GetFocus

Europe's EV Wake-Up Call: Rethinking Strategy to Compete with US and China

Strategic Insights for Automotive Executives, Policymakers, and R&D Leaders

Why is Europe Falling Behind in the EV Race?

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Introduction

Europe's major automakers are facing a decade-long lag in the electric vehicle (EV) race, trailing behind U.S. pioneer Tesla and China's BYD. This gap largely stems from Europe's late adoption of lithium-ion battery technology and early bets on alternative fuels. While Tesla and BYD doubled down on battery-electric vehicles (BEVs) in the late 2000s, European manufacturers hedged their bets on hydrogen fuel cells, biofuels, and compressed natural gas.

This gap has cost Europe technological leadership, market share, and economic influence in the global EV industry. With the global EV market projected to grow exponentially, Europe is not at risk of losing its competitive edge—it has already lost it. The real question is whether it can still recover.

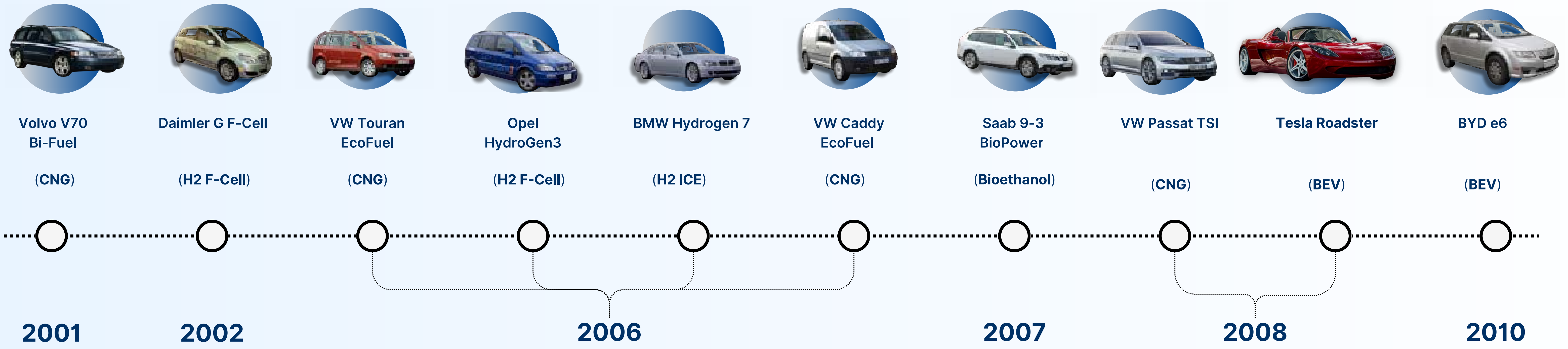
By 2024, China held nearly **60%** of global EV production capacity, while Europe lagged behind at about **17%**. (Refer to Appendix: Performance of Leading brands by EV unit sales BEV + PHEV from Jan-Sep 2024 worldwide)

This report examines how Europe arrived at this point, the current technology and market gap, the rising importance of lithium iron phosphate (LFP) battery chemistries, and the strategic moves required for Europe to regain leadership in the EV industry.

Tesla & BYD focused on **BEV** while
Euro OEMs kept hedging with other alternative drives

In the early 2000s, European automakers were reluctant to commit fully to battery EVs, exploring other avenues instead, such as hydrogen, CNG, and biofuels.. Companies like BMW and Daimler poured resources into hydrogen fuel cell prototypes and gas-powered alternatives (e.g. the **BMW Hydrogen 7 in 2006** ran on liquid hydrogen —two years before **Tesla's first-generation Roadster (2008).** This caution meant Europe squandered valuable time.

While U.S. and Chinese innovators were already investing heavily in EV R&D, with lithium-ion technology, Europe was stuck in **R&D cul-de-sacs**. Tesla's rise in the 2010s drove EVs into the mainstream and BYD began mass-producing BEVs, but Europe's incumbents were slow to pivot away from combustion-era thinking. The cultural and technological momentum shifted outside Europe.



The Consequences of Strategic Choices

Early in the game, Europe committed to the wrong bets...

Europe explored **hydrogen and CNG**, but Tesla and BYD committed to **lithium-ion**. This divergence set the foundation for today's competitive landscape.

...which led to the loss of momentum on Lithium-Ion.

While Europe invested in alternatives, Tesla and BYD capitalized on rapid advancements in lithium-ion technology, launching market-ready EVs by 2008 and 2010, respectively. Europe's caution cost valuable time.

Now, Europe is a decade behind and playing catch-up.

By 2012–2013, as European automakers introduced their first new-generation BEVs, Tesla and BYD were already mass-producing EVs. But the real issue wasn't just a late start—Europe didn't scale investments fast enough.

While Tesla ramped up production and China expanded gigafactories, European brands prioritized hybrids and combustion engines, keeping EV programs small. By the time they seriously invested in lithium-ion and gigafactories, Tesla and China had already secured cost advantages, supply chains, and technology leadership.

Today, this gap persists, with Europe still struggling to match leaders in battery production scale, energy efficiency, and cost reduction.

(Refer to Appendix: Performance of Selected EVs for comparative data.)

The Early Signals Were There But the Wrong Bet Was Made

Europe’s early focus on hydrogen and alternative fuels diverted resources from lithium-ion development, allowing China and the U.S. to seize leadership in battery-electric innovation.

GetFocus Forecasting Methodology

At GetFocus, we developed a quantitative method inspired by MIT research to **forecast the technological future** based on metrics that can be identified in patent data.

Using the latest advancements in AI technology, we have created a system that can estimate how rapidly any area of technology is improving.

Our method revolves around **3 key steps.**

1

We identify every single patent that relates to an area of technology using AI. The resulting dataset represents the entire developmental history of an area of technology.

2

Once this dataset is created we measure 2 key metrics.

Cycle Time - How many years it takes for a technology to produce a new generation of itself.
The lower the cycle time, the better.

Knowledge Flow - How significant of a step forward a new generation represents.
The higher the knowledge flow, the better.

