



Q4 2023

2210-23-Q4

Quarterly Wrap-Up

Summary & insights of the top trends from the last three months

About SBD Automotive

Management & technology consultants to the automotive industry for over 20 years

Our expertise:

Connected

Autonomous

Shared Mobility

EV

Cybersecurity

Anti-theft



Click to find out more

Our role:

As our industry faces...

Uncertainty



We provide our clients with...

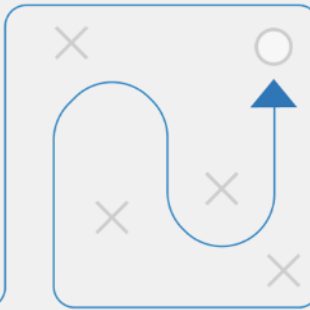
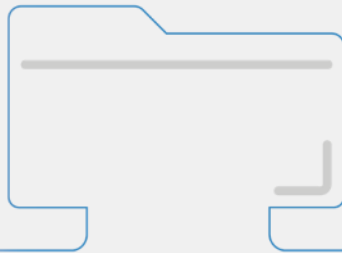
Data



Insight



Advice



Seeing Beyond Data

Turning data into actionable advice



Research Portfolio



Consulting Services



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- Digital assistants as first frontier of generative AI
- Automakers shed jobs as pressure on margins and software delivery increased
- Governments get serious about regulating automated driving
- Higher level Autonomy gaining traction in the East
- Expansion of automakers' branded charging stations
- Automakers move forward with battery swapping
- Investments in EV and battery technology started to bear fruit through innovations
- Automakers prioritized affordable EV launches amidst a global credit crunch

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Introduction

SBD's Quarterly Wrap-up helps you quickly catch-up on **CASES trends** from the **last three months**, providing **insights** from our analysts on the impact of **major announcements**.

How to use this Report

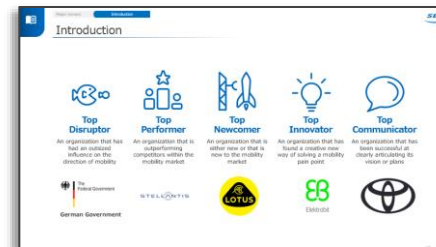
Top Trends

- Trends organized within SBD's **Trend Radar** and categorized by **CASES**
- Related news** explained for each trend along with **data** and **insights**



Major Movers

- Five organizations** picked based on their **impact** over the last quarter
- Announcements** relating to each of the companies **analyzed**



Everything Else

- Complete list of every **major news article** and **announcement** from the last quarter
- Articles organized by **CASES**

Source	Title	Date	Link
Autonews Group	Audi introduces "Audi Thermal" for vehicle customization	04/10/23	LINK
Starline	Starline announced direct-to-car capabilities to be released in 2024 (USA) and 2023	12/10/23	LINK
Goat	Right-to-repair act signed by House and Senate	12/10/23	LINK
Electrek	EVs released by Tesla: Shows support for their own applications	12/10/23	LINK
GT	Standardization of software to focus on EV with goal of providing customers better tech	12/10/23	LINK
The Verge	Vauxh EV300 passes EU speed limit warning requirements with Google built system	06/10/23	LINK
Carfax	Chrysler releases EV starting at \$3,300 price	11/10/23	LINK
Statista	Statista announces global commercial vehicle plan	08/10/23	LINK
Statista	DS integrates ChatGPT into vehicle	08/10/23	LINK
Business Wire	Fisher provides facts, enhancements, and new features with OTA updates	20/10/23	LINK
Reuters	Japan auto show returns	23/10/23	LINK
The Verge	GMG vehicles integrate voice with Apple iPhones	20/10/23	LINK
TechCrunch	Software launch for Porsche and Audi delayed due to Carfax layoffs	20/10/23	LINK
Porsche	Porsche and Google expand partnership	20/10/23	LINK
Autocar	Audi talks to offer more features on demand in 2024	02/11/23	LINK
Salesforce	Salesforce releases cloud services for automotive powered by data and AI	07/11/23	LINK
Automotive News	V2X being researched in Ann Arbor, MI	07/11/23	LINK



Executive Summary

High-level summary of what's changed from the last quarter



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Executive Summary

Trending companies

Top themes

C

Connected



Automakers are working with their tech partners to build embedded AI capabilities and high-speed connectivity. Cloud computing is also being developed because of its ability to unlock a more seamless digital experience for the end user.

A

Autonomous



In Asia, self-driving activities are growing as Governments allow more pilots without the need for an onboard safety driver. In the USA, the California State Government has revoked a major AV mobility company's license to conduct self-driving pilots.

S

Shared

No significant trends observed in the last quarter

E

Electric



Automakers are continuing their efforts to enable electric mobility, particularly with the roll out of 'branded' EV charging experiences and battery swapping. Both of these areas can boost consumer confidence and trigger more sales.

S

Secure



Combating car thefts is still a challenge as burglars exploit security vulnerabilities. Automakers are looking to build confidence by offering security upgrades.

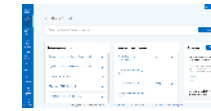
AI

Artificial Intelligence*



Regulatory bodies and AI expert groups are publishing guidelines and standards ahead of fully-fledged legislation on AI.

*Special edition (Let us know if you'd like to hear more in future editions)



Click on the SBD Automotive portal to learn more



New Reports: 2023 Research Summary

A wide **Research Catalogue** designed to help **automotive professionals** navigate effectively through a rapidly-changing industry

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Software-Defined Vehicles (SDV)

Software becoming key in automotive



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Shift beyond connecting cars to delivering value

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Updated Edition Q4

New Report Q4



New report category for 2023



Top Trends

The key trends fuelling the automotive innovation



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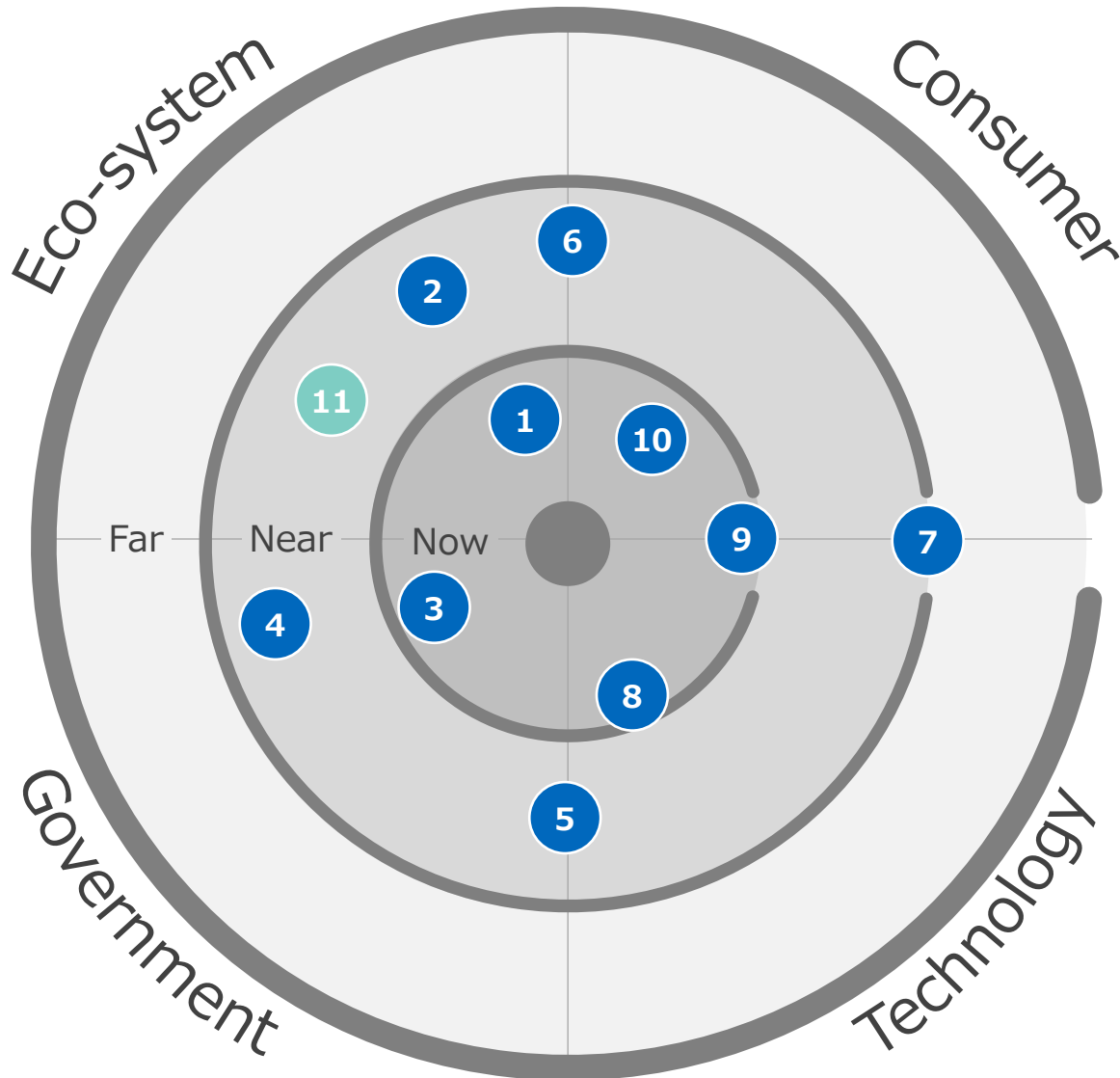
About SBD



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Q4 2023 Trend Radar



- 1 Automakers work with tech companies to improve the digital experience**
Tech giants provide hardware, software and cloud support to automakers
- 2 Virtual assistants as first frontier of generative AI**
Generative AI appears in the vehicle as part of virtual assistants
- 3 Automakers shed jobs as pressure on margins and software delivery increased**
BEVs and in-house software development requires new investments
- 4 Governments continue to develop automated driving regulation**
Regulatory work continues. Governments are mindful of safety incidents.
- 5 Higher level autonomy gaining traction in China and Japan**
AV pilot activities pick up in China and Japan
- No significant trends for shared mobility this quarter*
- 6 Expansion of automakers branded charging stations**
Automakers focused on expanding their branded charging infrastructure
- 7 Automakers move forward with battery swapping**
More companies are interested in battery swapping and its possibilities
- 8 Investments in EV and battery technology started to bear fruit through innovations**
Special emphasis on innovations related to battery technology, chargers, and motors
- 9 Automakers prioritized affordable BEV launches**
Affordability makes them ideal for emerging markets
- 10 Automakers offered consumers upgrades to combat theft**
Automakers prioritize physical security of cars.
- 11 AI standards and regulations**
SAE has announced they are working on several standards involving AI
Special edition (Let us know if you'd like to hear more in future editions)



1 Automakers partner with tech companies for digital experience: In the news

Automakers are partnering with technology companies in areas like cloud computing, AI, and data analytics. Most of these partnerships are focused on software, such as collaborations with Amazon AWS and Microsoft Azure while some automakers also partner with data providers to provide enhanced user experiences. Despite the software focus, hardware providers remain crucial in supporting the overall digital experience.

