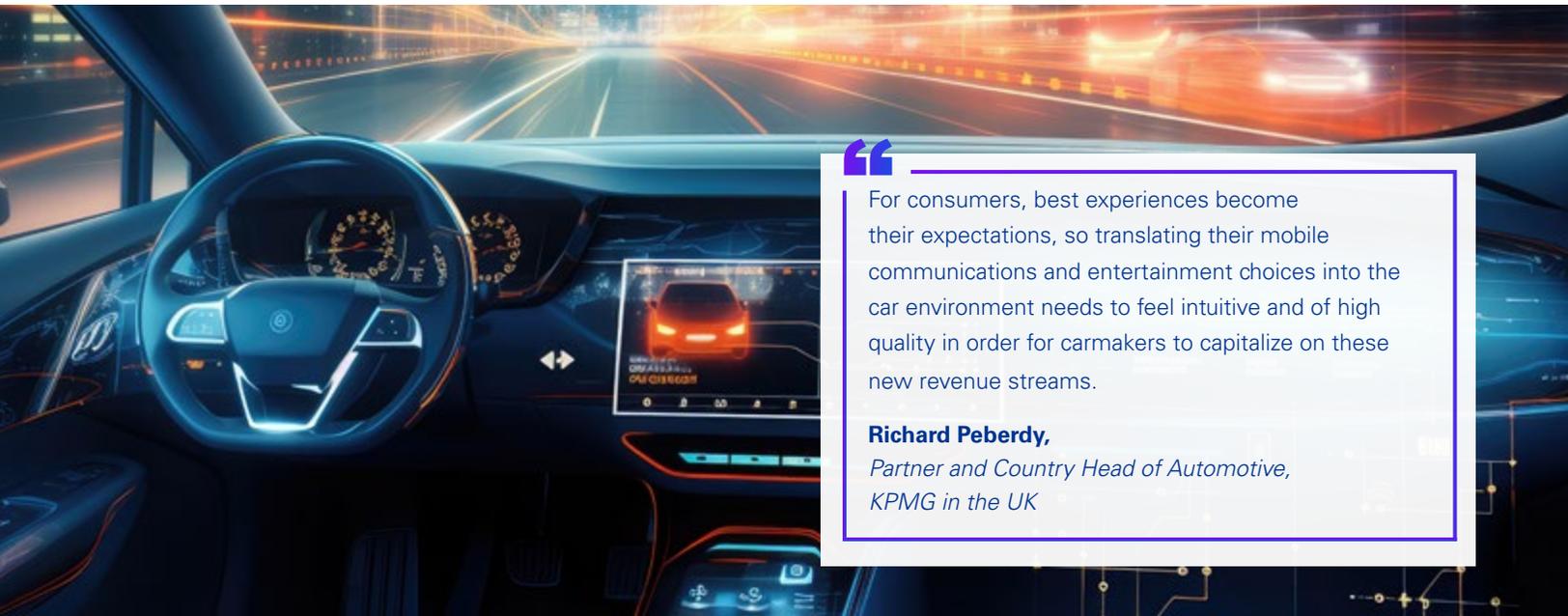


## New Business Models and Revenue Streams

### Vehicle purchasing witnessing a massive shift as consumer preferences undergo a change!

In the next five years, European consumers will be willing to splurge on OEMs whose vehicles demonstrate great driving performance, enable seamless or hassle-free experience, and embed zero emission or sustainable mobility as well as excellent vehicle connectivity features, according to European automotive executives. This is a great deviation from our 2022 survey results as “Brand image”, “Infotainment” and “Self-driving” no longer feature as the top purchasing criteria for European consumers. Carmakers should concentrate on further **improving the driving performance of new vehicle models (including EVs)** and **enable a hassle-free experience through their evolving retail & distribution models**, rather than concentrating too much on infotainment or self-driving features at least in the medium-term. The boundaries are blurring when it comes to consumers opting for popular homegrown automotive brands as the market has been flooded with vehicles from newcomers like Tesla and Chinese automakers which are offering infotainment, driver-assist, or self-driving systems as standard, built-in features.

A silver lining here is that **many European consumers will be willing to pay for monthly subscription services** like software services, maintenance, charging, Advanced Driver Assistance Systems (ADAS), though doubts remain on automakers’ minds whether this actually materializes during the purchase cycle. Automakers continue to search for the silver bullet when it comes to new revenue streams and seem to be best positioned to capture new opportunities though they may face stiff competition from new tech entrants. **Vehicle insurance might just prove to be this lucrative new revenue stream** for European automakers, and in this area, they are more than willing and confident to compete with incumbent motor insurance companies to take a big chunk off the pie, given their ownership of vehicle and consumer data.

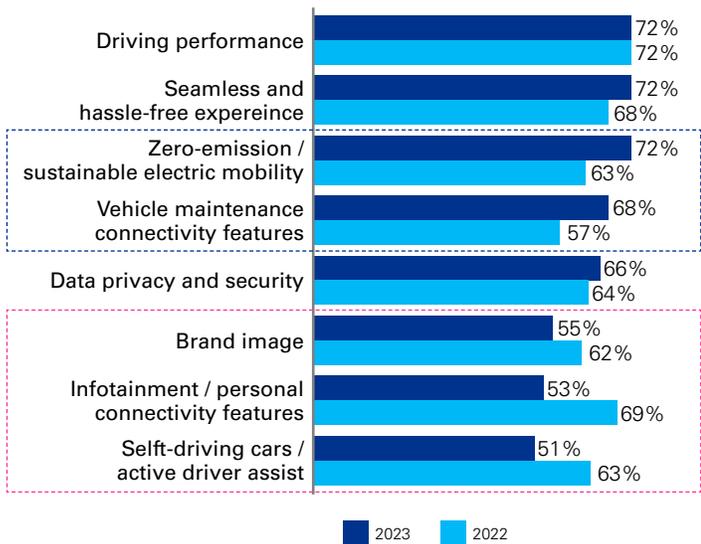


For consumers, best experiences become their expectations, so translating their mobile communications and entertainment choices into the car environment needs to feel intuitive and of high quality in order for carmakers to capitalize on these new revenue streams.