3

Using the previous metrics, we calculate the **'Technology Improvement Rate'**, which represents the average percentage (%) increase in performance per dollar that can be expected from an area of technology in one year.

By using the above methodology, technology improvement speeds can be accurately measured, and those speeds can be used to predict technological disruption well ahead of time.

The Winning Bet Was Obvious —If You Knew Where to Look

Lithium-ion's dominance was predictable decades ago.

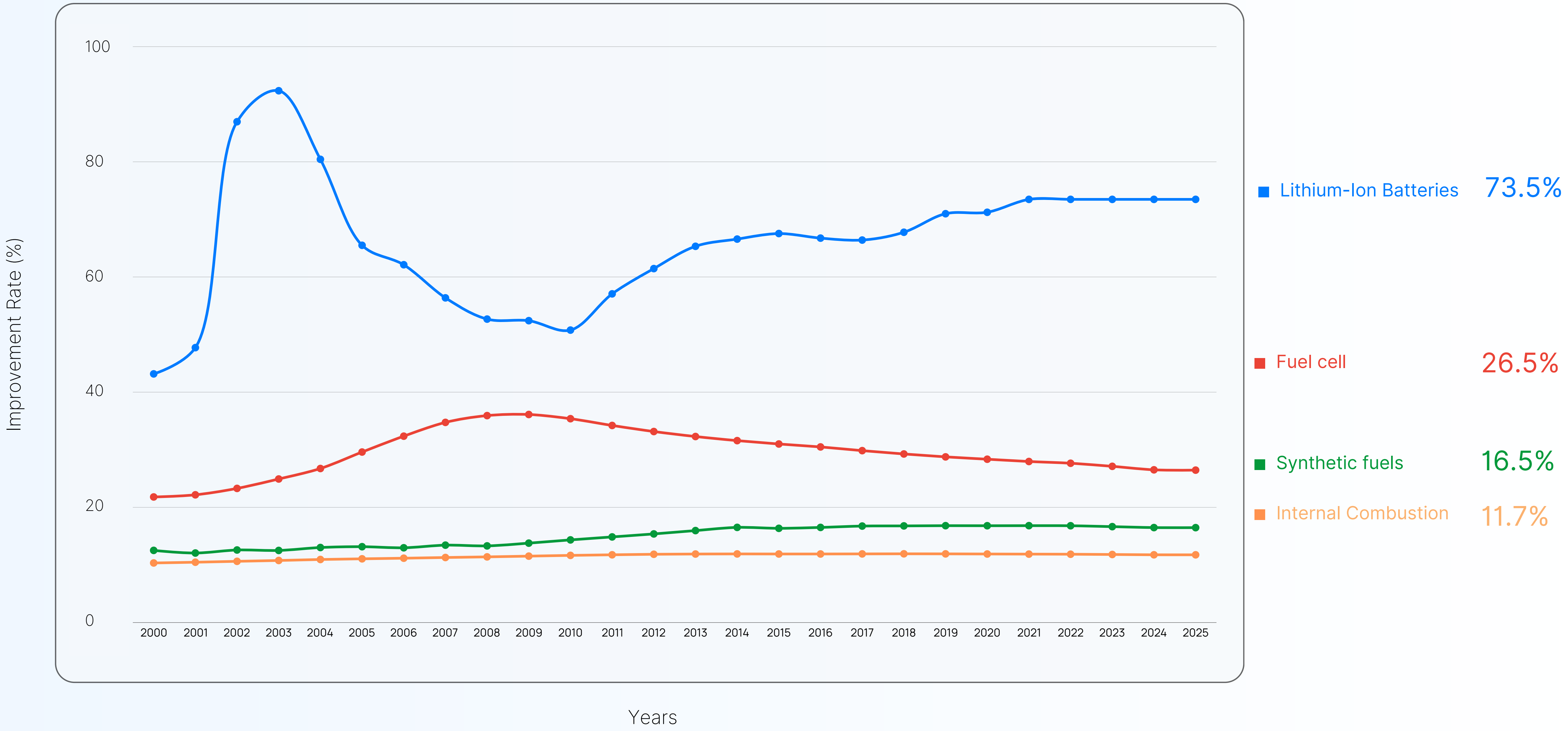
Even in the early 2000s, lithium-ion's improvement rate was already far ahead of hydrogen fuel cells, synthetic fuels, and internal combustion engines. Its energy density, cost reductions, and performance gains were accelerating at a rate that made it the only viable long-term solution for mass EV adoption.

Lithium-ion's dominance became inevitable as its improvement rate outpaced hydrogen and synthetic fuels.

However, without tools like GetFocus—the only platform that can forecast technological winners—European automakers lacked visibility into lithium-ion's trajectory.

This led to fragmented investments in alternatives like hydrogen, while Tesla and BYD capitalized on lithium-ion's clear advantages to build unassailable leads in cost, scale, and technology.

Lithium-Ion Batteries vs. Hydrogen Fuel Cells: A Clear Performance Advantage



Source: GetFocus Platfrom

The Next Battleground: Battery Chemistry

How Lithium Iron Phosphate (LFP) Is Reshaping the EV Industry

GetFocus

When European Automakers Finally Committed to EVs, They Were Still Late on LFP

By the time European automakers fully embraced battery-electric vehicles (BEVs), the industry had already moved to the next battleground: **battery chemistry.**

While European manufacturers focused on **high-nickel chemistries (NMC, NCA)** to maximize energy density, Chinese and U.S. players were scaling **Lithium Iron Phosphate (LFP)**, prioritizing **lower costs, improved safety**, and a more **secure supply chain.**

The shift wasn't unpredictable. Battery suppliers like **CATL** and **BYD** began investing heavily in LFP in the early **2010s**, betting on its long-term advantages. By 2021, Tesla had already transitioned its Model 3 and Model Y to LFP to reduce dependency on nickel and cobalt. Meanwhile, European automakers only announced their first LFP-based EVs for 2025—nearly 15 years behind China's large-scale adoption.