Continental build display for Hyundai Kona

- Continental built what they describe as a “V-shaped display” for **the Hyundai Kona**.
- This display contains the instrument cluster and the central display **under one piece of glass**.
- The design looks to making viewing and controlling the central **display more ergonomic**.

HERE and Eco-Movement work for improved EV charging experience

- Eco-Movement will provide HERE with charging station data.
- The goal is to leverage Eco-Movement's data to enhance the charging experience for consumers by enabling HERE to deliver more precise and real-time information on charge points.
- eMobility Service Provider (eMSP) will support the partnership as well by providing information on **compatible vehicle charge points**.

AWS supports automakers

- **Hyundai** has partnered with **AWS** for cloud services. Hyundai plans to leverage AWS to transform their digital experience.
- **Amazon Alexa** will become **built-in** on future Hyundai vehicles.
- **BYD** has selected **AWS** as their preferred cloud provider. By using AWS, BYD can provide an enhanced connected experience through automated updates.
- Amazon is also coming to the in-vehicle experience with **Amazon music built-in** for European vehicles.



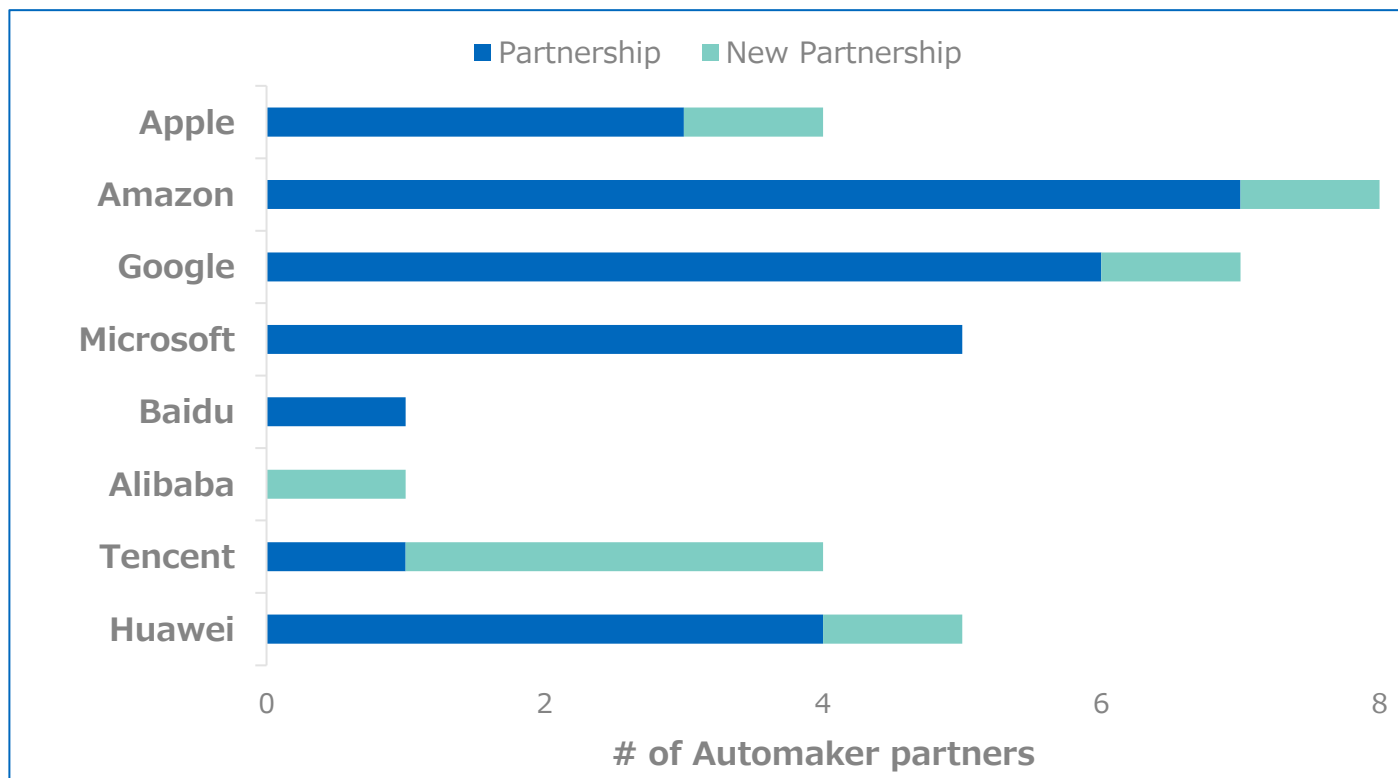
Continental V-Shaped display for Hyundai Kona



1 Automakers partner with tech companies for digital experience: Going Deeper

SBD PERSPECTIVE: Vehicles are becoming more feature-rich with embedded AI capabilities, high-speed connectivity, and digital experiences. These features will be delivered through tech ecosystems pioneered by tech giants. Over the past few years, tech giants have increased their capabilities expanding their geographical coverage and targeting more segments within CASES. This rapid evolution has brought automakers and tech giants together to the extent that automakers no longer see tech giants as potential threats to their business models.

How are tech giants helping automakers? (Source: 212 - Tech Giants in Automotive Guide)



The chart on the left summarizes tech company partnerships with automakers (where the New partnership is for the period 2022-2023) Some tech companies already have long-standing partnerships with automakers. Google’s Android Automotive OS, Apple CarPlay, and Baidu CarLife are now commonplace in vehicles. Tech companies are continuing to make new partnerships to benefit from the evolving nature of the automotive business.

These partnerships are diverse. Some automakers rely on tech companies to power their range of connected and autonomous services through **cloud platforms such as Amazon AWS and Microsoft Azure**. On the other hand, some automakers partner with tech companies for specialized projects, for example, Apple’s partnership with Nissan and Volkswagen on self-driving shuttles.



CASES

USA
China
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Global



2 Digital assistants as first frontier of generative AI: In the news

Automakers are looking for ways to use new AI technology to help build their brand and support the user. Generative AI can be used to improve the in-vehicle virtual assistant. AI virtual assistants can allow for safe interaction with the driver through voice and reduce the need for users to take their eyes off the road and hands off the wheel. Developments outside the automotive industry with AI have allowed for fast implementation into vehicle systems.



DS integrates ChatGPT

- DS opened a pilot phase for **ChatGPT** capabilities within their vehicles.
- The pilot phase is open to the **first 20,000 registered users** and they must have a DS 3, DS 4, DS 7, or DS 9 with a DS IRIS SYSTEM to participate.
- It is **available** in France, Germany, Italy, Spain, and the United Kingdom.



Mercedes Benz Direct Chat for employees

- Mercedes-Benz released an **internal web application** for their employees called **Mercedes-Benz Direct Chat**.
- This web application uses OpenAI's ChatGPT and is intended to help support work-related tasks.
- The user's text input is anonymous and not stored to ensure privacy. Outputs generated must be checked for accuracy, with unreviewed content appropriately labeled.

Lenovo released "AI for All" vision powered by NVIDIA

- Lenovo announced at their Tech World event plans for "AI for All". The plan looks to leverage AI to advance **everyday life and industries**.
- 3 new products were announced at the event. The products are powered by the **NVIDIA DRIVE Thor AI**. These products are:
 - Lenovo XH1: Central compute unit for ADAS and smart cockpit
 - Lenovo AH1: L2++ ADAS domain controller unit
 - Lenovo AD1: L4 autonomous driving domain controller unit



Mapbox announces MapGPT

- Mapbox has developed a generative AI model known as MapGPT.
- The AI model is **available to developers** to incorporate into their applications.
- The AI has access to **in-depth location data**, allowing users to get important information and **support with navigation, infotainment, and trip planning**.
- Actions can also be performed by the AI, such as **making reservations at a location**.



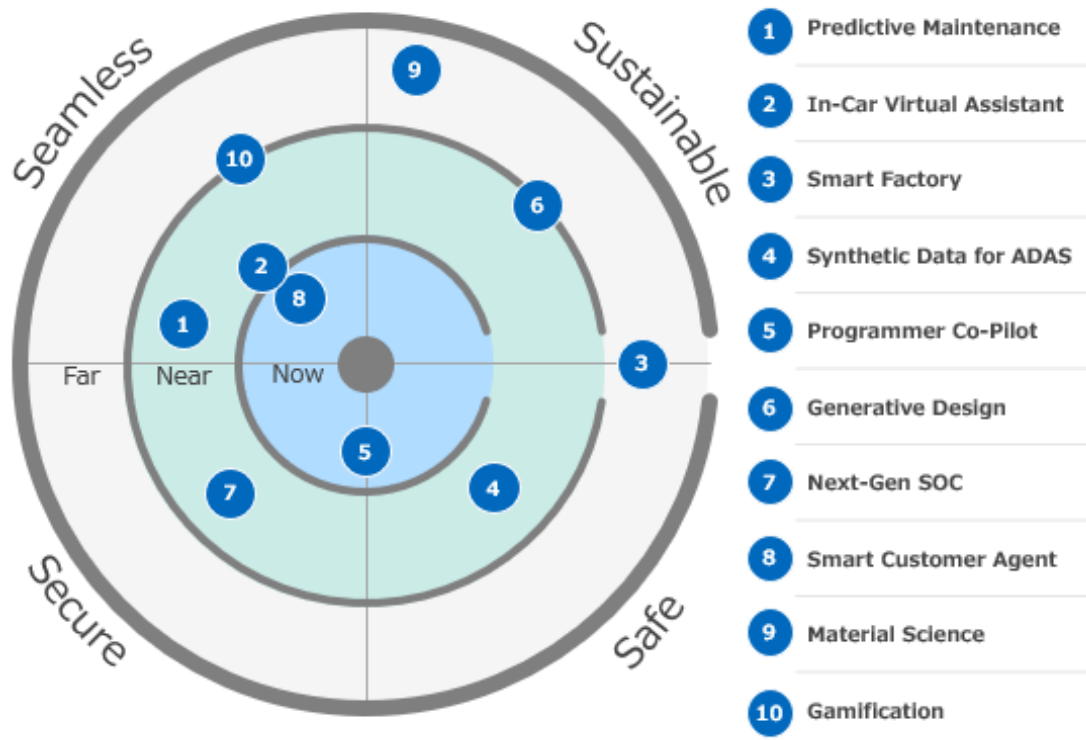


2 Digital assistants as first frontier of generative AI : Going deeper

SBD PERSPECTIVE: The new wave of AI is impacting business processes. Most automakers today prioritize integrating AI into in-car features like virtual assistants and ADAS. Some automakers are using AI to strengthen their business processes, especially in Research and Development. SBD anticipates a multifaceted AI approach within automakers with high-level prioritization and coordination to ensure maximum efficiency and the best return on investment.

Automotive AI use-cases

(Source: SBD Explores: Automotive AI Use Cases – 2200e)



SBD has identified 10 potential AI use cases and categorized them against four personal mobility outcomes. They are shown on the graph on the left.