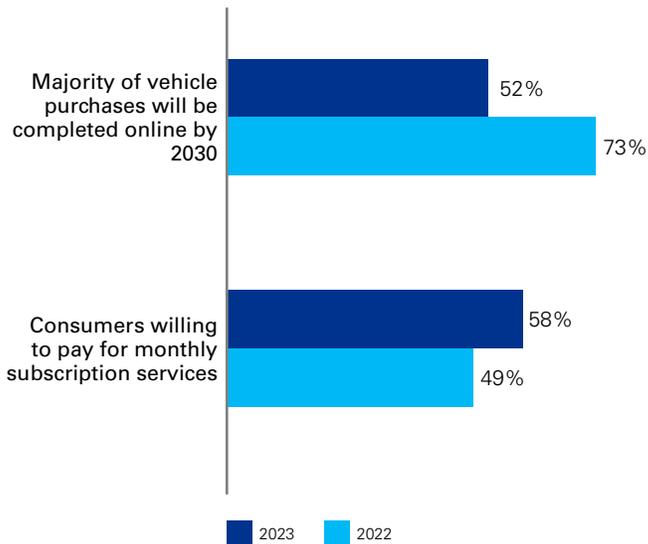
**Richard Peberdy,**  
*Partner and Country Head of Automotive,  
KPMG in the UK*

**Figure 10: While “Driving performance” and “Seamless experience” are top vehicle purchasing criteria, European consumers are also considering “Electric mobility” and “Vehicle connectivity” over “Brand image”, “Infotainment”, and “Self-driving”. A lower percentage of these executives are confident about majority of vehicle purchases completed online by 2030 but a higher percentage believes in European consumers willing to pay for monthly subscription services vs. 2022.**

Percent of European executives who think the following features will be very or extremely important for consumers when deciding to purchase a car in the next five years



Percent of European executives who think that majority of vehicle purchases will be done online by 2030, AND who are very or extremely confident about consumers willing to pay for monthly subscription services

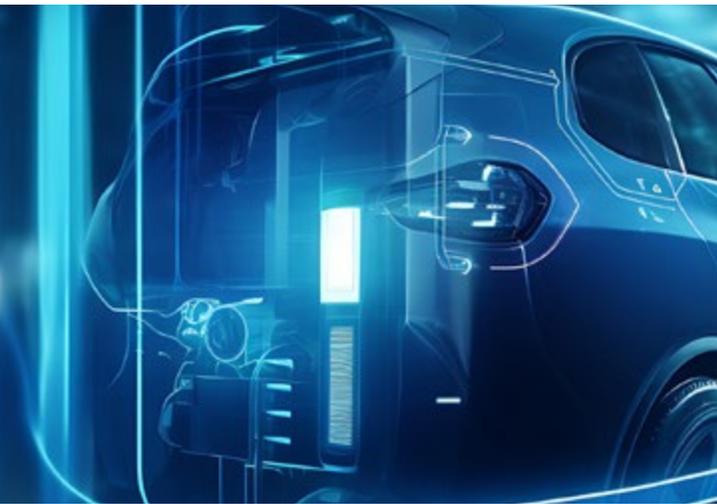


Source: KPMG’s 24th Annual Global Automotive Executive Survey, December 2023

### **Evolving retail and distribution models will likely make automakers the centerpiece of the digital mobility ecosystem!**

While a lower percentage of European automotive executives (52% vs. 73% in 2022) believe that majority of vehicle purchases will be completed online by 2030, the **share of non-traditional channels in selling vehicles will substantially go up** (to two-thirds) wherein the online/digital component will play an increasingly important role. These non-traditional channels like Direct-

to-Consumer sales by automakers, agency model, and pure-play e-commerce portals will increasingly compete with traditional dealerships as automakers gradually evolve their own retail and distribution models. And in that process, they not only control the consumer experience, and become absolute custodians of consumer data but also tap into previously untouched profit streams.



Automakers need to reinvent and redesign their revenue streams with subscription services for digital products as well as service packages lifting the customer experience to a new level. As cheaper vehicle models with greater in-built features flood the market, European automakers should seek to capitalize on new revenue streams which play on vehicle and consumer data.

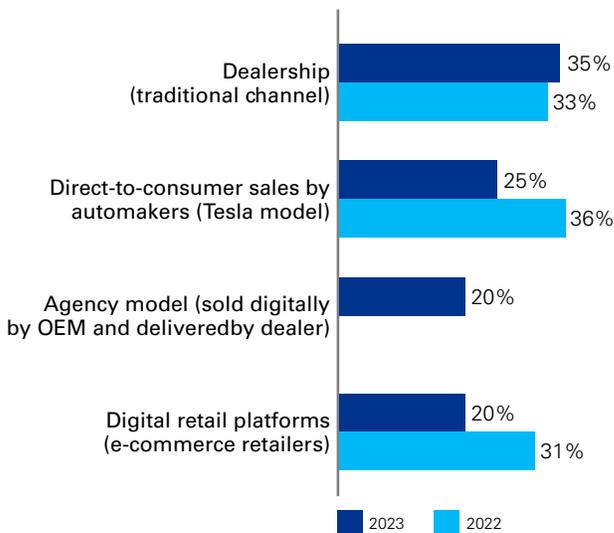
**Tom Lurtz,**  
*Partner in Consulting – Value Chain Transformation,  
 KPMG in Germany*

In recent years, the **agency model has picked up quite a traction** among European automakers. For instance, BMW has switched to an agency model in 2024 starting with the rollout in its MINI brand in select countries, with plans to complete an eventual full-scale rollout across Europe by 2026. Selling vehicles via the agency model will allow BMW to ensure nationwide price transparency for consumers and its affiliated retailers to earn fixed commissions per car sold but more importantly, it will

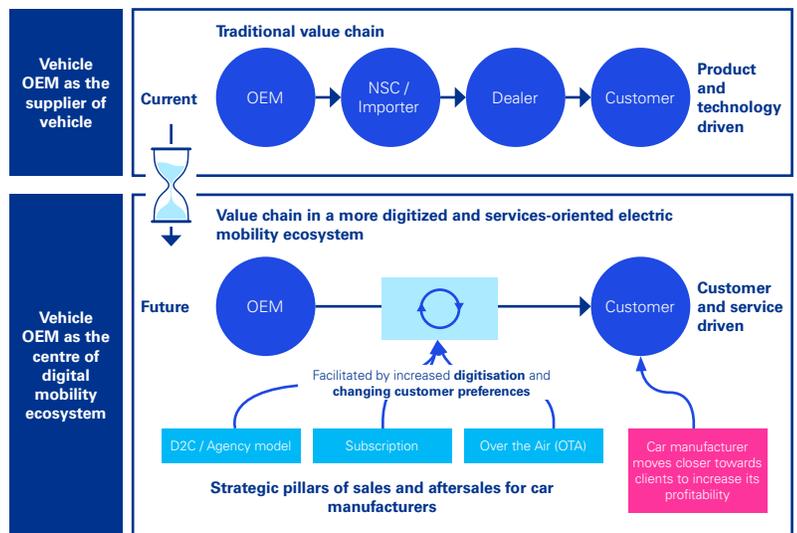
enable the company to own the whole consumer vehicle purchase experience.<sup>40</sup> But **switching to a new retail & distribution model is not without its challenges**. For example, a global automotive OEM has recently delayed the launch of its agency model in Europe for its premium and light commercial vehicle brands due to IT glitches.<sup>41</sup> Similarly, a prominent German automotive OEM has delayed the rollout of its agency model for its EV models due to issues with its new car ordering system.<sup>42</sup>