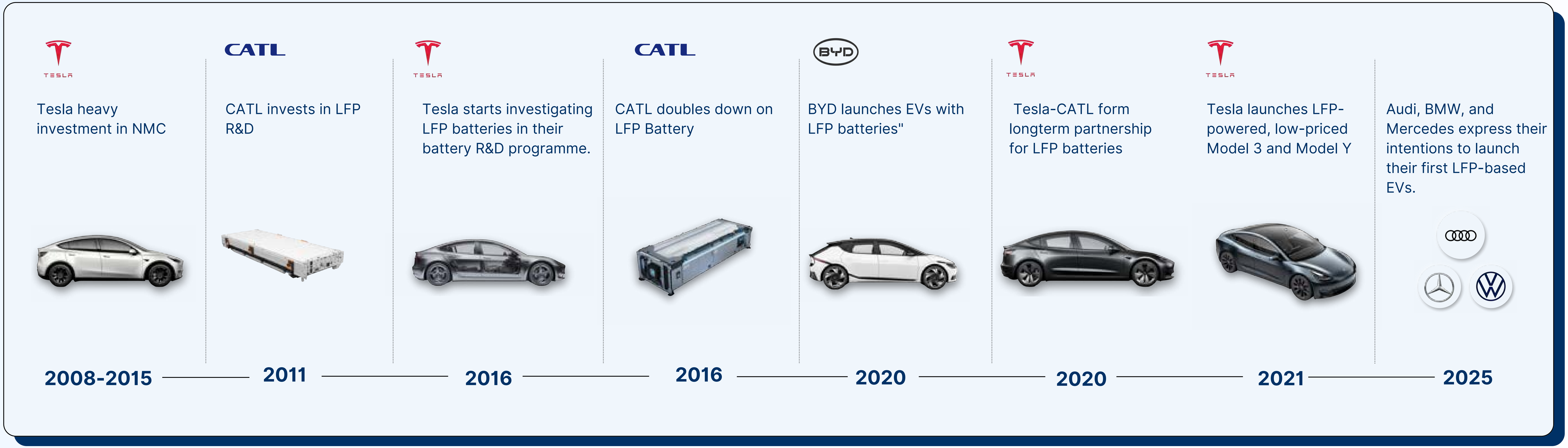
While they may not have had direct forecasting tools, early supply chain shifts, material cost trends, and strategic decisions by competitors were clear indicators that LFP was gaining momentum. Yet, European automakers remained committed to NMC, assuming it would maintain its edge in the long term.

By the time they started adapting, the competitive advantage in cost, battery supply, and production scale had already shifted elsewhere.

Europe Clearly Late to the Game:

Roadmap to Commercialization of LFP EVs

LFP batteries are reshaping EVs. Tesla first focused on NMC, while CATL invested in LFP (2011). By 2020, BYD launched LFP EVs, and Tesla partnered with CATL. In 2021, Tesla introduced LFP-powered models. By 2025, Audi, BMW, and Mercedes joined the shift.



The Early Signs of LFP's Rise Were There But Overlooked

While most automakers now recognize LFP's dominance, the data had been signaling this shift long before they acted.

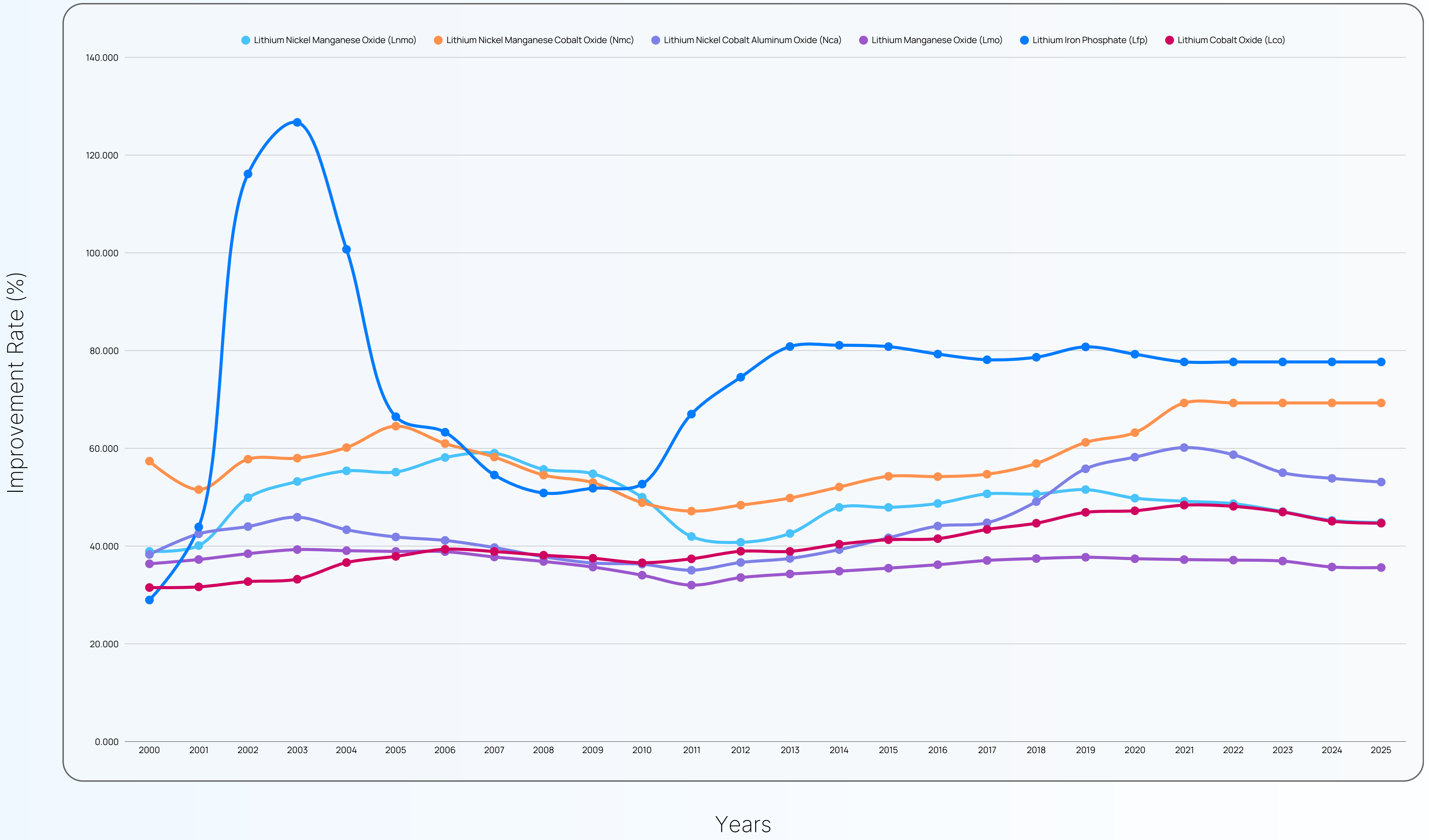
European OEMs originally prioritized NMC, believing its higher energy density made it the better long-term bet. However, as early as the mid-2000s, LFP's improvement rate had already surpassed NMC's, showing that it could close the energy gap while remaining cheaper, safer, and longer-lasting.