- Large language models (LLM) excel in multiple forms of language understanding, spanning human languages and programming languages.
- The superior capabilities of LLM compared to previous Deep Learning models include:
 - Proficiency in understanding and operating in various languages.
 - Ability to comprehend and retain common knowledge.
 - Proficiency in reasoning, a.k.a. the Chain of Thought (COT).
- In SBD’s view, we are currently in the initial stages of advanced AI development, and the future trajectory of AI is fraught with uncertainty around how fast it will continue to develop and what legislation will arise to control and monitor AI.
- There are ongoing safety and privacy concerns that need to be addressed, such as the potential misuse of input data for AI training.





3 Automakers shed jobs as pressure on margins and software delivery increased: In the news

Automakers are being affected by inflation. This is being shown by their efforts to reduce workforce and operating costs. Automakers are also balancing new investments in rapid electrification and software defined vehicles. In the USA, the recent Union Auto Workers (UAW) strike may have also led to automakers making the decision to reduce workforce size.

Cruise cuts 24% of its workforce

- Cruise, The **GM self-driving subsidiary, is laying off 900 employees** from non-engineering jobs such as commercial operations and corporate staffing.
- The layoffs are part of a **plan to cut costs and revamp** the company.
- Cruise blames the revamping on an October 2 incident where a pedestrian was struck by a vehicle.

Stellantis plant in Toledo to lay off thousands of workers

- The Toledo Assembly Complex could **lay off 1,200 employees** by Feb 5th.
- The plant will be changing to two shifts to manage sales.
- A main aspect of this is **higher interest rates slowing car sales** and over-saturation of the market.
- The Toledo plant produces the Jeep Wrangler and Gladiator.

Jeep owner Stellantis announces mass layoffs

- The Detroit Plant **may lose up to 2,445 workers** in addition to the Toledo plant.
- The Detroit Plant produces the Jeep Grand Cherokee.
- Stellantis is cutting these jobs **due to a lack of sales** from the Jeep brand.
- This layoff is followed by the previous layoff (of 1,310 employees) in Illinois due to the **slow transition to electric vehicles**, aligning with industry-wide cost-cutting measures amidst falling ICE vehicle sales.

Volkswagen Brand to slash administrative costs in \$11 Billion cost cut drive

- Volkswagen plans to **reduce its administrative costs** by nearly \$11 billion by 2026.
- Volkswagen has been hit by inflation and fierce competition from Asian companies. Other automakers are facing similar pressures.
- High labor and energy costs in Germany are also contributing towards the need for cost-cutting measures.
- Another **cost-saving initiative by Volkswagen** is the cancellation of the \$900 million R&D plant project in Wolfsburg, Germany.



3 Automakers shed jobs as pressure on margins and software delivery increased : Going deeper

SBD PERSPECTIVE: Job cuts by automakers due to rising material costs and economic uncertainties pose a distressing situation for employees. The shift towards in-house software and electric vehicles, coupled with production challenges, introduces more complications, causing uncertainties in the manufacturing process and delays in launching new models. Amidst an industry undergoing significant transformation, prioritizing employee well-being and facilitating transitions to new roles or industries becomes essential to adapt to evolving skill demands.













Automakers investments towards EVs and delays in software deliveries

(Source: 623 – Electric Vehicle Guide, [Automotive News Europe](#))

Volkswagen layoffs likely to continue

- The consequences of delays in software development have forced **Volkswagen** to trim jobs.
- Due to delays in getting the **software delivery**, Volkswagen is letting go of 2,000 employees from its software unit, Cariad. These job cuts are expected to take place in 2024 and 2025.
- The delay in the development of the software means that the launch of some new electric car models, like the Audi Q6 e-tron and Porsche Macan, will be pushed back by about 4 months.
- Additionally, the planned 2.0 architecture for 2025 is undergoing a complete redevelopment due to these challenges in software delivery.

The table below showcases automakers' investment announced for their EV strategy and remain competitive in a fast-developing market.

Automakers	Announced Investments towards EVs	EV Models Committed	Automakers	Announced Investments towards EVs	EV Models Committed
 HONDA	\$40bn	30		\$35bn	70
	\$70bn	30		\$6.5bn	25
 MAZDA	\$10bn	13	 HYUNDAI	\$87bn	34
	\$30bn	40		\$85bn	10
 NISSAN	\$17.6bn	23		\$35bn	30
 STELLANTIS	\$35.5bn	75		\$3.7bn	6



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4 Governments get serious about regulating automated driving: In the news

With the roll out of more automated vehicles, the public is pushing Governments to regulate and adopt standards for vehicle safety. Many countries have begun or finished studying these systems and are developing plans for the testing of these systems. Some states in the USA allow SAE Level 3 driving but that is very limited currently. In Europe, Governments are introducing new laws to regulate the use of automated vehicles, with safety being the topmost priority.

California DMV suspends Cruise's robotaxi permit

- The California Department of Motor Vehicles (DMV) **suspended the license** that was issued just a few months ago.
- The Cruise Robotaxis were operating in the San Francisco area.
- Cruise representatives met with the DMV and another undisclosed agency one day after an **October 2nd incident**.
- The October 2nd incident involved a pedestrian who was hit by another vehicle next to the AV and **fell under the vehicle and became trapped**.



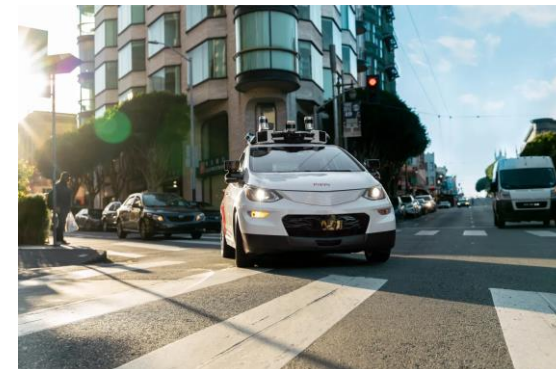
Tesla recalls nearly all vehicles sold in the US

- The recall covers more than **two million vehicles** in the U.S. to update software.
- The update will fix an issue noticed by the federal government that needs to ensure the driver is **paying attention to the road**.
- The update will increase the warnings and alerts to the driver but will also limit **where the "Autopilot" system can operate**.
- Tesla met with investigators in October, and after disagreeing with their findings, they **still agreed to issue the recall**.



UK government announces automated vehicle bill

- After **four years of legal review and three public consultations** which received hundreds of responses from individuals and organizations, the **UK Government** proposed the Automated Vehicle Bill.
- **75 recommendations** set out the shape of a new legal framework to enable the safe deployment of self-driving vehicles.
- **The distinction between driver assistance technology and self-driving technology** is a fundamental principle of the safety framework.



Cruise Robotaxi Vehicle



Tesla vehicle recall



4 Governments get serious about regulating automated driving: Going deeper

SBD PERSPECTIVE: The automakers across Europe have been fitting various ADAS like autonomous emergency braking (AEB) and lane keeping assist (LKA) and have seen a steady rise in penetration even before the system was mandated. Automakers have acted proactively and offered these systems as a standard fit on many models which is primarily driven by government regulations. These ADAS regulations also serve as building blocks for overall autonomous vehicle laws. However, safety-related incidents (like the Cruise crash in the US) are a huge setback for the industry and stifle years of progress and the overall regulatory process.

Regulations on ADAS and AV in Europe

(Source: 535 – Autonomous Car Legislation Guide)

Name of the system	Vehicle category	Mandated by
Driver drowsiness and attention warning	M1, N1, M2, N2, M3, N3	2022 (New type), 2024 (All vehicles)
Intelligent speed assistance	M1, N1, M2, N2, M3, N3	2022 (New type), 2024 (All vehicles)
Emergency lane keeping system	M1, N1	2022 (New type), 2024 (All vehicles)
Event data recorder	M1, N1	2022 (New type), 2024 (All vehicles)
Advanced Emergency Braking system (AEB)	M1, N1	2022 (New type), 2024 (All vehicles)
Blind Spot Warning Systems	N2, N3	2022 (New type), 2024 (All vehicles)
Advanced emergency braking for VRUs	M1, N1	2024 (New type), 2026 (All vehicles)

M1, N1: Passenger cars, multipurpose vans; M2, M3: Minibuses, full-size bus; N2, N3: Trucks

Regulatory groundwork on automated vehicles/ADAS across the world

- The [General Safety Regulation \(GSR II\)](#) as amended has been in force since July 2022. The GSR II imposes a range of (see the table) active safety and Advanced Driver Assistant Systems (ADAS) depending on the type of vehicle. Cars and vans will need to have some additional features like **emergency lane-keeping system and advanced braking system** which is not mandated for trucks. Similarly, **blind spot warning** systems are mandatory in commercial vehicles but not in passenger cars.
- Along similar lines, the **UK government** is also proposing a holistic automated vehicle regulation.
- The Government of the USA, through NHTSA, is also working on a federal mandate for AEB systems.





5 Higher level autonomy gaining traction in the East: In the news

Although autonomous vehicles and ride-hailing services are facing challenges in the West, companies are exploring new markets in the East, especially in China. Despite regulatory hurdles and public doubt, the potential for growth in the East, driven by technological advancements and evolving consumer preferences, continues to attract significant investments and partnerships.



BMW gains test license in Shanghai for L3 autonomous driving

- BMW Group has obtained a **test license for level 3 autonomous driving on high-speed roads** in Shanghai, which is an advancement over their current autonomous test license. The existing license acquired in 2018 allows them to conduct tests on 5.6 km of public roads in the city.
- The new license broadens BMW's testing capabilities for advanced autonomous driving in Shanghai, aligning with China's efforts to promote widespread adoption and **safety guidelines** for autonomous vehicles in public transport.



Mercedes-Benz gets L3 self-driving test permit in Beijing

- Mercedes-Benz has received approval to **conduct L3 self-driving road tests in Beijing**, following a similar permit granted to BMW in Shanghai. The permit allows Mercedes-Benz to test vehicles with conditional self-driving functions on **designated highways** in Beijing.
- Mercedes-Benz aims to optimize its **L3 system for speeds of up to 130 km/h** on highways by the **end of the decade**. Early this year, Mercedes-Benz **introduced the L2+ navigation-assisted driving feature** on the new long-wheelbase E-Class.



GM, Cruise and Honda Are Bringing Autonomous Vehicle Ride hail Service to Japan

- **GM, Cruise, and Honda** are forming a **joint venture** to launch a driverless ride-hail service in **Japan by early 2026**. Utilizing the Origin (another joint venture between GM, Cruise, and Honda) vehicle, the joint venture aims to meet the high demand for taxis in Japanese cities and provide an accessible transportation solution.
- GM will manufacture around **500 Origin vehicles in Michigan** for the launch, reflecting collaborative efforts in manufacturing, software, and development.



Origin autonomous ride hailing vehicle by GM, Cruise and Honda joint venture





5 Higher level Autonomy gaining traction in the East : Going deeper

SBD PERSPECTIVE: Despite being the first country to approve SAE L3 commercially, Japan hasn't made any significant progress in advanced levels of autonomy. Similar situations appear in China in terms of 'hands-free' law restrictions. However, both these countries are finally making some serious attempts to expedite the legal process to regulate automated driving which will pave the way for more unmanned AV trials and commercial approval of SAE L2+, SAE L3, and so on.