**Figure 11: The vehicle retail & distribution model will increasingly shift towards Direct-to-Consumer sales by automakers, via the agency model, and through pure-play digital e-commerce players.**

Percent of new cars sold directly to consumers by automakers or non-traditional channels by 2030, according to European executives



Evolution of the vehicle OEM as the centerpiece in the increasingly digital mobility ecosystem



Sources: KPMG’s 24th Annual Global Automotive Executive Survey, December 2023; KPMG analysis



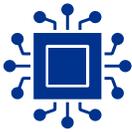
Which retail and distribution model fits best ultimately depends on what overall strategy the automaker has and how much control it wants to own and further build the consumer experience. At the same time, due consultation with its retail partners is of the essence to arrive at a working model which is a win-win for both parties.

**Christian Willmes,**  
Partner in Consulting – SAP & Finance Transformation,  
KPMG in Germany

<sup>40</sup> “BMW Group to launch direct sales model across Europe, starting from 1 January 2024 with MINI in three countries,” BMW, October 2023.

<sup>41</sup> “Stellantis reviews rollout of European dealer rejig amid IT complexity,” Reuters, December 2023.

<sup>42</sup> “Exclusive: Internal system ‘likely cause’ as VW Group delays agency sales until at least 2024,” CarDealer, March 2023.



# Future of Gen AI in Automotive

## Automotive companies seem less prepared for GenAI technologies but consider GenAI skills to be the most important!

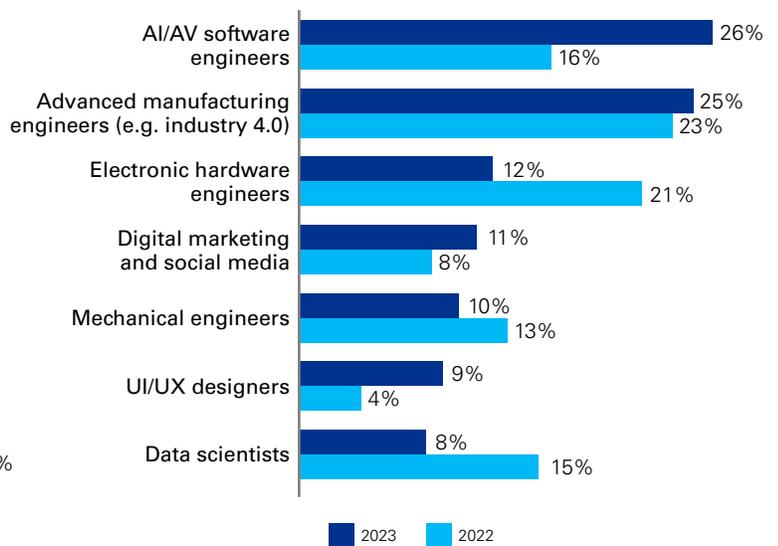
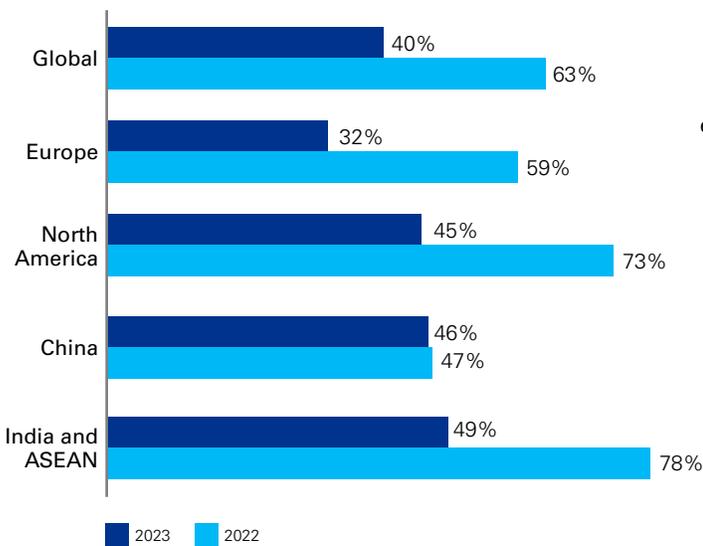
There is a growing sentiment that automakers are less prepared for advanced technologies, such as artificial intelligence (AI), digital twins, and advanced robotics, than in previous years. Only 32 percent of European automotive executives think their company is very or extremely

prepared for these advanced technologies – compared to 59 percent in 2022. This may stem from the fact that companies are realizing that it is extremely difficult to excel in many fields and to take advantage of a range of technological breakthroughs requires immense capabilities.

**Figure 12: Automotive companies across regions seem less prepared and ready for advanced manufacturing technologies, including GenAI, vs. 2022. AI/AV software engineering skills seem to be the most important to automakers compared to advanced manufacturing, and electronic hardware skills.**

Percent of executives who think that their company is very or extremely prepared for advanced manufacturing technologies? (e.g., AI / Gen AI, machine learning, digital twins, advanced robotics)

Percent of European executives who believe in the following jobs/skills as the most important to their automotive business in the next several years



Source: KPMG’s 24th Annual Global Automotive Executive Survey, December 2023

**Companies may feel less prepared to implement new technology this year** because of the proliferation of new AI systems. Across industries, companies are rushing to adopt generative AI, which potentially puts AI tools in the hands of workers across many functions. But that will also require job redesign, training, and hiring. The automotive sector increasingly competes with companies in other

industries for talent with advanced skills in areas such as AI. The good thing is that automotive companies recognize this aspect in our survey, and as such **place the highest importance on AI/AV software engineering skills** for ensuring their future business success.



GenAI is now embedded in the way vehicles are designed, engineered, manufactured and sold. It will also supercharge competition based on how effective GenAI is used for new products, new features, and optimization.