By the early 2010s, Chinese manufacturers and Tesla recognized LFP's potential and scaled production, while European automakers remained focused on high-nickel chemistries (NMC, NCA), assuming they would retain long-term competitiveness.

Today, LFP continues to improve at a rapid pace, with a **77% Technology Improvement Rate** (TIR) versus **69% for NMC**.

Had our methodology been applied to 2011 patent data, LFP's dominance would have been clear long before it overtook NMC in the mainstream EV market—highlighting the power of data-driven forecasting to anticipate technological shifts. By the early 2020s, LFP had become the clear winner for mass-market EVs—a shift that caught many European automakers off guard.

Comparative Improvement Rates of Key Li-Ion Chemistries



Source: GetFocus Platfrom

Turning the Ship

The Path to Reclaiming Leadership in Passenger EVs

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The Next Frontier in Battery Technology

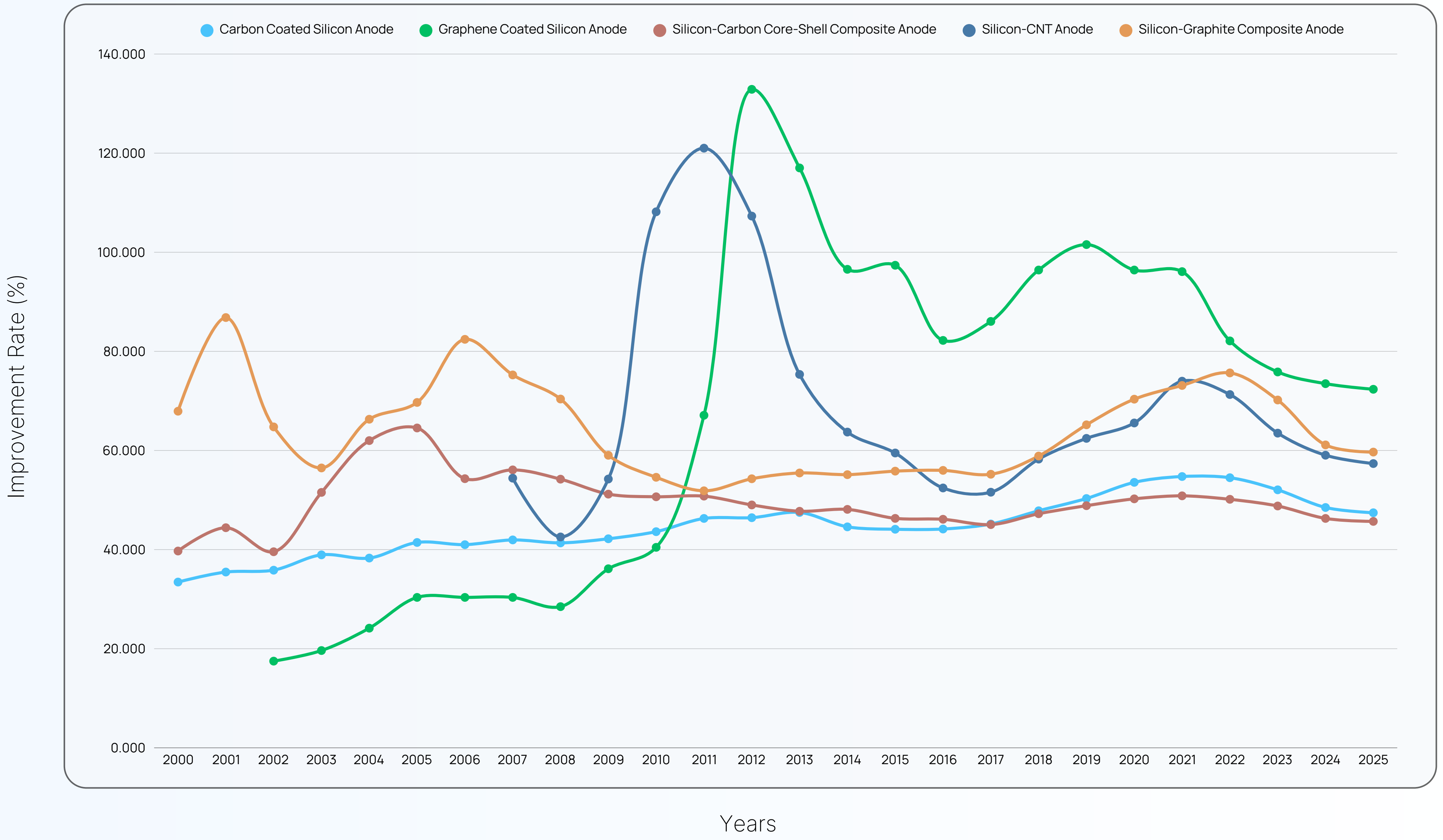
While graphite anodes have been the industry standard, silicon-based anodes are redefining battery performance—offering up to **10× higher energy density**. Several approaches—carbon-coated silicon, graphene-coated silicon, silicon-carbon core-shell composites, silicon-CNT, and silicon-graphite blends—are competing to push performance further.

Among these, **graphene-coated silicon anodes** are emerging as the front-runner. With the **fastest improvement rate (72%)**, they offer higher **conductivity**, better mechanical **stability**, and significantly longer **cycle life** compared to other silicon-based alternatives.