Autonomous vehicle trial comparison (US, EU and CHN)

(Source: 814 - L4 Autonomous Vehicles Pilots)

Regions	Proportion of manned and unmanned L4 pilots	Key takeaways
	<p>Unmanned: 22 Manned: 37</p>	<ul style="list-style-type: none"> USA is leading in terms of the number of active L4 pilots being conducted across the country. Most unmanned pilots are in the 'Last-mile delivery' segment as the vehicles or pods used in these trials are small and move on the pavements and sidewalks at a very low speed. Shuttles and ride-hailing pilots are starting to move from manned to unmanned.
	<p>Unmanned: 14 Manned: 16</p>	<ul style="list-style-type: none"> European L4 trials are predominantly focused on passenger mobility (shuttles & robotaxis) and nearly half of the active pilot projects are without safety drivers. Some of the pilots, though unmanned need remote supervision. Starship's last-mile delivery pilot which is commercially operating in a few countries is constantly monitored by a remote operator.
	<p>Unmanned: 11 Manned: 16</p>	<ul style="list-style-type: none"> China L4 trials are predominantly focused on robotaxis and automated trucks and roughly 40% of the L4 pilots are unmanned. The overall number of trials in China is gradually picking up. Like the USA and EU, some robotic autonomous delivery pilots in China that use small delivery pods do not need a safety driver but require constant monitoring by a remote operator for navigating intersections.



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6 Expansion of automakers' branded charging stations: In the news

Telsa has led the industry when it comes to reliable charging infrastructure. By having connected infrastructure directly controlled by the automaker, Tesla has been able to offer reliable service that customers can count on. Other automakers are looking to follow suit and are building their own branded charging networks globally.



CASES

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Europe

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Lotus expanding charging stations and introduces charging solutions

- Lotus launches charging station brand as part of the **all-electric journey by 2028**.
- Lotus chargers are available **today in China** and are expected to arrive in **Europe and the Middle East by Q2 2024**.
- Solutions include **an ultra-fast 450 kW DC charger** design. It can charge up to 88.5 miles (142 km) of range in ~5 minutes.
- Liquid-cooled design for All-in-one DC charger, Power cabinet, and Charging unit.



Mercedes-Benz charging station expansion

- Mercedes-Benz has opened charging stations in Germany and the USA.
- A charging station supporting **400 kW charging speeds** has been installed in **Atlanta, Georgia**, by the USA headquarters of the company.
- The stations were built in collaboration with **ChargePoint**.
- The charging stations built in Germany will support up to **300 kW charging speeds**.



BMW and Mercedes-Benz collaboration

- BMW and Mercedes-Benz will form a **joint venture to build charging stations in China**.
- Goal of 1,000 high-power charging stations and 7,000 charging piles **by the end of 2026**.
- **First station** is set to be built and **operational in 2024**.



Lotus Charging Solutions



Mercedes High-Power Charging Network



6 Expansion of automakers' branded charging stations: Going deeper

SBD PERSPECTIVE: Automakers find themselves in a compelling situation as they navigate the development of their electric vehicle infrastructure strategy on a global scale. While most EV makers have traditionally relied upon 3rd party public charging operators; many are constructing (or at least considering) their own branded charging station network. Thus, establishing a branded EV charging station can certainly boost the company's overall brand value and trigger sales conversions. However, scaling the EV charging network with time and deriving a sustainable ROI remain two of the biggest challenges.

Automakers providing own-branded services (Source: 217 – EV Charging Infrastructure Guide)

Automaker	Own-Branded Services
Audi	e-tron Charging Service
BMW	BMW Charging
Ford	FordPass Charging Network
Hyundai	Charge myHyundai
JLR	Jaguar Charging App/Go I-PACE (Plugsurfing)
KIA	Kia Charge
Mercedes-Benz	Mercedes me Charge
Porsche	Porsche Charging Service Porsche Destination Charging
Stellantis	Free2move Electric Charge
Tesla	Tesla Supercharger network Tesla Destination Charger network
Volkswagen	We Charge
Volvo	Volvo Recharge Highways

Overview

Automakers are developing their charging networks for electric vehicles for several reasons. Firstly, it helps alleviate range anxiety for potential customers, as having control over the quality and availability of charging stations ensures a reliable and convenient charging experience. This makes electric vehicles more appealing and addresses a significant concern of buyers.

Secondly, developing charging networks gives automakers a competitive advantage by differentiating themselves from competitors. In addition to focusing on the quality of their vehicles, they can now also emphasize the quality of their charging infrastructure, attracting more customers in the growing electric vehicle market.

Exclusive Charging Networks

Pros

- Offers a unique, premium experience for a brand's customers
- From an automaker's perspective, it's a direct way to support customers
- Vertically integrated automakers (e.g., Tesla) can drive revenue to other parts of its business and ensure coverage in nascent EV markets
- Allow for control of the broader EV ownership experience

Cons

- Customers may feel bound to the proprietary network, missing out on access to public networks
- Collaboration with other automakers is necessary to overcome infrastructure barriers and transform the EV market into a self-sufficient market
- Addressable market and profitability is generally enhanced if the network is non-exclusive
- Automakers lacking vertical integration should be wary of the investment required for this approach





7 Automakers move forward with battery swapping: In the news

NIO is leading in the space of EV battery swapping. They have deployed swapping stations on a large scale throughout China and a few in Europe. Battery swapping offers some key advantages over traditional EV charging. Battery swapping can reduce the time needed to achieve a full charge and minimize issues related to battery damage and degradation as it can be replaced easily. Some Chinese automakers have looked to leverage NIO's capabilities by partnering with them. Stellantis is also looking to incorporate battery swapping into its models and has partnered with a company called Ample.

Stellantis and Ample partnership

- Stellantis looks to use Ample's modular battery swapping technology.
- Ample's technology offers battery swapping in **less than 5 minutes**.
- Stellantis plans the first implementation to be in **Europe with Free2move's Fiat 500e car-sharing fleet** and is expected to role out in **2024**.

Changan Auto and NIO

- Changan and NIO have signed an agreement to **work on battery swapping in Chongqing**.
- The companies will work to **build a standard** for battery swapping, swapping stations, and vehicles making it **quick, effective, and sustainable**.

Geely Holding and NIO

- Geely and NIO have signed an agreement to cooperate on battery standards.
- Like the deal with Changan Auto, NIO, and Geely will work on **battery standards, swapping technology, and network expansion**.
- The partnership supports China's initiatives **for new infrastructure and energy**.



Concept image for Stellantis and Ample battery swap station



Current NIO battery swapping station



7 Automakers move forward with battery swapping: Going deeper

SBD PERSPECTIVE: The limited charging infrastructure in numerous regions hinders the widespread adoption of electric vehicles, causing consumer frustration and, at times, results in queues. Battery-swapping technology can be an interim solution for drivers who are considering a transition from ICE to EV and have no intention to change their driving habits. It would help with range anxiety for long-distance travel with no charging time required and serve as an ideal solution for those who are unable to install a charging facility at home or work. However, current battery-swap stations are mostly designed and built by automakers themselves, which leads to a closed ecosystem, requiring specific pack designs to meet the swap station's requirements.

Will battery swapping go mainstream?

(Source: 219 – EV Battery Technologies & Ecosystem)

Battery Swap Service in different regions



- China is currently the **largest market share in battery swap service**. There are more than 1900 stations across China, which are mainly constructed **by NIO, Aulton, and CNEV**. The overall number of stations is expected to exceed 30 thousand stations by 2025.
- The potential market disruptor is a joint company established by SAIC, CATL, and two state-owned oil companies SINOPEC and CNPC. By transforming the fuel station of SINOPEC and CNPC into a combined station, it can easily build a nationwide battery swap network.



- Currently most battery swap stations in the **EU are constructed by NIO**, which are located in Germany, Netherlands, Norway, and Sweden. In the Netherlands, one of its stations is now co-branded by Shell, which shows the determination of Shell to follow the trend of electrification.



- The modern battery swap station was first released by Better Place in 2011, however, it went bankrupt in 2013 and it never ran any station in the USA.
- A start-up called **Ample has developed several automatic battery-swap stations** around the San Francisco, Bay Area and it has formed partnerships with five automakers and designed adapter plates for 20 models. In 2021, it struck a deal with Uber to share the station.



8 Investments in EV and battery technology started to bear fruit through innovations: In the news

In the rapidly evolving landscape of electric vehicles (EVs), automakers and their strategic partners are making advancements not only in batteries but also in chargers and motors. Collaborative efforts are shaping the future of sustainable mobility, with innovative technologies and partnerships driving the development of more efficient, cost-effective, and sustainable EVs.



Stellantis and CATL sign MoU for the local supply of LFP batteries for Europe

- **Stellantis and CATL** have signed a MoU for the local **supply of LFP battery cells** and modules, considering the formation of a joint venture. This collaboration aims to support Stellantis' EV production in Europe.
- The partnership focuses on a technology roadmap and **strengthening the battery value chain**, aligning with Stellantis' carbon net zero goal by 2038.
- Stellantis aims to utilize **LFP technology** for its **electric vehicles** in Europe, particularly in the **B and C segments**.



Toyota and Idemitsu to produce solid-state batteries in FY27

- Partnering on **solid-state batteries**, **Toyota and Idemitsu** plan to address durability and mass production challenges. They aim to launch EVs featuring these batteries **by 2027-2028**.
- Solid-state batteries offer quicker charging and longer ranges. Toyota's goal is a **610-km range**, 2.4 times that of current EVs, with less than **20 minutes of charging**.
- While **solid-state batteries** will initially be limited to **expensive vehicle** models, Toyota is also developing **affordable LFP batteries**.

XCharge's battery-integrated EV charger makes debut in Japan

- XCharge Group and BYD introduced the Net Zero Series (NZS) **210kW Battery-Integrated DC Charger** in Osaka, marking its entry into the Japanese market.
- The NZS offers 210kW EV charging with minimal 30-60 kW input, ideal for locations with grid limitations. Launched successfully in Spain in 2023, it **serves as a reliable backup during outages**.
- Designed for Japan's focus on green energy with **B2G, V2G capabilities, and solar integration**.