**Fabrizio Ricci,**

*Partner and Country Head of Automotive,  
KPMG in Italy*

**Traditional automakers are already taking the strategic steps to ensure GenAI readiness.** For instance, Volkswagen has setup a specialized AI lab which will develop digital prototypes and new product ideas using AI (and particularly GenAI) by acting as a “globally networked competence center and incubator” and collaborating with tech companies in Europe, China, and North America.<sup>43</sup>

Others like BMW, Mercedes-Benz and Toyota, though haven’t setup a dedicated AI center, have adopted the use of GenAI tools and technologies in customer-facing infotainment applications, plant scheduling optimization, and digital prototypes for simulated real-world testing.<sup>44</sup>

## Use cases abound for GenAI in Automotive - the great leap forward in the AI revolution!

While traditional AI concerns itself with mostly pattern recognitions, predictions and automation of repeatable & mundane tasks, the field of GenAI produces new outputs in the form of audio, text, video, images, simulations, scenarios, etc., based on past data and feedback on which GenAI algorithms have been trained. Advanced computing power also allows GenAI algorithms to process huge amounts of data thereby enabling greater efficiency, accuracy, innovation, and creativity.

Besides augmenting the organizational support functions, the application of GenAI in the automotive sector can range from vehicle design/R&D and production to supply chain and consumer experience:

1. **Vehicle design/R&D:** GenAI reduces the vehicle design time and thereby the time to market new vehicles. This it does by optimizing vehicle design through considering

multiple variables like costs, capacity, and materials availability, and reducing the number of design iterations. For instance, a new text-to-image GenAI tool developed by Toyota can incorporate engineering constraints into new vehicle designs, reconciling the complex design, safety and engineering considerations early in the design process, without too many iterations.<sup>45</sup>

2. **Vehicle production:** GenAI can be used as a supplement to traditional AI methods used in optimizing vehicle production. For instance, BMW leverages a GenAI tool to optimize its vehicle plant production scheduling which has demonstrated more than 70 percent performance improvement over other techniques, thereby minimizing idle time, enhancing production target accuracy, and maximizing efficiency.<sup>46</sup> This GenAI tool was trained on traditional Machine Learning (ML) algorithms to arrive at a more effective optimization solution.

<sup>43</sup> [“Volkswagen Group establishes artificial intelligence company”](#), Volkswagen Group, January 2024.

<sup>44</sup> [“GenAI’s impact on the automotive industry and tips to capitalize on it”](#), Automotive Dive, January 2024.

<sup>45</sup> [“Toyota Research Institute Unveils New Generative AI Technique for Vehicle Design”](#), Toyota, June 2023.

<sup>46</sup> [“GenAI’s impact on the automotive industry and tips to capitalize on it”](#), Automotive Dive, January 2024.

3. **Automotive supply chain:** Like vehicle production, GenAI can enhance existing state-of-the-art solutions used for forecasting demand of raw materials, reducing product defects (ensuring quality and thereby reducing vehicle recalls), optimizing logistics networks and streamlining supply chain operations.

4. **Consumer experience:** GenAI is already revolutionizing consumer experience by creating immersive virtual showrooms (integrated with AR/VR technologies), enabling vehicle personalization, powering virtual test drives,

optimizing predictive maintenance, and transforming in-car experience through voice assistants and chatbots. For instance, Mercedes-Benz has recently made its in-car infotainment system more intuitive and responsive to voice commands by integrating ChatGPT into it.<sup>47</sup> GenAI algorithms can also further optimize the automation of back-end processing and submission of loan documents thereby increasing financial fraud detection capabilities and offering a more personalized purchase experience to the consumer.

### Gen AI applications in new areas of EVs and autonomous vehicles will open novel opportunities!

The application of GenAI within the EV ecosystem can open new innovation-related opportunities. Besides usage of GenAI to optimize EV design taking into consideration the engineering, safety and raw materials constraints, **GenAI can reduce time-to-market of incorporating new EV components and novel battery chemistries.** For instance, General Motors (GM) has invested in Mitra Chem whose “atoms-to-tons acceleration” platform powered by GenAI-based simulations and machine learning models can help the automaker reduce the development time of advanced iron-based cathode materials synergistic with GM’s Ultium batteries.<sup>48</sup>

At the same time, **with the application of GenAI, autonomous vehicles can be commercialized in a quicker timeframe.** GenAI algorithms can produce real-life driving simulations taking into account humongous amount of data ranging from actual consumer driving behavior to location-based traffic conditions. Testing autonomous vehicles in exceptional driving scenarios created by GenAI can make them more capable of navigating complex driving conditions thereby ensuring a smoother and safer experience for consumers before these self-driving vehicles even hit the road.



Surge in GenAI application development sets the stage for a competitive battleground over acquiring top-tier talent. Automakers must refine their organizational cultures, making them more appealing for data science and AI professionals, ensuring they can attract and retain the expertise essential for innovation in this evolving field. This can be achieved by smaller satellite entities or by a major shift towards a software-centric organization, which implies new organizational structures, processes, and culture.

**Michael Niederée,**  
*Partner in Consulting - Value Chain Transformation,  
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<sup>47</sup> “Mercedes-Benz takes in-car voice control to a new level with ChatGPT,” Mercedes-Benz Group, June 2023.

<sup>48</sup> “General Motors (GM) & Mitra Chem to Boost EV Battery Tech,” Yahoo Finance, August 2023.



# Tech Companies vs. Automotive Incumbents

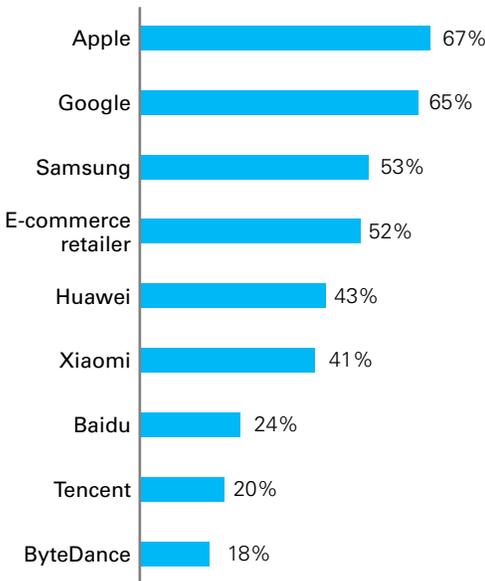
## Big tech companies likely to compete in EV and autonomous vehicle segments!

Most European executives believe **more tech companies will enter the industry with their own branded vehicles (preferably EVs)**. Apple remains the number one choice, but it is now followed very closely by Google. However, Apple has recently canceled its electric self-driving vehicle project titled "Project Titan," and has diverted its resources towards GenAI projects.<sup>49</sup> Major global tech brands such as Samsung are also seen as likely competitors in major automotive markets, including Europe.