- **Graphene-coated silicon**: The most promising near-term solution, combining high conductivity, flexibility, and structural integrity—preventing the expansion issues that typically cause silicon anodes to degrade over time.
- **Silicon-carbon core-shell**: Offers moderate energy density gains but struggles with cost-efficiency and long-term stability.
- **Silicon-CNT (carbon nanotube)**: Shows potential in enhancing conductivity but remains expensive and difficult to scale.

By combining graphene-coated silicon anodes with LFP chemistry, automakers can boost energy density without compromising cost, safety, or longevity—closing the energy gap with NMC while maintaining LFP's well-established advantages in affordability and thermal stability.

Silicon Based Anodes: The Next Evolution in EV Batteries



Source: GetFocus Platfrom

From Late Pivot to Leading Edge:

Europe's Action Plan for EV Battery Competitiveness

Accelerate LFP Battery Production

Europe must establish a robust LFP battery supply chain to lower costs and increase BEV affordability.

Invest Heavily in Silicon-Based Anode R&D (Graphene-coated silicon anodes)

To stay ahead in the next phase of battery evolution, European automakers need to lead in silicon-based anode technology.

Leverage AI-Driven Technology Forecasting

Winning in the next phase of EV development means spotting high-potential technologies early and securing the right investments before competitors do By using platforms like GetFocus, European automakers can track emerging breakthroughs, assess long-term viability, and act before market shifts become obvious.

Conclusion

Europe's delayed commitment to lithium-ion battery technology has left it trailing behind the U.S. and China in the global EV race. While Tesla and BYD scaled production early, European manufacturers hesitated, investing in alternative fuels instead of prioritizing lithium-ion R&D. By the time Europe shifted its focus, it had already lost the cost and supply chain advantage.

However, all is not lost. While the lithium-ion battle has been decided, the next phase of battery evolution is already underway. Silicon-based anodes, AI-driven energy optimization, and localized LFP production present opportunities for Europe to regain ground—if acted upon swiftly.

Key Strategic Priorities for Europe:

- Accelerate LFP and Graphene-Coated Silicon Adoption – Europe must scale local battery production and invest in next-gen chemistries to close the energy gap with Chinese manufacturers.

- Leverage AI for Energy Optimization – Improving EV efficiency through advanced battery management software can offer differentiation beyond hardware improvements.

- Secure Supply Chains & Reduce Dependency – Europe's reliance on external battery suppliers must be addressed through domestic gigafactories and raw material partnerships.

The lesson from the past decade is clear: future technological disruptions can be predicted and acted upon. Europe must decide whether it will remain a follower in the EV revolution or shape its next chapter. The window of opportunity is closing. **Now** is the time to act.

Appendix

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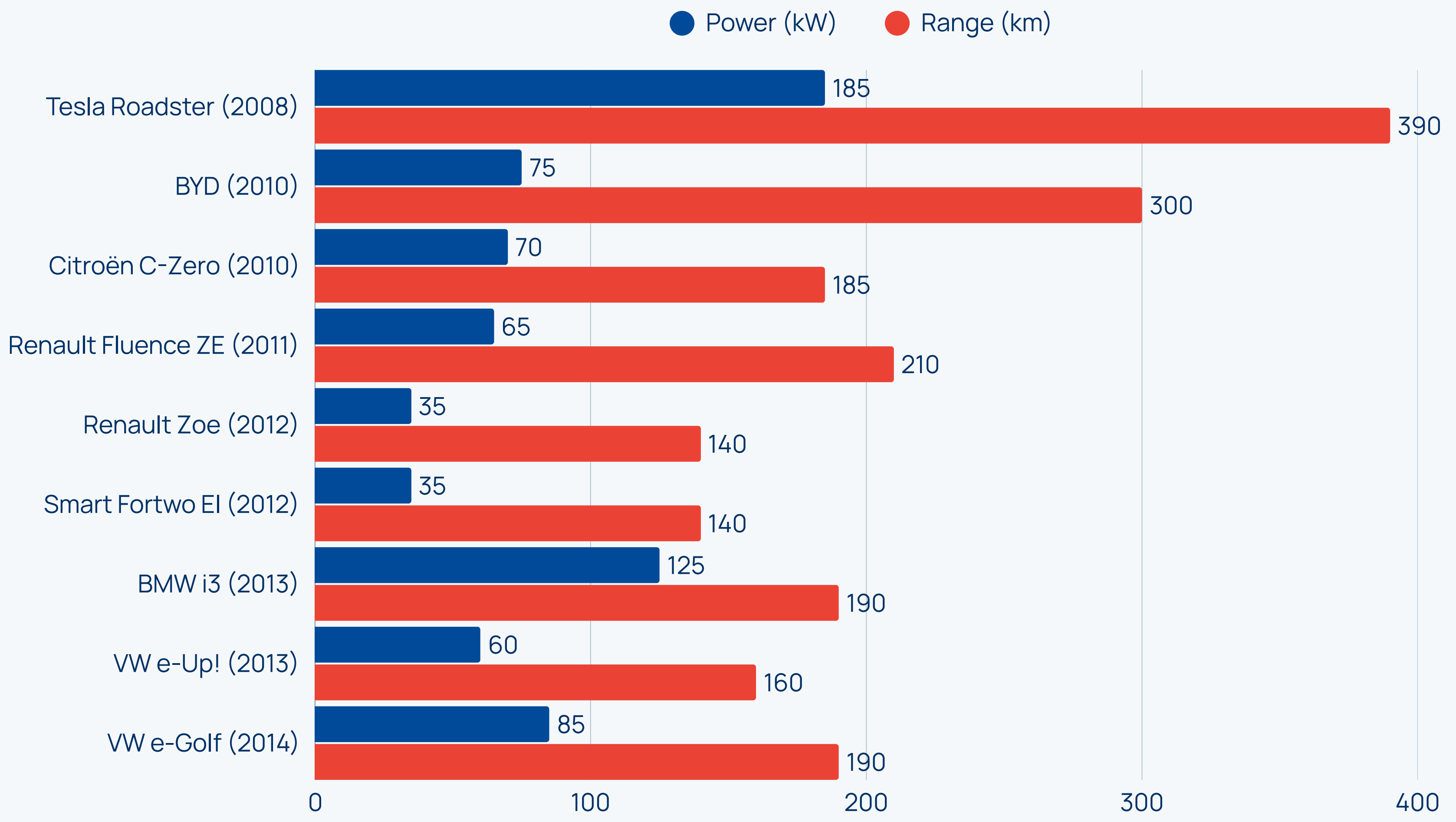
The Competitive Benchmark: How Europe Stacks Up