GM and Niron Magnetics pursue sustainable EV Motor Magnets

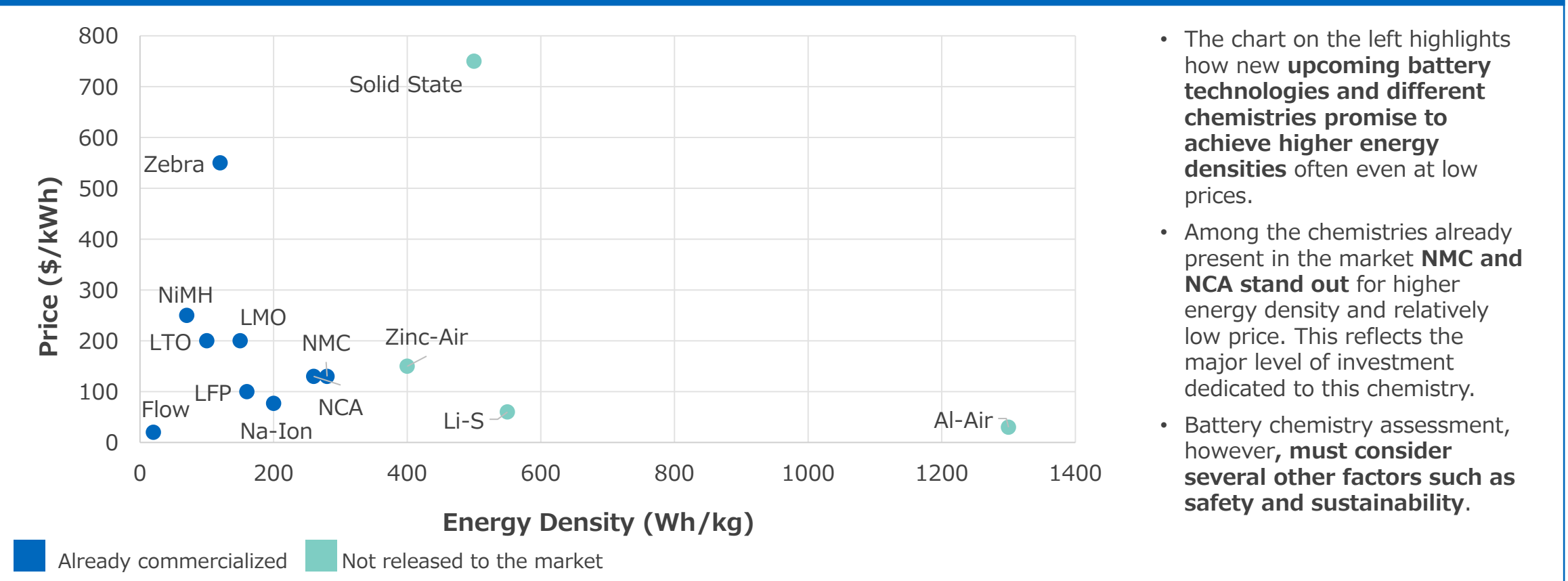
- Partnering with **Niron Magnetics**, **GM** aims to co-develop clean earth magnet motor technology, **eliminating the need for rare earth minerals** in EV motors. Niron's **iron nitride-based magnets offer a cost-effective and sustainable alternative**.
- GM collaborates with Niron through a partnership, investing to **support the scaling of sustainable magnet manufacturing**. This aligns with GM's vision dedicated to an all-electric future, focusing on a sustainable EV portfolio.



8 Investments in EV and battery technology started to bear fruit through innovations : Going deeper

SBD PERSPECTIVE: As automakers gear up for rapid electrification of their model lineups, investment in battery technology remains the primary focus. These strategic investments are targeted to overcome all the battery-related hurdles facing EV innovation. However, the industry is still considering the ideal material and raw material sourcing strategies to develop next-generation batteries. The priority for the automakers with these massive investments in battery and EV infrastructure is not only to alleviate the range anxiety problem but also to do it in a more environment-friendly manner.

Battery chemistry prices & energy densities compared (Source: 219 – EV Battery Technologies & Ecosystem)



- The chart on the left highlights how new **upcoming battery technologies and different chemistries promise to achieve higher energy densities** often even at low prices.
- Among the chemistries already present in the market **NMC and NCA stand out** for higher energy density and relatively low price. This reflects the major level of investment dedicated to this chemistry.
- Battery chemistry assessment, however, **must consider several other factors such as safety and sustainability.**

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9 Automakers prioritized affordable EV launches amidst a global credit crunch: In the news

The high price of EVs, mixed with range anxiety has been making people reluctant to purchase an EV. Automakers have been looking to reduce costs to attract more people to the EV market. Automakers from all over the world have been trying to lower the cost by making smaller SUVs with a good range to suit the needs of people who are in urban to somewhat rural areas.



BYD Yuan UP Electric pictures revealed ahead of the launch

- The **new compact EV pictures have been leaked over the internet.** The new SUV will be the smallest in the Yuan series and will be **slightly smaller than the Kia EV5**
- BYD has had an excellent sales streak, **selling over 170,000 EVs** in November alone.
- Battery options come in either **70kW or 130kW** and will include BYDs LFP Blade Battery.
- Prices are expected to be around **\$14,000** when it gets released in the **first half of 2024.**



Citroen reveals the first European electric vehicle

- The new E-C3 from Citroen will be **an affordable EV** for the European market.
- Equipped with a **44kWh battery** that claimed almost **200 miles** of range and **100kW DC fast charging.**
- Prices start at **\$25,000** with a claimed 124 miles option starting at \$22,000 coming in 2025.
- The E-C3 comes equipped with **Citroen Advanced Comfort Suspension** with new Advanced Comfort Seats to give a "Magic Carpet Ride" feel.



Kia to release affordable small to midsize SUVs

- Kia to release **three new EV models**
 - Compact SUVs EV5 and EV3
 - EV4 Sedan
- Prices for the new models will range from **\$35,000 to \$50,000.**
- Kia is aiming to sell one million EVs by 2026.



BYD Yuan UP Electric



Citroen E-C3



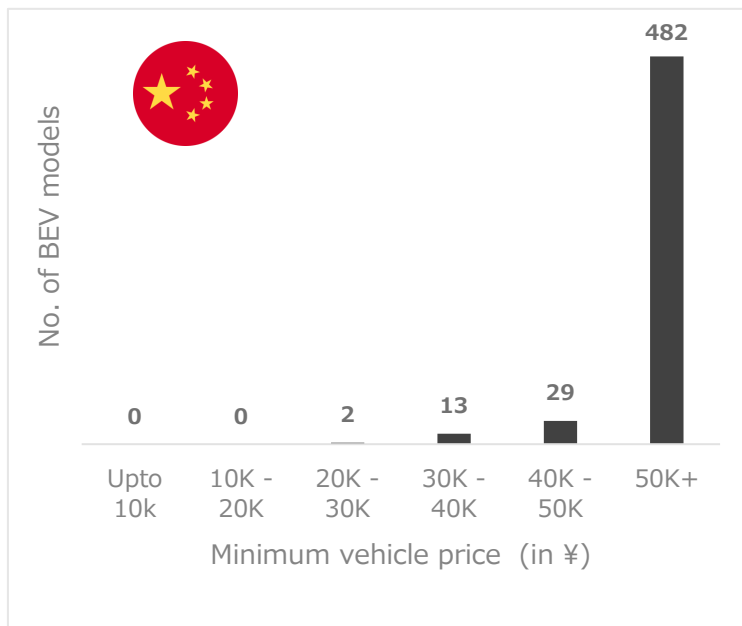
9 Automakers prioritized affordable EV launches amidst a global credit crunch: Going deeper

SBD PERSPECTIVE: Acquiring an electric vehicle is still relatively expensive due to high up-front costs. This is one of the biggest reasons why EVs have a relatively low share of the vehicles sold in the market. However, that trend is changing as automakers are prioritizing more affordable electric model launches. The presence of affordable electric vehicles is currently limited in the market, especially when solely considering the (MSRP) without considering incentives and subsidies. Despite having a shorter range compared to more expensive models, their lower cost makes them appealing to automakers aiming to penetrate emerging markets.

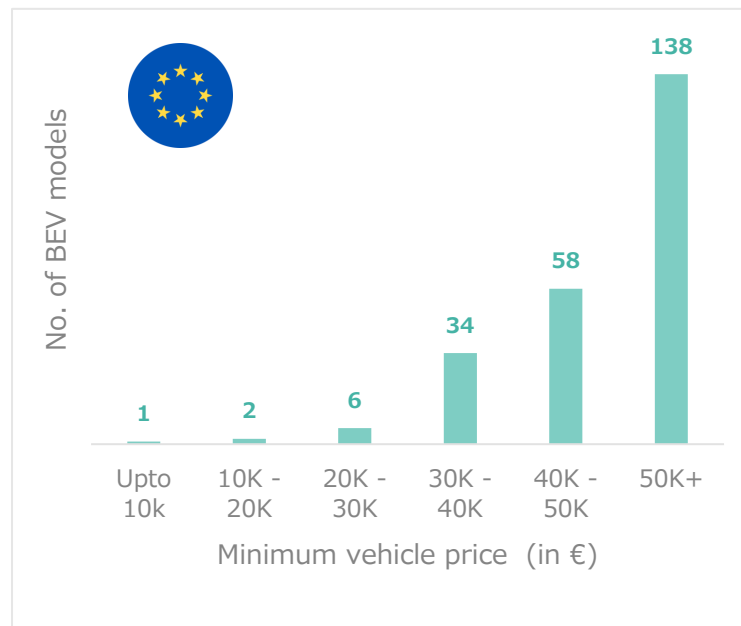
BEV models price ranges in the respective regions

(Source: 623 – Electric Vehicle Guide)

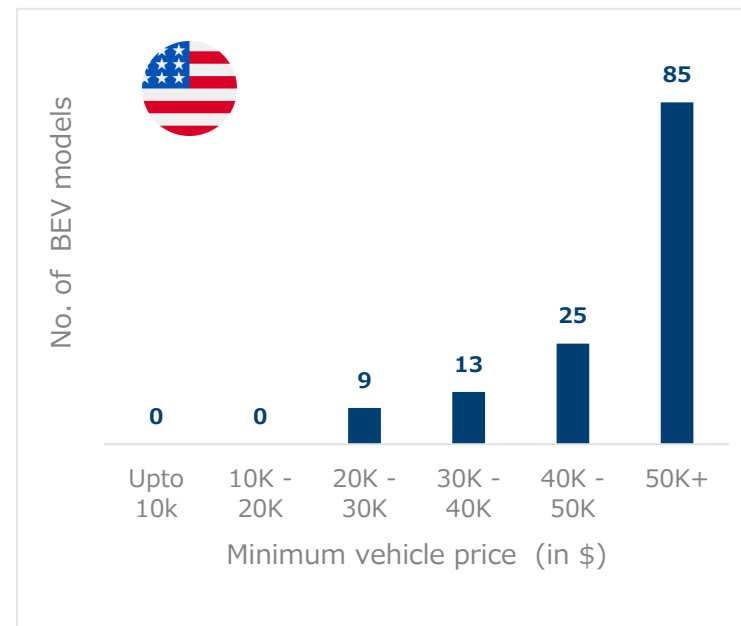
In China, only two models **BAW-Yuanbao (9.6 kWh)** and **Chery-QQ Bingqiling (9.6 kWh)** under ¥ 30K, and the majority under ¥ 50K+ price range.



In Europe, there are BEVs available in the first two price ranges (up to € 20K) compared to China and the USA, with **Opel Rocks-e** priced at **€7,990** being the cheapest BEV available.



In the USA, the BEV model's distribution against the minimum price is almost the same as China's (as seen in the charts below). **Nissan's** offering of the **Leaf 40 kWh** model, is the currently affordable BEV at **\$20,540**.



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10 Automakers offered consumers free upgrades to combat rise in theft: In the news

Car thefts, particularly targeting specific brands, are on the rise. Thieves exploit security vulnerabilities, creating significant challenges for owners, given insurance companies' reluctance to provide coverage or high premiums. To address this, automakers are offering security upgrades and other solutions.

JLR JLR re-launches in-house insurance due to increased Range Rover thefts

- JLR reintroduces in-house insurance to aid customers facing soaring premiums, particularly affecting Range Rover owners.
- Launched in October 2023, it serves **4,000+ clients with a monthly premium below £200**. Fully comprehensive and flexible, **repairs are done by JLR authorized shops** with genuine parts.
- Prices guaranteed for 12 months and **clients can modify or cancel without fees**.