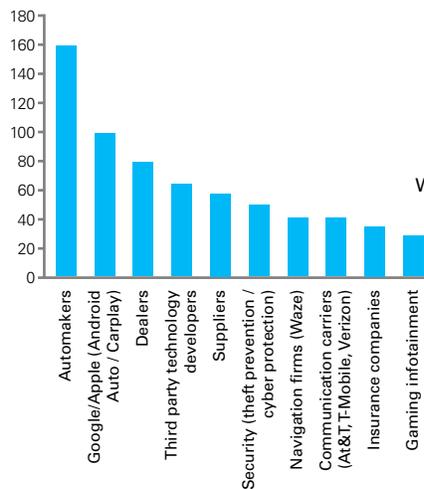
**Among Chinese big tech companies, Huawei and Xiaomi feature on top compared to other Chinese tech companies.** In the context of Europe, therefore, the Chinese threat doesn't only emanate from the big Chinese OEMs, but also the Chinese big tech companies who might launch their branded vehicles in the European market. Xiaomi, for instance, has laid out a \$10 billion plan to achieve global automotive market leadership in the next 10 years, and has debuted its SU7 electric sedan recently.<sup>50</sup>

**Figure 13: Tech companies Apple and Google feature on top as the ones most likely to enter the automotive market with their own branded vehicles. Apple and Google are also best positioned to capture the revenue streams from software-defined vehicles, second only to existing OEMs. When it comes to autonomous vehicles, European executives foresee Tesla as a clear leader, among other emerging companies.**

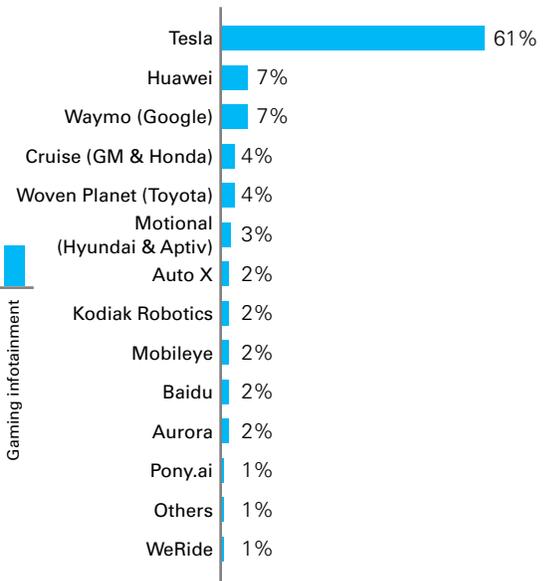
Percent of European executives who think that the following major technology companies will enter the automotive market with their own branded vehicles



Ranking of players best positioned to capture revenue streams from software-defined vehicles, Europe



Percent of European executives who think the following companies will be the leader in their respective country in autonomous vehicles

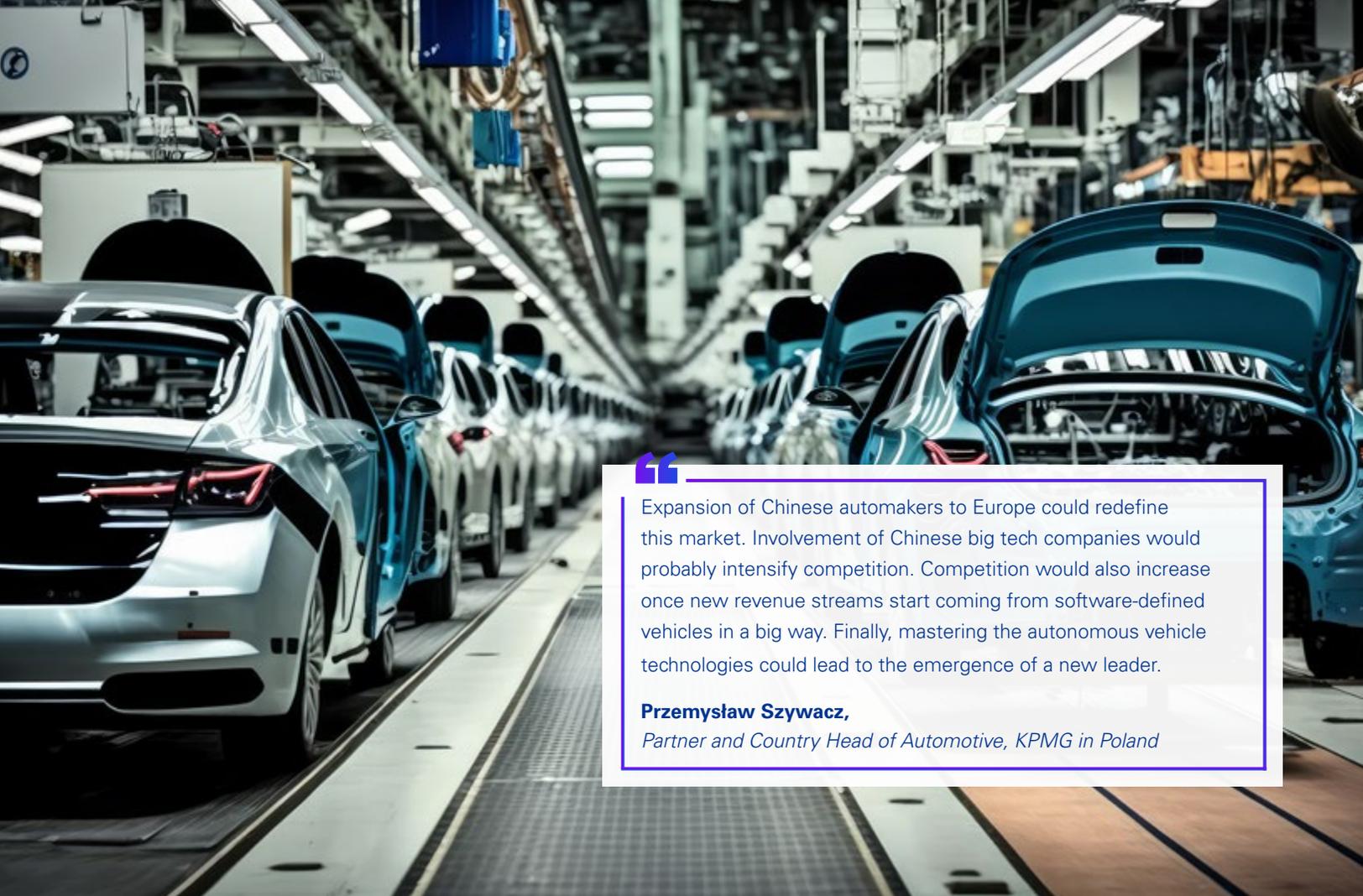


Source: KPMG's 24th Annual Global Automotive Executive Survey, December 2023

<sup>49</sup> "Apple cancels decades-long electric car project in shock move," Livemint, February 2024.