Performance of selected EVs



Note: approximate power and range figures;
Source: EV Volumes, Wikipedia

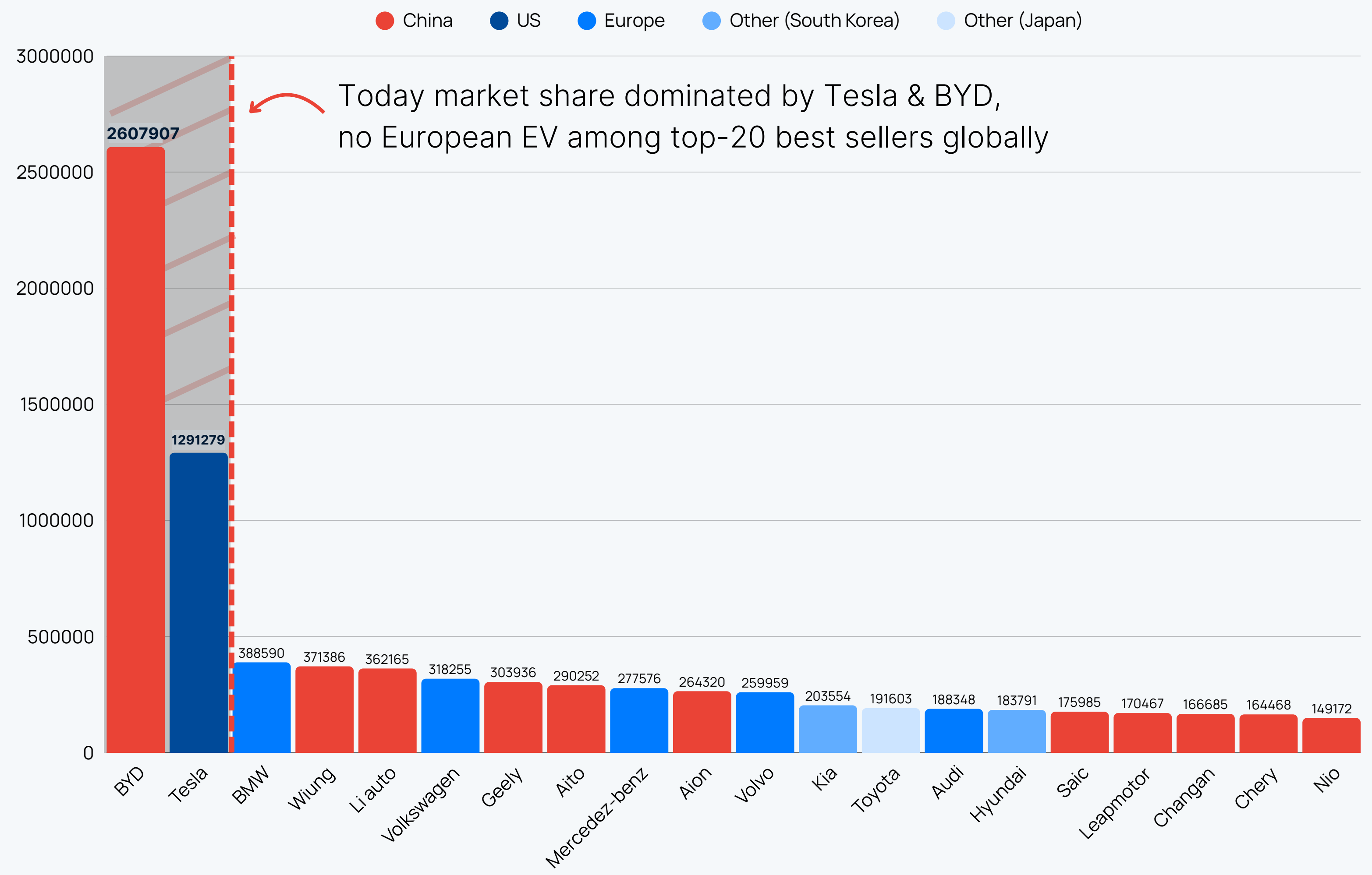
To understand where Europe stands, it's crucial to compare the performance metrics of key EV models. This includes power, range, and efficiency.