JLR JLR invests £10 million in vehicle security to reduce thefts

- JLR UK **invests £10 million to deploy updates aimed at protecting vehicles from theft** focusing on models like the **Range Rover, Range Rover Sport, and Defender**.
- Updates, including **enhancements** to the **Body Control Module**, combat keyless entry hacks. JLR advises using smartphone apps for added security, featuring vehicle lock reminders and Guardian Mode for monitoring and alerts.
- Over **65,000** eligible vehicles from **2018** onwards receive security updates through retailers. JLR actively contacts clients for broad deployment.

Kia and Hyundai hosts free software upgrade center amid thefts

- Kia and Hyundai **offered free anti-theft software upgrades** for its vehicles by hosting installation centers in communities across the USA.
- The installation centers were opened in various parts of the country on different dates in October and December, with no appointment needed. The upgrade process took **around 30 minutes**, the company said.
- The software fix was for vehicles from the model years **2011 to 2021 with a turn-key ignition**. Models that were **not compatible** with the software updates were given **steering locks**.



Video from one of the Hyundai clinic in the USA

Source: [Carscoops](#)



Security sticker given after the software update to prevent further break-in

Source: [Carscoops](#)





10 Automakers offered consumers free upgrades to combat rise in theft: Going deeper

SBD PERSPECTIVE: Thieves steal vehicles they can sell, use, or dismantle to sell the parts. SBD believes that the most popular models for thieves are those cars that must be in demand either through specific orders, or easy to re-sell in the used car market(not always new or high-cost models). The automakers need to identify these patterns and prioritize the necessary software upgrades or OTA updates on these models. Another aspect is if the vehicle is part of a business fleet (taxi or delivery van for example) it can be important that upgrades are carried out as quickly as possible and for the lowest cost. This also necessitates the parts/ and components to be delivered to the dealers as quickly as possible and at an affordable cost.

E-Theft tools and OTA updates as CX-friendly solution

(Source: 554- Anti-theft Guide; 638 - OTA, FaaS & SW-Delivered Features Guide)

E-Theft tools

Trends in vehicle theft are linked to the most popular targeted models and those with the simplest and fastest method to gain entry and start. It is a common misconception that high-cost supercars are most at risk from theft. This is not to say that they are not stolen, but the reality is that unless you have a specific order for one of these models, the market for a stolen supercar is very small.

Relay Attack

Code Grabber

Key Programming

Transponder

Security Control

OTA updates

The holistic experience for the fixes of the vehicle recall and security through OTA updates (in the case of firmware and software) is the ideal solution.

Cost saving

The ownership cost of the vehicle is saved as the OTA update is deployed to the vehicle with the requirements of connectivity only and not requiring the visit to the dealerships.

Convenience

The hassle of the vehicle owners at dealerships while amid busy schedules is saved



Safety

Software bugs can be fixed quickly and efficiently in case of safety concerned issues



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11 AI standards and regulations: In the news

The SAE has been establishing comprehensive standards for AI, ranging from defining the technology to recommendations for AI development, thereby simplifying complex topics for the industry. As all standards mentioned below are a work in progress, SBD will continue to monitor their developments.

SAE INTERNATIONAL SAE AI – Terms & definitions taxonomy

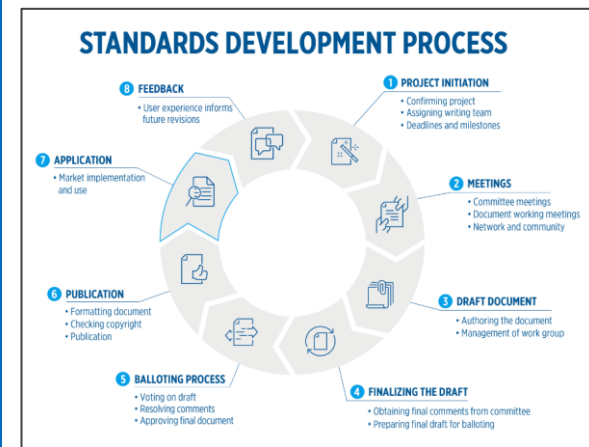
- The SAE is working on creating a list of terms and definitions that apply to artificial intelligence.
- Announced December 15, 2023, the standard is currently a work in progress and will be released later.
- These definitions will help to standardize the complex world of AI with use of common terminology.
- Classified as SAE J 3313

SAE INTERNATIONAL SAE AI – Use cases in ground vehicle applications

- Another work in progress standard by the SAE is the ‘AI – Use cases in ground vehicle applications’.
- The goal of this standard is to identify use cases and applications of AI in ground vehicles and transportation infrastructure.
- The report will be published with guidance on best practices and standards for AI use cases.
- Written in collaboration with other standard organizations/groups.
- Classified as SAE J 3312

SAE INTERNATIONAL SAE AI – WIP for ground vehicle AI data information

- Announced late in Q3 (Sept 28), the SAE is working on a report for data collection, processing, and usage for developing AI.
- This standard will focus on systems and applications for the ground mobility domain.
- Classified as SAE J 3298



SAE Standards development process



AI

- USA
- China
- Europe
- Other
- Global

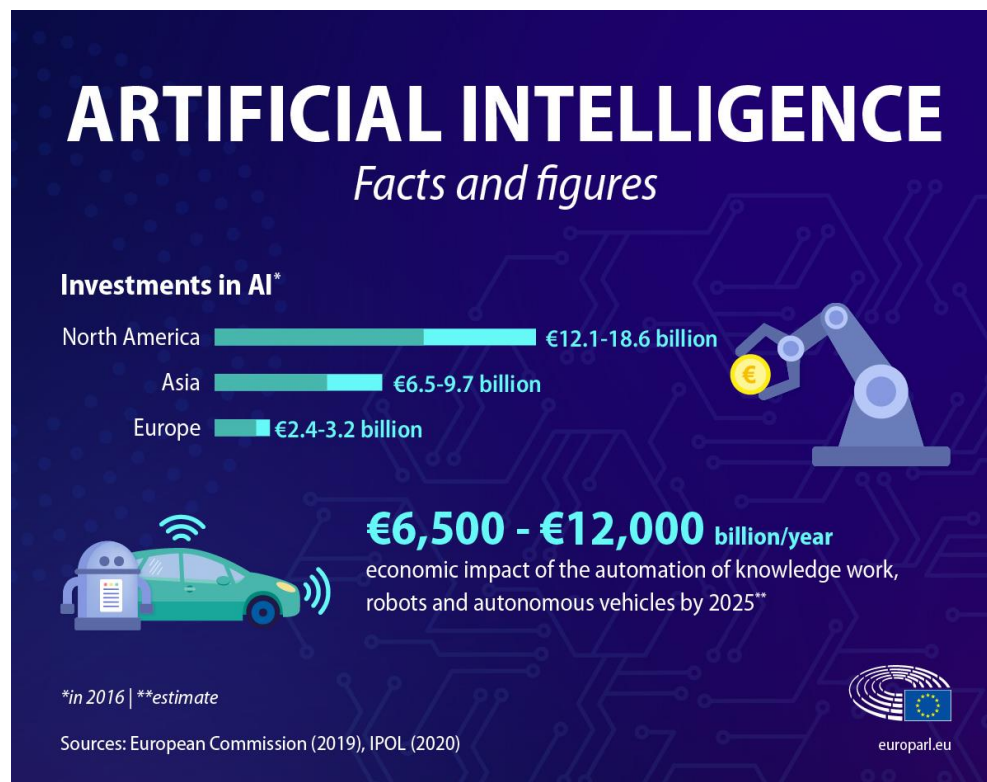


11 AI standards and regulations: Going Deeper

SBD PERSPECTIVE: The automotive industry is committed to leveraging AI and machine learning technology in response to consumer demands. As AI is becoming more common across the entire value chain, Government bodies are emphasizing the need to incorporate automotive-specific AI standards. The aim is for these standards to help AI improve vehicle production efficiency and promote safer mobility around which wider regulations are likely to be made. Going forward in the absence of any firm regulations, these standards are also likely to be integrated into the existing vehicle type-approval framework.

State of AI regulation in Europe

(Source: 528 – Connected Car Legislation Guide, European Commission)



European Data Protection Supervisor (EDPS) publishes final recommendations on the AI Act

The AI Act designates the EDPS as a notified body and market surveillance authority to assess the conformity of high-risk AI systems. The EDPS considers that individuals affected using AI systems should be provided with the right to complain to a competent authority, in case providers and users of AI systems infringe on the AI Act.

As stated by the European Data Protection Authorities, it is paramount that **the use of AI systems that pose unacceptable risks to individuals and their fundamental rights are prohibited**. This includes the prohibition to use AI systems for automated recognition of human features and other behavioral signals in public spaces, and **the categorization of individuals based on their biometric features**, for example.

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Major Movers

The market participants that have left a significant impact on the industry last quarter



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Introduction

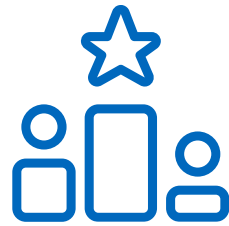


Top Disruptor

An organization that has had an outsized influence on the direction of mobility

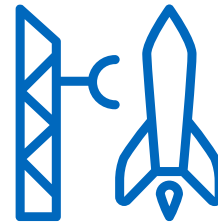


German Government



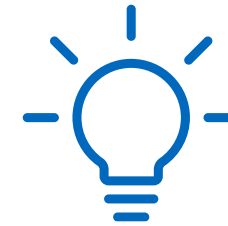
Top Performer

An organization that is outperforming competitors within the mobility market



Top Newcomer

An organization that is either new or that is new to the mobility market



Top Innovator

An organization that has found a creative new way of solving a mobility pain point

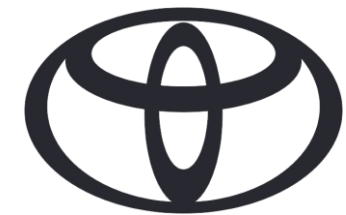


Elektrobit



Top Communicator

An organization that has been successful at clearly articulating its vision or plans





Top Disruptor: German Government

The German Government was at the forefront of countries leading in EV incentivization with their first program starting in 2009 with the Environmental Bonus (a.k.a. Umweltbonus). In the current scenario, the new updates in the Environmental Bonus scheme by the German Government are likely to be treated as ‘disincentives’ as they discontinue the high monetary benefits previously available. This is likely to have a disruptive impact on the growth rate of EVs, at least in the short term. Automakers will need to change vehicle prices, or the EV charging tariffs (via partnerships) to maintain or increase sales, which might offset the disincentives.

Why are they Major Movers?