<sup>50</sup> "China's Xiaomi unveils first electric car, plans to become top automaker," Reuters, December 2023.

<sup>51</sup> KPMG's 24th Annual Global Automotive Executive Survey, December 2023



Expansion of Chinese automakers to Europe could redefine this market. Involvement of Chinese big tech companies would probably intensify competition. Competition would also increase once new revenue streams start coming from software-defined vehicles in a big way. Finally, mastering the autonomous vehicle technologies could lead to the emergence of a new leader.

**Przemysław Szywacz,**

*Partner and Country Head of Automotive, KPMG in Poland*

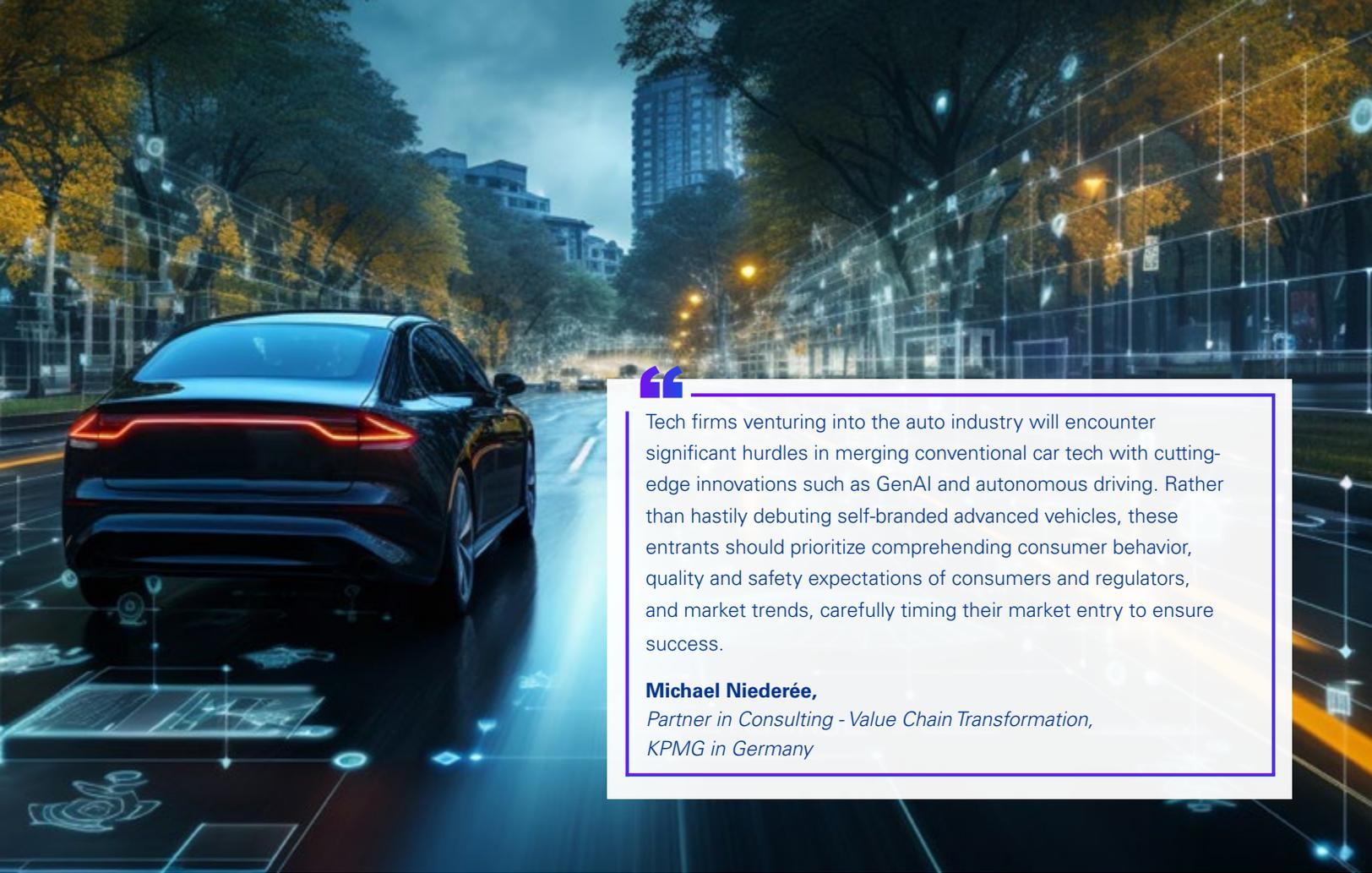
And since contract manufacturing is so prevalent in China, Chinese big tech companies like Xiaomi seeking to enter the automotive market are relying on existing Chinese OEMs like the BAIC Group to contract manufacture their vehicles which will allow them to focus more on vehicle design, in-car features, and marketing. In fact, 73 percent of global executives surveyed believe that these **new automakers will likely succeed in pursuing asset-light strategies using third parties to manufacture their vehicles.**<sup>51</sup>

According to our survey, though automakers are expected to be best positioned to capture new revenue streams from opportunities such as infotainment, insurance, cybersecurity, and even gaming, big tech companies - especially Apple (CarPlay) and Google (Android) - are already embedded in cars' software, and this makes them formidable competitors in this space. The automakers and the tech firms will have to fight for their share of revenue, as other new companies enter the market to sell their in-car services.

<sup>51</sup> KPMG's 24th Annual Global Automotive Executive Survey, December 2023

<sup>52</sup> "[Waymo is full speed ahead as safety incidents and regulators stymie competitor Cruise](#)," CNBC, December 2023.

Apart from launching their own branded vehicles and competing to capture new revenue streams in software-defined vehicles, **the emerging area of autonomous vehicles will likely be another flashpoint between big tech companies and automakers.** When it comes to autonomous vehicles, there is no doubt which car company is seen as the leader - 61 percent of European executives say Tesla, same as the previous year, likely reflecting the company's success in winning approval for its autonomous driving technology in many countries. Huawei and Waymo (Google) come a distant second for market leadership position in the autonomous vehicles space. Waymo, for example, has already launched its commercial autonomous ride-hailing services in three major cities in the US, with plans to expand to two more cities soon.<sup>52</sup> However, many new automakers might continue to face hurdles with regards to regulations, safety and consumer perception while trying to test and launch their own autonomous vehicles and robotaxi services.



Tech firms venturing into the auto industry will encounter significant hurdles in merging conventional car tech with cutting-edge innovations such as GenAI and autonomous driving. Rather than hastily debuting self-branded advanced vehicles, these entrants should prioritize comprehending consumer behavior, quality and safety expectations of consumers and regulators, and market trends, carefully timing their market entry to ensure success.