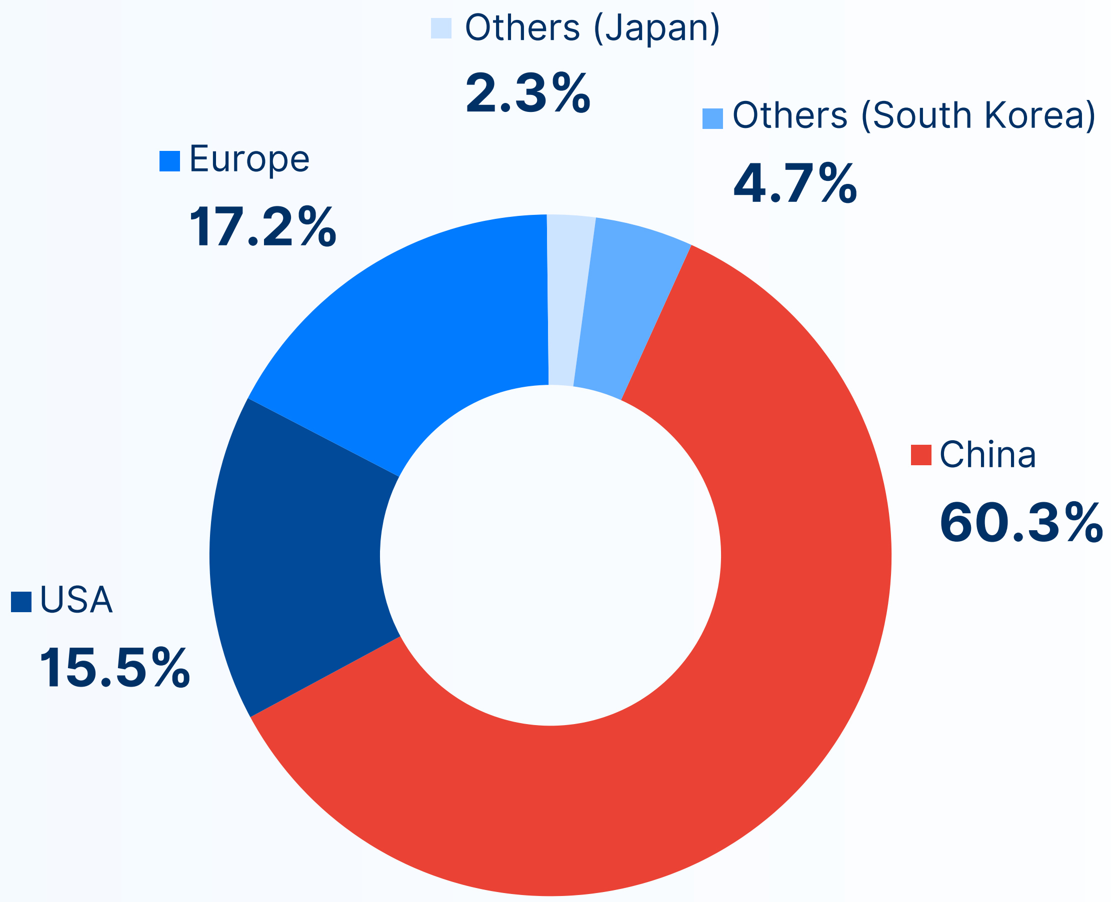
Tesla and BYD consistently lead in power and range due to advanced battery integration and superior software management.

European models like the VW ID.4 and BMW i3 offer competitive range but fall short on power efficiency and charging speed.

Closing this performance gap requires breakthroughs in both hardware (battery and powertrain) and software (energy management systems).

Leading brands by EV unit sales BEV + PHEV from Jan-Sep 2024 worldwide





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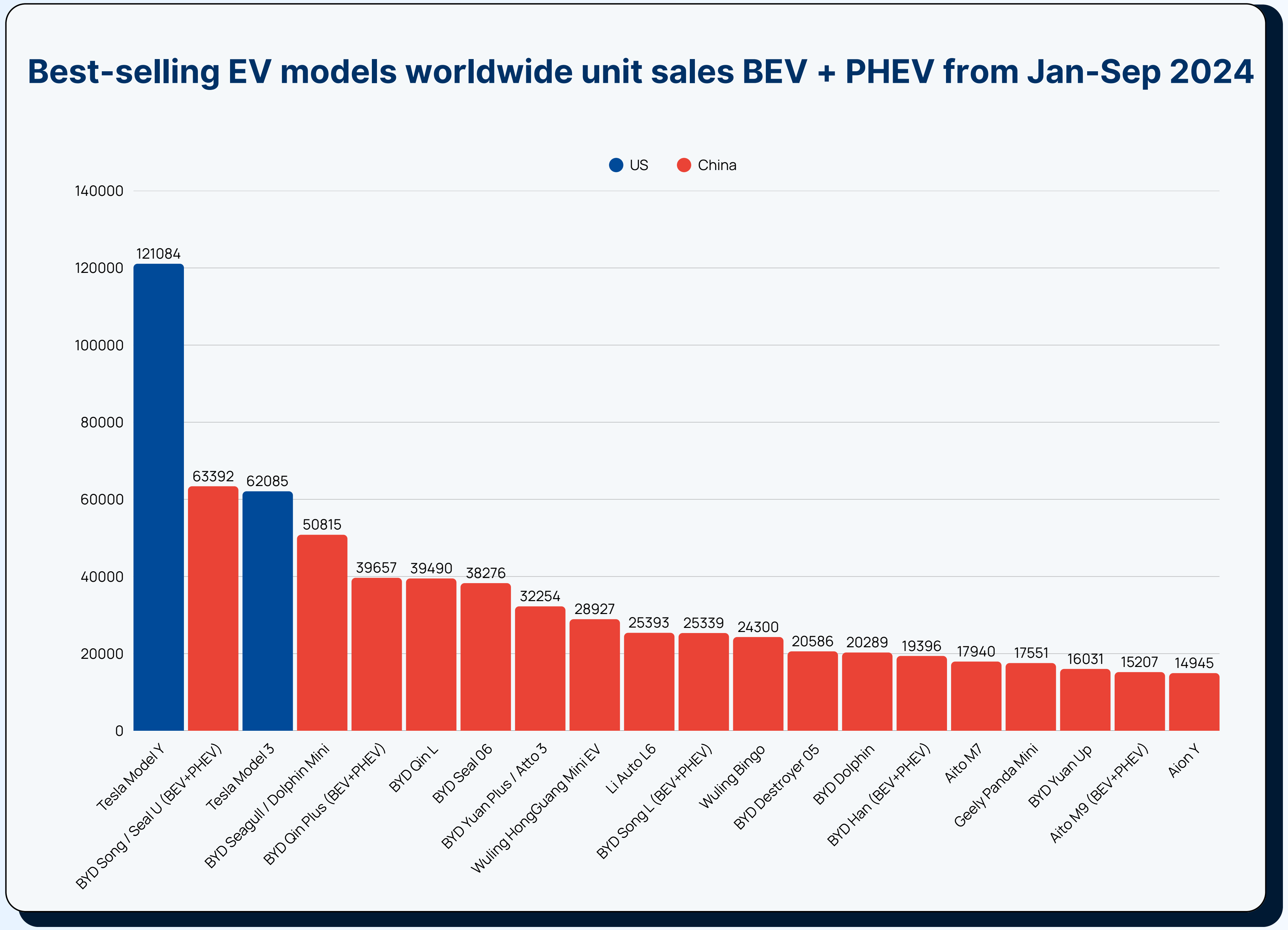