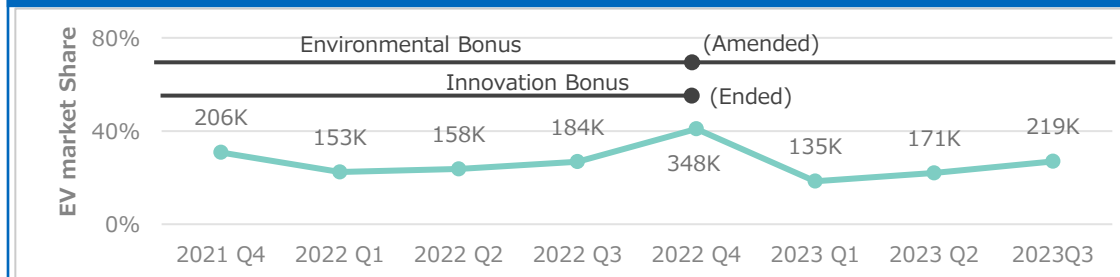
- Germany has been a benchmark for other economies for EV adoption and made a substantial impact on the rise in EV sales across the world.
- Reducing financial incentives for EVs is a significant shift in Germany’s approach to promoting electric vehicles. The country has been one of the largest contributors to the EV adaption through incentives.
- The decision removed the incentives for electric vehicles and subsidies for company cars

Environmental bonus for battery electric or fuel cell vehicles

Before 17th December, the federal portion of the environmental bonus, which includes the innovation bonus, as a non-repayable award, for applications submitted from January 1, 2023, as mentioned in the table on the right.

Net List price	Purchase	Lease 12-23 months	Lease Over 23 months
<40k €	4,500 €	2,250 €	4,500 €
>40k €	3,000 €	1,500 €	3,000 €
Young Used vehicles	3,000 €	1,500 €	3,000 €
Min. Holding period	12 months	12 months	24 months

Impact of Incentives on the Sales of Vehicles



This initial set of incentives to German EV purchasers was introduced on May 18, 2016, and included an **Environmental Bonus** for the purchase and leasing of BEVs, PHEVs, and FCEVs. Starting January 1st, 2023, the subsidy rates have been reduced which is why there was a sharp rise in the EV sales volume from late 2022 which gradually declined in the following quarter. In the latest update, The German government **discontinued the Environmental Bonus** on **December 17th, 2023**, and no more applications can be submitted.

SBD Perspective

- Germany’s decision to reduce and then stop the subsidies in 2023 is due to the belief that EVs have achieved popularity and therefore the government does not see the need to continue the existing financial support. As this will increase the EV price, therefore it is foreseen that there will be a drop in EV sales in the coming year.
- Germany’s focus has now shifted to supporting funding for climate protection. The German Government is to plan and invest in resources that could help their climate protection goals.

Note: EV Market Share includes BEV, PHEV, and FCEV



Top Performer: Stellantis

The Dare Forward 2030 plan of Stellantis is a strategic roadmap that highlights the group’s commitment to sustainable mobility and becoming a carbon net zero automaker group by 2038 for which it focuses on the partnership for the battery supply chain. In line with the strategic roadmap, Stellantis also unveiled "Pro One," an initiative for its commercial vehicle business that covers vans, trucks, and micro-mobility. The goal of this initiative is to double the company's net revenues from commercial vehicles by 2030 and position itself among the top automakers in the commercial vehicle market.

Why are they Major Movers?

- Stellantis is proactively establishing partnerships with EV battery technology providers.
- Under the commercial vehicle initiative, "Pro One" Stellantis is planning to achieve a 40% EV sales mix and generate €5 billion in connected services revenue.
- The automaker aims to introduce a renewed van lineup and electrified vehicles of 12 vans across brands, with new features on HMI, wireless connectivity, and OTA updates.

Strategic Partnerships for Accelerating Electric Mobility

As part of the Dare Forward 2030 plan, Stellantis is expanding its electric vehicle production and is partnering with companies that primarily focus on EV battery technology, as highlighted below:



- Partnering with **CATL to supply lithium iron phosphate (LFP) battery cells** and modules and to explore joint investment possibilities.
- Stellantis is also collaborating with Ample in EV **battery charging technology** to use Ample's **Modular Battery Swapping solution**, to deploy 100 Fiat 500e EVs within Stellantis' Free2move car-sharing service.
- The automaker is trying to establish a **joint venture with Orano for recycling end-of-life electric vehicle batteries and scrap** from gigafactories in the EU and USA.
- Kokomo, Indiana has been selected by Stellantis and Samsung SDI as the **second battery manufacturing facility in the USA** under the StarPlus Energy joint venture. **2027 is the initial production year**, with an annual capacity of 34(GWh).

SBD Perspective

- Stellantis has an electrification strategy and plans to introduce many BEVs that will represent annual sales of 5 million units. The automaker aims to only offer BEV from 2026 in the EU and no less than 25 new BEV products in the USA by 2030.
- Stellantis is highly focused on partnering for the development of its EV technology.



Top Newcomer: Lotus

Lotus is part of Geely Automotive. Geely Automotive's headquarters are in Wuhan, China. In one of the recent developments, Lotus has introduced a 450kW electric car charger that can add more than 80 miles of range in five minutes. This technology has been developed and introduced in line with Lotus' Vison80 strategy to become all-electric by 2028. Lotus is developing its range of branded EV charging solutions, as part of the transition from a sports automaker to an all-electric global luxury technology brand by 2028.

Why are they Major Movers?

- Lotus' fast-charging solutions have already been deployed in China and are expected to roll out across most European countries and the Middle East in Q2 2024.
- The automaker is offering the fastest charging speeds in current public devices.
- Lotus has unveiled its new range of charging solutions for the first time in the UK at the London EV Show, which took place on 28-30 November 2023.

A full suite of EV charging solutions designed for businesses

Liquid-Cooled All-in-One DC Charger : a new charger, which offers ultra-fast charging of up to 450 kW. For example, with the Lotus Eletre R, it can add up to 88.5 miles or 142 km of range with approximately 5 minutes of charge making it one of the most competitive electric vehicle chargers. A 10% to 80% charge can be achieved in 20 minutes with a range extension of 74 miles or 120 kilometers from a 5-minute charge when using a 350 kW Rapid Charger.

Liquid-Cooled Charging Unit: a charging terminal, which when used with the Liquid-Cooled Power Cabinet, can charge up to four vehicles at once. The unit has a maximum current output of 600 Amp, which ensures it can meet the needs of all-electric vehicle drivers. For instance, if they need a short top-up whilst on the go, or fast-charge for long-distance drives, Lotus' new offering provides them with a convenient solution.

Liquid-Cooled Power Cabinet: a modular power cabinet that is suited for spaces that require high energy to increase efficiency and minimize charging time, such as motorway rest stops. It offers market-leading power output capabilities of up to 480 kW.

Liquid-Cooled All-in-One DC Charger



Liquid-Cooled Charging Unit



Liquid-Cooled Power Cabinet



SBD Perspective

- The introduction of fast charging solution marks Lotus' investment in EV technology and infrastructure to accelerate its transition to electrification.
- Lotus is making global expansion with the introduction of its solution to the UK (timeline not announced)
- As more Chinese brands are entering the European market, the competition is increasing for the already established automakers in the region.
- With updated technologies, the new model with LEAP 3.0 architecture will be competitive in the automobile industry.



Top Innovator: Elektrobit

Elektrobit has introduced Theming Engine software that enables the full customization of a vehicle's user interface through the life cycle without the need for a software specialist which allows automakers and mobility providers to enhance their service, improve customer satisfaction and revenue generation. The Theming Engine is based on the Android platform that provides design templates to speed up the application development and its customization.

Why are they Major Movers?

- Elektrobit has been working towards the development of Software Defined Vehicles (SDVs) by developing innovations for connected, autonomous, and cyber-secure software for the benefit of the automakers.
- Elektrobit is considering modern interior features such as curved glass displays, voice controls, and personalized interfaces that can adapted to the consumers' preferences.

Theming Engine to in-car customization for SDVs

The Theming Engine decouples UI design from software development so creative designers can modify the look and feel of an interface at any point within the life of a vehicle. This makes it easy for them to create and deploy a variety of themes.

1. **Create dynamic theming:** Develop distinctive themes for various automotive brands, models, geographic areas, or consumer groups. It would provide a platform for the simple creation and implementation of user-customized or brand-driven themes to mold the experience and establish brand identity.
2. **Foster customer identification:** Customers would feel satisfied and will have a closer emotional connection if they are encouraged to express themselves through personalizing the dashboard of their cars.
3. **Build custom triggers for theme changes:** Automakers can programmatically alter the theme in response to timetables, user feedback, or adjustments to your brand. Vehicle's cockpits can be updated remotely or as needed, keeping them current and interesting.
4. **Agile theme adaptation:** Respond to changing consumer tastes and market trends by swiftly creating and implementing new theme variations while retiring outmoded ones. With low effort, extensive cockpit modifications can be made.
5. **Simplified A/B testing:** Effectively test color schemes, contrast ratios, and other theme components. To achieve the ideal balance, the Theming Engine enables iterative changes to fonts, colors, and other elements right within the live cockpit.
6. **Address regional and local differences:** Automakers may easily change UI components like language, units, and icons to meet the varied demands and local preferences of users in other markets.

SBD Perspective

- Software Defined Vehicle enables automakers to introduce new features and functionalities through OTA updates, which helps to advance features and the capabilities of services such as connectivity, in-car entertainment, safety, and autonomous driving.
- Elektrobit is providing in-car customization for SDVs and is carefully considering the current landscape of digitally aware consumers' expectations, where it needs cars to adapt to their evolving preferences.



Top Communicator: Toyota

Toyota made a series of announcements primarily related to electrification recently with a special focus on electrification and battery technology. Toyota has announced long-standing partnerships with several companies in this space that will support the company's overall electrification strategy. Toyota has made several announcements covering connected, autonomous, and electrification in the last three months which showcases the automaker's aims for the advancement of future mobility through research, concepts, and partnerships.

Why are they Major Movers?

- Toyota is emphasizing electrification, which aligns with the global shift towards electric mobility.
- The company's strategy is built around a core business of electrification, Next-gen architecture, and connectivity.
- The diversified approach of providing comprehensive solutions to the industry is positioning Toyota as a competitor.
- Toyota is expanding its partnerships and innovations globally, which makes it a major move in the automotive industry.

Announcements for Concepts, Vehicle OS, Battery 3R, and Research

Connected	Autonomous
<ul style="list-style-type: none"> • LF-ZL, a BEV mobility flagship concept, presents the future vision of the Lexus brand with Next-generation BEV architecture to bring together software and hardware platforms. • "Arene OS" to provide personalized driving experiences, extended entertainment, and connectivity. 	<ul style="list-style-type: none"> • Pony.ai unveiled a robotaxi concept in collaboration with Toyota at the China International Import Expo. • Nippon Telegraph and Telephone (NTT) and Toyota to join May Mobility in AVs to trial autonomous buses and taxis by 2025.

Electrification and Batteries

- The company uses the so-called **"Battery 3R"** and is now accelerating efforts related to what the 3R's represent— 1. Reduce, 2. Rebuilt/Reuse, 3. Recycle
- Idemitsu and Toyota announce the Beginning of Cooperation toward **Mass Production of All-Solid-State Batteries** for BEVs.
- Expansion of **Vehicle-to-Grid (V2G) Research** with San Diego Gas & Electric Company to focus on the customer experience, business model, and technology aspects of V2G to explore how EVs support both customers and the grid.
- **LG Energy Solution to supply** Toyota with 20GWh of high-nickel **NCMA battery** modules annually from 2025.