**Michael Niederée,**  
*Partner in Consulting - Value Chain Transformation,  
KPMG in Germany*

## Automakers to invest in, acquire or partner with new tech startups but only on an opportunistic basis!

While competition is talk of the town when it comes to emerging growth opportunities and new revenue streams in the automotive sector, **a majority of automakers are also cooperating and jointly pursuing these opportunities with big tech companies and new tech start-ups.** In the absence of deep expertise when it comes to new-age vehicles which are more defined as “smartphones-on-wheels”, incumbent automakers have no choice but to invest in, acquire, or partner with tech startups. And yet, for a mere 22 percent of European automotive executives this is a critical part of their company’s strategy. **A majority of these European executives (58%) will consider investments, acquisitions or partnerships with tech startups only on an opportunistic basis.**

This may stem from the fact that a low percentage of European executives (23%) think that these start-ups will have a major impact causing a reordering of the industry. An overwhelming majority of these European executives (72%) believe that **only a few tech startups will find**

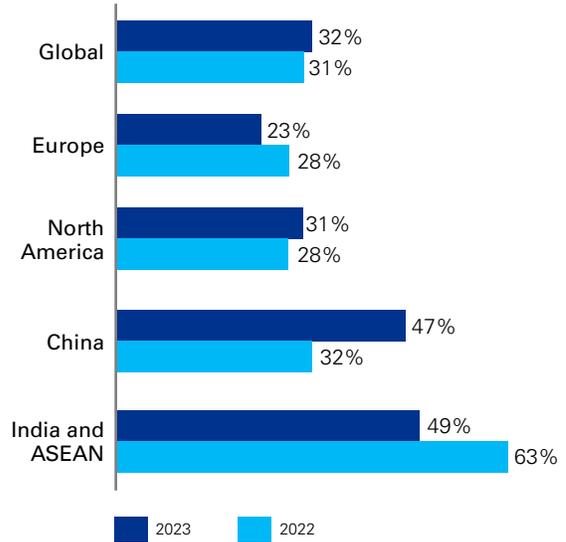
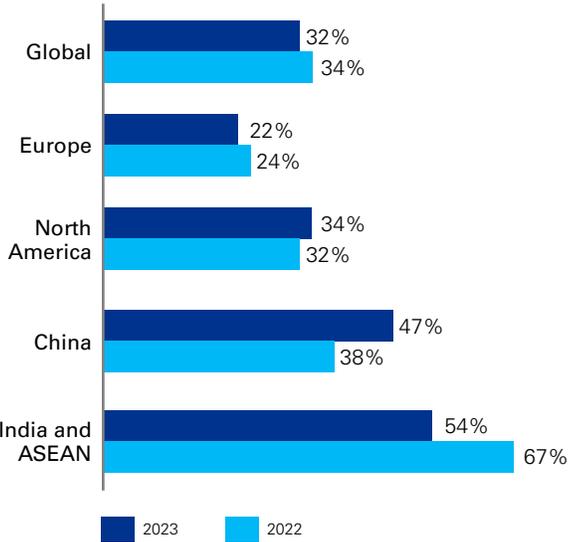
**success in the industry and will either be bought out by established automakers or continue to operate in niche segments.** Investing in, or partnering with, new technology companies should be part of every player’s toolkit. Changes in car technology are occurring too fast to ignore, and pursuing these opportunities frequently requires established companies to partner with emerging entrepreneurs.

Close to half of European executives (48%) are very or extremely likely to divest non-strategic parts of their businesses in the next several years, little changed from the year before (51%). **The EV transition and the beginning of a decline in sales of ICE vehicles will involve corporate restructuring.** We expect companies to divest assets that are overly dependent on ICE markets and continue to invest in electrification. Some players may try to consolidate ICE businesses as the market declines.

**Figure 14: While close to a fifth of European executives are considering making significant investments, acquisitions or partnerships with tech startups, a majority will do this only on an opportunistic basis. Less than a fourth of European executives think that start-ups will have a major impact in the automotive market.**

Percent of executives who are considering making significant investments / acquisitions / partnerships in new technology companies in the next several years, and recognize this need as a critical part of their strategy

Percent of executives who think that one or more start-ups will take significant market share causing a reordering of the automotive industry (major impact)



Source: KPMG's 24th Annual Global Automotive Executive Survey, December 2023



# What to do now

There is more excitement in the automotive industry today than at any time since the early years of the industry. New powertrains, new ways of building cars, and new customer expectations are driving a far-reaching transformation. Consumers have a growing array of buying options, while manufacturers press ahead with diverse R&D efforts, not just in EVs, but also in hybrid technologies, hydrogen fuel cells, and alternative fuels. At the same time, convergence with the technology industry will only accelerate. It is a time of rapid innovation, big bets, and big risks. There will be winners and there will be losers as the automotive business transforms.

Faced with so many challenges and opportunities, executives should recalibrate strategies—and act. These are four priorities for top leaders to better position them in the altered automotive business.

## Hedge your bets—and commit to a future vision

There are so many variables in the car market right now that CEOs could be forgiven for throwing up their hands in exasperation. But they have to act. Manufacturers should hedge their bets about the trajectory of both the internal combustion engine and all the alternatives. However, if they spread themselves too thin they risk losing to competitors that more successfully predict the future and focus more narrowly. The answer, then, is to entertain heretical theories, employ a diverse array of talent with different perspectives, and make your best bets.

*Do CEOs have teams that are up to the task?*

## Get ready to embed AI everywhere

The power and range of artificial intelligence is exploding. Generative AI has captured the imagination of business leaders across industries and is vastly expanding access to AI. We believe AI technology will likely touch virtually every aspect of the automotive business, from the way autos are designed and manufactured to how they are sold and driven.

*The critical question for auto executives, then: Is your AI strategy sufficiently comprehensive and forward-looking?*

## Find the collaborators you need

Car manufacturers have tended to go it alone when it comes to developing automotive technologies, often with unspectacular results. Given the array of business opportunities and the limited pool of skills, auto companies have little choice but to look outside for the ideas and know-how they need to supercharge their R&D operation. Nobody can do it all on their own.

*How effective is your ability to work the ecosystem and find alliances and business partnerships?*

## Face up to global challenges

The EV transition highlights important differences in national auto markets. Demand for electric vehicles is soaring in parts of Europe, the US, and China. In other big markets, such as India, Latin America, and Africa, the growth of electric cars will be slower, hampered by low incomes and poor infrastructure. Global automakers cannot afford to ignore these regions because of their growing populations and diverse needs. At the same time, automotive companies must continue to build resilience to ongoing geopolitical turmoil and changes in the global economy that affect supply chains and markets.