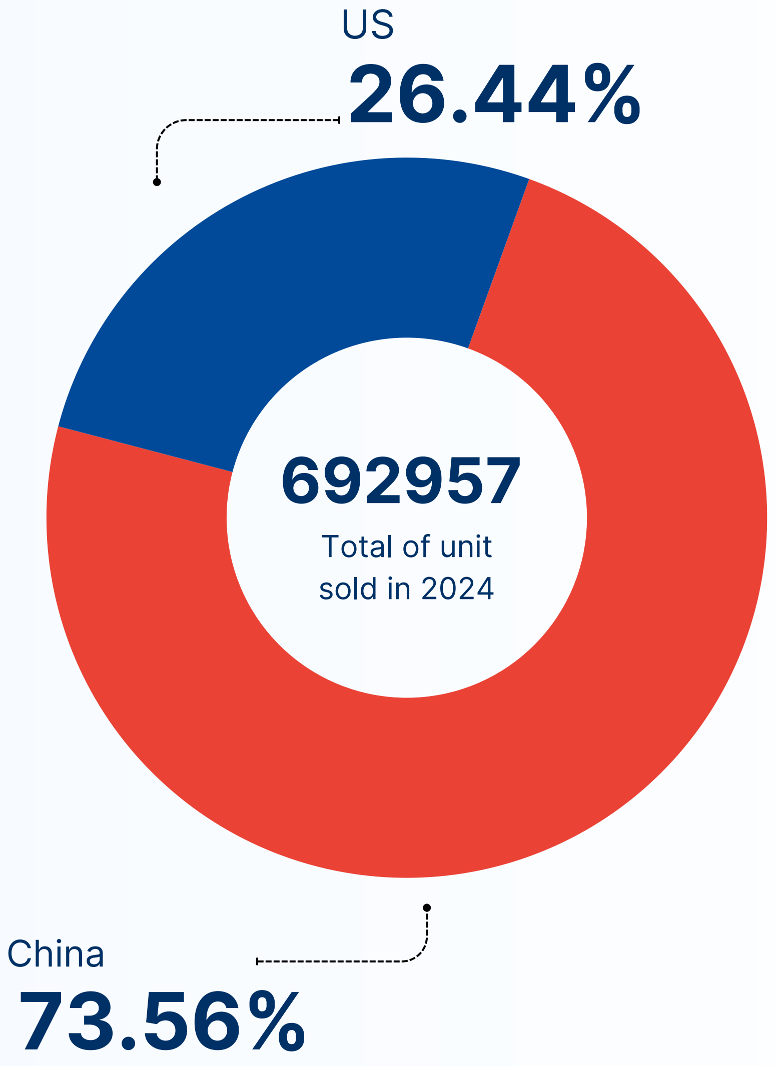

Source: EV Volumes, Wikipedia

Key challenges on the way to BEV adoption are being addressed and likely to be resolved

Challenges		Solutions being explored
Supply Chain: Dependence on scarce materials like Lithium and Cobalt, often sources from areas with geopolitical risk	→	Material substitution by more abundant alternatives and new battery chemistries e.g., Li-Sulfur, relying on more stable supply chains
Range/Energy Density: Lower energy density of batteries vs. fossil fuels, restricting driving range and load capacity	→	Increasing energy-density with advanced materials e.g., Carbon Nanotubes and chemistries, improving thermal management, lightweighting pack design
Power Infrastructure: Insufficient electrical grid and charging infrastructure for widespread BEV use	→	Demand response systems optimizing power delivery, fast charging solutions for charging efficiency, and bidirectional charging giving back excess energy
Battery life cycle: Loss of performance and capacity of batteries over time impacting sustainability and costs	→	Battery Management Systems optimizing for performance and durability; improved material recycling processes and battery repurposing e.g., microgrids

About GetFocus

We are on a mission to **fast-track technological progress worldwide**.
What started with foundations laid by MIT researchers, is now a full blown technology forecasting system. By equipping innovators with **data-driven technological foresight**, we help them make the right investment decisions and innovate faster.

Emerging technologies that turn into winners show clear and measurable signals early on in their development. By giving you access to this data, we help you innovate faster.

Our method has been verified to work on more than 50 technological areas.

If GetFocus and our method had been around in the past, one could have known that:

- Lithium-ion batteries would eventually become cheaper than combustion engines for vehicles by 1995,
- Digital photography would disrupt film by 1975.
- SSDs would become cheaper than HDDs by the early '80s

If you'd like to see the full data set of this report or discuss a technology you'd like us to analyse, please contact us via :

contact@getfocus.eu
www.getfocus.eu

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LVMH

Christophe Perthuisot

Head of R&D – Moët Hennessy

"In **one week with GetFocus**, we gained more technology insights than we previously could in 9 months"

Conclusion

Electrification in **commercial and off-road vehicles** presents unique challenges, requiring solutions that balance r**ange, load capacity, and battery size** in heavy-duty applications while ensuring high power and durability in off-road segments.

While Europe has lagged in passenger EV adoption, these segments offer a **new opportunity to leapfrog ahead**—provided the right technologies are embraced. Many of the traditional barriers to BEV adoption, such as **supply chain dependencies, energy density limitations, charging infrastructure, and battery lifecycle concerns**, are already being addressed through **next-generation battery chemistries and advanced battery management systems (BMS)**.

LFP + graphene-coated silicon anodes represents the most viable and scalable solution for European automakers. This combination overcomes **LFP's energy density limitation** while maintaining its **cost, safety, and longevity advantages**, making it a superior alternative to the nickel-heavy chemistries (NMC/NCA) that Europe originally prioritized.

By scaling domestic **LFP production**, investing in **silicon-based anodes,** optimizing **energy management software**, and **expanding fast-charging infrastructure**, Europe can reclaim its position as a leader in the global EV market. The alternative? **Continued reliance on foreign battery supply chains and a growing competitive gap with China and the U.S.**

For detailed insights, data analysis, and strategic recommendations, refer to the Appendix or contact GetFocus at **contact@getfocus.eu**.