SBD Perspective

- While Toyota was somewhat delayed in unleashing its EV plans, as compared to other volume brand automakers, it's announced a series of projects now and becoming more aggressive with every passing quarter.
- The incorporation of NACS commences from 2025 which will further expand Toyota's charging network (nearly ~100,000 points).
- Around the same time, LG Energy Solution's lithium-ion battery modules will be used on Toyota/Lexus models which will help the company expand its EV offerings.



Everything Else

Relevant news articles from the last quarter



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Connected News from the last 3 months

Source	Title	Date	Link
Sythner Group	Audi introduces "Audi Themes" for vehicle customization	04/10/23	Link
Starlink	Starlink announced direct to cell capabilities to be released in 2024 (text) and 2025 (voice/data)	11/10/23	Link
Grist	Right-to-repair act signed by Rivian and Tesla	12/10/23	Link
Electrek	API released by Tesla allows support for third-party applications	12/10/23	Link
GM	Standardization of software is focus of GM with goal of providing customers better tech	12/10/23	Link
The Verge	Volvo EX30 passes EU speed limit warning requirements with Google built system	16/10/23	Link
Citroën	Citroën releases EV starting at 23,300 Euros	17/10/23	Link
Stellantis	Stellantis announces global commercial vehicle plan	18/10/23	Link
Stellantis	DS integrates ChatGPT into vehicle	19/10/23	Link
Business Wire	Fisker provides fixes, enhancements, and new features with OTA updates	20/10/23	Link
Reuters	Japan auto show returns	23/10/23	Link
The Verge	BMW wireless chargers mess with Apple iPhones	28/10/23	Link
Tech Crunch	Software launch for Porsche and Audi delayed due to Cariad layoffs	30/10/23	Link
Porsche	Porsche and Google expand partnership	30/10/23	Link
Autocar	Audi looks to offer more features on demand in 2024	03/11/23	Link
Salesforce	Salesforce releases cloud services for automotive powered by data and AI	07/11/23	Link
Automotive News	V2X being researched in Ann Arbor, MI.	07/11/23	Link



Connected News from the last 3 months

Source	Title	Date	Link
Parkopedia	ŠKODA and Parkopedia partner to offer payment services in Europe	10/11/23	Link
The Verge	Tesla Model 3 Highland can connect to Bluetooth headphones for rear seat entertainment	15/11/23	Link
Amazon	Amazon and Hyundai partner for digital and cloud services	16/11/23	Link
Lenovo	Lenovo used NVIDIA tech to power new AI compute unit and domain controllers	20/11/23	Link
Ford	Ford ratifies agreement with UAW	20/11/23	Link
Business Wire	BYD and AWS partner for cloud services for connected vehicle platform	30/11/23	Link
Asia Financial	Honda and Toyota to cut production in China	02/12/23	Link
Nikkei Asia	Japan announces regulation for L4 self-driving vehicle bandwidth	04/12/23	Link
LG	LG incorporates Netflix shows into their new webOS for automotive	04/12/23	Link
BMW	New talent campus being built in Munich by BMW	04/12/23	Link
BMW	Airbus and BMW partner for quantum computing challenge	06/12/23	Link



Autonomous News from the last 3 months

Source	Title	Date	Link
The Telegraph	Cruise involved in injuring a woman after a hit and run	03/10/23	Link
Ford	Ford's BlueCruise is now available in Spain	06/10/23	Link
Tech Crunch	Waymo-Zeekr robotaxi to begin testing in US by end of 2023	09/10/23	Link
GM	Autonomous ridehail service being brought to Japan by GM and Honda	23/10/23	Link
Reuters	Japan auto show returns	23/10/23	Link
Tech Crunch	Cruise's robotaxi permit suspended by California DMV	24/10/23	Link
Tech Crunch	Cruise pauses all driverless robotaxi services	26/10/23	Link
Reuters	Fatal crash cast finds Tesla not at fault	01/11/23	Link
Pandaily	Tesla found not at fault by Chinese court regarding accident	02/11/23	Link
Reuters	Car makers liable for self-driving crashes according to Britain	07/11/23	Link
Automotive News	V2X being researched in Ann Arbor, MI.	07/11/23	Link
BMW	New i7 Series will offer L3 automated driving next spring	10/11/23	Link
Lenovo	Lenovo used NVIDIA tech to power new AI compute unit and domain controllers	20/11/23	Link
Ford	Ford ratifies agreement with UAW	20/11/23	Link
Hyundai	New Hyundai Motor Group Innovation center will manufacture Motional IONIQ 5 robotaxi in Singapore	21/11/23	Link
Autonomous Vehicle International	New standard for AV safety proposed	24/11/23	Link
Nikkei Asia	Japan announces regulation for L4 self-driving vehicle bandwidth	04/12/23	Link



Autonomous News from the last 3 months

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BMW	New talent campus being built in Munich by BMW	04/12/23	Link
Ministry of Transport of the People's Republic of China	China announces autonomous public safety guidelines	05/12/23	Link
BMW	Airbus and BMW partner for quantum computing challenge	06/12/23	Link



Shared News from the last 3 months

Source	Title	Date	Link
The Telegraph	Cruise involved in injuring a woman after a hit and run	03/10/23	Link
Tech Crunch	Waymo-Zeekr robotaxi to begin testing in US by end of 2023	09/10/23	Link
GM	Autonomous ridehail service being brought to Japan by GM and Honda	23/10/23	Link
Reuters	Japan auto show returns	23/10/23	Link
Tech Crunch	Cruise's robotaxi permit suspended by California DMV	24/10/23	Link
Tech Crunch	Cruise pauses all driverless robotaxi services	26/10/23	Link
Ford	Ford ratifies agreement with UAW	20/11/23	Link
Hyundai	New Hyundai Motor Group Innovation center will manufacture Motional IONIQ 5 robotaxi in Singapore	21/11/23	Link
BMW	New talent campus being built in Munich by BMW	04/12/23	Link
Ford	Ford invests \$5 million to support public transport in Detroit and other cities	05/12/23	Link
BMW	Airbus and BMW partner for quantum computing challenge	06/12/23	Link



Electric News from the last 3 months

Source	Title	Date	Link
Jalopnik	NIO is getting subsidies of \$35,000 from Chinese government for loss on every car	05/10/23	Link
Inside EVs	Tesla prices for Model 3 fall below US average	09/10/23	Link
Tech Crunch	Waymo-Zeekr robotaxi to begin testing in US by end of 2023	09/10/23	Link
Nikkei	All-solid-state batteries to be made by Toyota and Idemitsu in Japan in 2027	12/10/23	Link
Electrek	API released by Tesla allows support for third-party applications	12/10/23	Link
The Sun	WM Motors files for bankruptcy	12/10/23	Link
Electrek	Most EV owners will go back to an ICE vehicle except Tesla drivers	17/10/23	Link
The News Market	Volta Trucks files for bankruptcy	17/10/23	Link
Citroën	Citroën releases EV starting at 23,300 Euros	17/10/23	Link
Mercedes-Benz	Mercedes-Benz EV crash tests show they are as safe as ICE vehicles from the brand	17/10/23	Link
The Verge	Toyota and Lexus adopt NACS	19/10/23	Link
The Telegraph	Electric cars face insurance issues	20/10/23	Link
Business Wire	Fisker provides fixes, enhancements, and new features with OTA updates	20/10/23	Link
Reuters	Japan auto show returns	23/10/23	Link
Green Car Congress	California meets goal for zero-emission truck sale ahead of schedule	24/10/23	Link
Detroit Free Press	Honda and GM partner for EV development	25/10/23	Link
Car and Driver	Honda Prelude to be a hybrid	25/10/23	Link
Bloomberg	Toyota's next-gen EV will be launched under Lexus brand in 2026	25/10/23	Link



Electric News from the last 3 months

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Jalopnik	Hertz stock hurts after Tesla cuts prices	26/10/23	Link
Carscoops	Toyota working on steer-by-wire to be released soon	01/11/23	Link
The Verge	Subaru adopts NACS	01/11/23	Link
GM	GM ventures and Niron Magnetics research new EV motor magnets	08/11/23	Link
Arcore/Rock Tech	Arcore and Rock Tech partner for European lithium supply	13/11/23	Link
Honda	Partnership between the Ohio State University, Honda, and State/Federal leaders for battery cell research	13/11/23	Link
The Verge	Mercedes-Benz opens first US charging station in Atlanta	15/11/23	Link
Lucid	Lucid announces new electric SUV	16/11/23	Link
PR Newswire	Xchange releases battery-integrated EV charger net zero series in Japan	17/11/23	Link
Ford	Ford ratifies agreement with UAW	20/11/23	Link
Automotive World	Battery swapping partnership between NIO and Changan Auto	21/11/23	Link
Automotive World	Stellantis and CATL sign MoU for European LFP battery supply	21/11/23	Link
Renault	Renault announces new multi-energy aerovan; the Renault Master	21/11/23	Link
The Verge	New fee to prevent congestion at Tesla Superchargers	22/11/23	Link
Hyundai	New Hyundai Motor Group Innovation center will manufacture Motional IONIQ 5 robotaxi in Singapore	21/11/23	Link
Hyundai	Hyundai Motor Company and University College London collaborate on carbon-free technology	23/11/23	Link
Automotive Logistics	Remanufacturing and recycling plant opened by Stellantis for 4R strategy	27/11/23	Link



Electric News from the last 3 months

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Mercedes-Benz	First Mercedes-Benz European charging station opened in Mannheim	27/11/23	Link
Lotus	EV charging solution launched by Lotus	28/11/23	Link
PR Newswire	Exicom expands to UK market	28/11/23	Link
Hyundai	New 'Uni wheel' design introduced by Hyundai and Kia	29/11/23	Link
NIO	Battery swapping partnership with NIO and Geely Holdings	29/11/23	Link
Automobilwoche	Mercedes-Benz and BMW partner to build charging stations in China	20/11/23	Link
Pinsent Masons	New federal regulation allow for CPOs to throttle heat pumps and charging stations for EVs	01/12/23	Link
Wallbox	Partnership between Generac and Wallbox	04/12/23	Link
BMW	New talent campus being built in Munich by BMW	04/12/23	Link
Volkswagen	New ID models will support bidirectional charging	06/12/23	Link
BMW	Airbus and BMW partner for quantum computing challenge	06/12/23	Link
Jalopnik	Rental companies to sell Teslas due to repair costs	07/12/23	Link



Secure News from the last 3 months

Source	Title	Date	Link
Carscoops	\$200 million settlement by Hyundai and Kia for vehicle thefts rejected by judge	31/08/23	Link
Reuters	Japan auto show returns	23/10/23	Link
Daily Mail	Mayor of Washington D.C. will provide Apple AirTags to help combat vehicle theft	01/11/23	Link
The Telegraph	JLR forced to retrofit thousands of cars due to theft	02/11/23	Link
Ford	Ford ratifies agreement with UAW	20/11/23	Link
BMW	New talent campus being built in Munich by BMW	04/12/23	Link
BMW	Airbus and BMW partner for quantum computing challenge	06/12/23	Link
Fleet News	Insurance offer re-launched by JLR in wake of rise of Range Rover thefts	19/12/23	Link



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