*Does your company have a global strategy that can help you profit from the differences among markets, not just their similarities? Are you resilient to global disruptions?*

**All these trends make life exceedingly complicated for auto executives. They must navigate a maze of choices to come out on the winning side.**



# How KPMG can help

KPMG firms provide audit, tax, and advisory services to automotive companies around the world. KPMG firms are leaders in delineating critical trends in the automotive sector—mobility, autonomy, electrification, and turning them into actionable strategies. Our global automotive practice helps top companies in the industry plan and execute strategies to make the most of these trends.

Our data-driven approach allows us to quantify the impact of trends such as mobility for automakers, dealers and other players so they can identify and prioritize emerging opportunities. KPMG professionals then assist clients in defining technology investment and development roadmaps to pursue these opportunities.

In addition, KPMG firms support clients with operating-model and business transformations to prepare their organizations for building new types of products and doing business in new ways. For example, KPMG is a recognized leader in supply chain strategy.



## Automotive/mobility clients

*Our audit, tax, and advisory teams serve:*

- Major OEMs
- Tier 1 suppliers
- Aftermarket players
- Mobility providers
- EV/AV start-ups
- Institutional investors

## Examples of recent projects

- Market sizing and entry options development for EV and mobility as a service (MaaS)
- Tax strategies re-imagined for the new mobility market
- Scenario development for regulatory changes based on AV/EV adoption
- Analysis of industry supply chain shifts and future options
- Development of vehicle subscription operating models based on ROI simulation
- Retail innovation and customer experience transformation

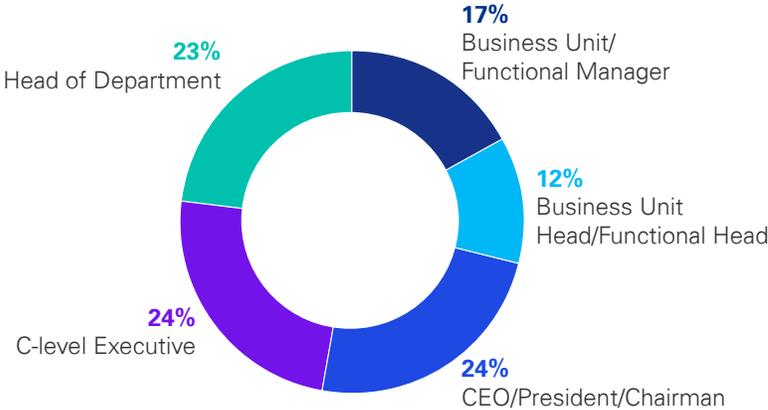
Source: KPMG International, KPMG recognized as a Supply Chain Pacesetter” (March 2023)

# Respondent profile

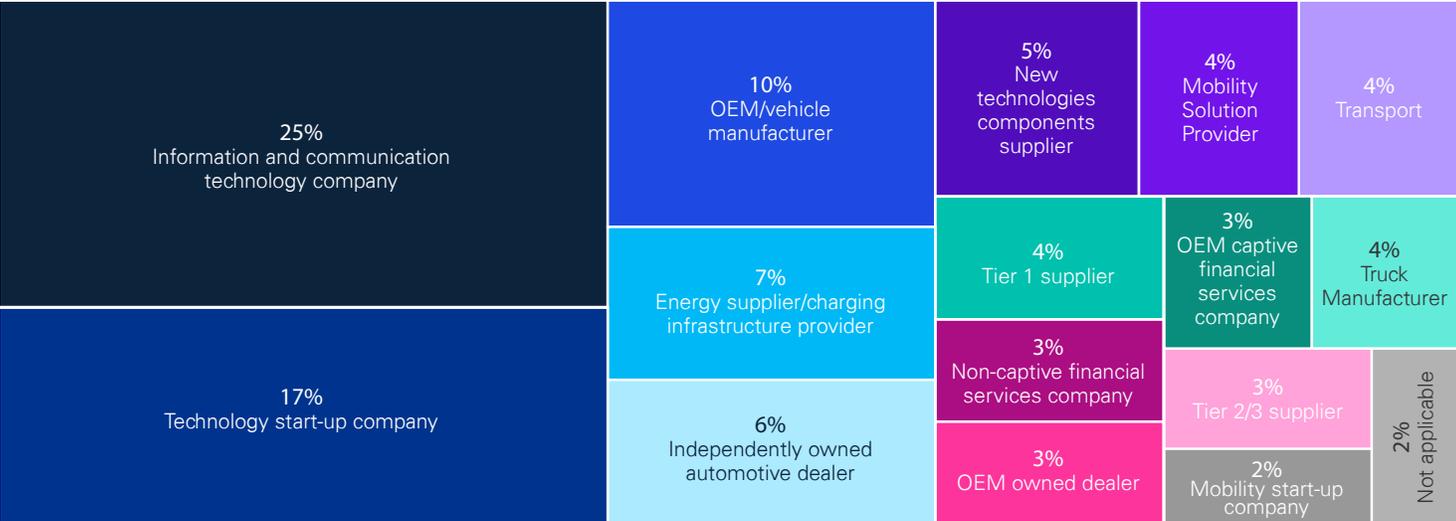
KPMG conducted a survey of 1,041 executives across the automotive and adjacent industries in October 2023. Almost a quarter were CEOs and another quarter were C-level executives. The remainder were heads of department and business units or functional managers. Ten percent worked in OEMs, 7 percent in suppliers and 9 percent in dealerships. The rest worked in car-related financial services, in automotive technologies, and in the provision of charging infrastructure.

In terms of corporate size, 323 worked at companies with at least US\$1 billion in annual sales, 238 were in companies with US\$500 million to US\$1 billion in revenue, and 459 were at firms with under US\$500 million. A total of 30 countries and territories were represented from Africa, Asia, Europe, Latin America, Middle East, and North America. The three largest pools of respondents were in Europe (330), the US (277) and China (154).

### Which of the following best describes your job title?



### Which of the following best describes your company?



Note: Percentages do not total to 100 due to rounding

## Which of the following best describes your company's annual global revenue in 2022?

Number of responses

Over US\$10 billion



US\$1 billion to US\$10 billion



US\$500 million to US\$1 billion



US\$100 million to US\$500 million



Less than US\$100 million



Not Applicable

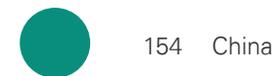


## In what country, territory, or jurisdiction do you live?

### North America



### China



### Rest of the World



### Western Europe



### Eastern Europe



### South America



### India and ASEAN



### Japan / South Korea



● Number of respondents

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