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**Is data the new
must-have revenue
stream for automakers?**

Mobilisights turns connected car data into big business | **Lotus** pioneers new EV charging technology | **Renault** backtracks on **Ampere** IPO | **Here Technologies** CEO steers location data in new direction | Rumoured **Renault-Stellantis** merger raises questions of European competitiveness



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Is data the new must-have revenue stream for automakers?

The CEO of Mobilisights, Stellantis' data business, shares his outlook for DaaS developments in 2024 and beyond. By Megan Lampinen

The automotive industry's evolution towards smart, connected mobility is redefining the traditional automaker business model and putting data at the centre. Data opens the door to personalised services, optimised electric vehicle (EV) charging, real-time mapping, improved emergency response assistance, autonomous driving, and much more. In January 2023, Stellantis officially launched Mobilisights as an independent business unit with the stated mission of “harnessing and delivering the transformative power of automotive data.”

In simple terms, it's a data-as-a-service (DaaS) company. "At Mobilisights, data is the product. That data is, in turn, used by customers to create their own services," explains Chief Executive Sanjiv Ghatе. The company has exclusive access to embedded data telematics across the 14 Stellantis automotive brands and roughly 14 million connected vehicles. The data covers numerous vehicle attributes and environmental insights, including fuel systems, infotainment units, and advanced driver assistance systems (ADAS).

The company expects to collaborate with data partners and license data to a wide range of customers, including other automakers, public-sector utilities, start-ups, and in the future, research and educational institutions. "We are initially tackling those categories that require a vast amount of anonymised data," Ghatе tells *Automotive World*.

Mobilisights is playing in a hot segment, but it's not exactly a first mover. "Some of our OEM counterparts have been bringing anonymised data to market for a much longer period of time," he



Sanjiv Ghatе,
Chief Executive, Mobilisights

concedes. GM, for instance, has been providing data for improved insurance offerings through OnStar Insurance.

"We've not invented data, and we're not inventing connected vehicles," asserts Sebastien Fraysse, Mobilisights Vice President and Head of Sales for the EMEA region. "We are here to build something scalable, sustainable, and beneficial for many use cases. The aim was to pivot from a stage where we offered the data we

14

BRANDS

80+

MODELS

70+

DATA
SIGNALS

13M+

CONNECTED
VEHICLES BY
THE END OF
2023

34M+

CONNECTED
VEHICLES BY
THE END OF
2030



Mobilisights is positioning itself as the “gateway to telematic data” from Stellantis’ 14 global brands

simply happened to have, thanks to what we produce in our factories, to really understanding market requirements and making sure we enable those use cases.”

Data is everywhere. For most players, the problem is extracting the valuable bits from the masses available.

“There is too much data,” Fraysse observes. “People and organisations are full of it. The only ones not complaining are AWS, Azure and Google Drive. But it’s all about what kind of data—like light or water, data needs to be good quality.”

Much of the company’s focus in its first year has been directed towards building a scalable platform, understanding what it has and what it needs to build for its customers. Now it’s time for the next phase.

Critical mass of connectivity

Mobilisights is based in the high-tech hub of Silicon Valley and initially addressing the North American and Western European market. The regions share a common evolutionary path within mobility, including growth of connected cars. “You need to have a certain critical mass of connected vehicles to make some of the things we are doing attractive, or even viable,” Ghate notes. Stellantis is pushing hard on connectivity across all segments. For its entire LCV line-up, for example, it has committed to providing an embedded data connection as standard. “Going forward, there is a very high chance that if you’re purchasing a Stellantis vehicle, it will be natively connected,” Fraysse says.



Other regional markets may be added as their share of connected vehicles grows. Stellantis itself has a strong position in Latin America and the Middle East, and the new DaaS company is monitoring these regions to determine the best timing for a possible entry. Australia is also a likely candidate for the near-term. “Our product and our teams are global, but local needs differ. Entering new markets would entail creating a go-to-market team and customising products for local requirements,” Ghate elaborates. “Essentially, it would be creating a different flavour of the same use case, which we could support in a relatively short order.”

As the wider connected vehicle parc grows, several use cases are expected to gain momentum. This includes usage-based insurance (UBI). “Earlier UBI solutions depended on either a phone, which is not very accurate, or aftermarket devices, which creates a lot of process friction,” says Ghate. “But with the increase in connectivity natively available, UBI is turning a corner, and we really see this as an emerging sector.”

EVs represent another potentially big area for Mobilisights, particularly electric fleets. “Most EVs are connected, and because this is such new, unknown territory, data becomes even more important,” he says.

Whether it's data on the battery's health, the vehicle's remaining range, route planning around charging, or another aspect, data can help with a host of new challenges. "There are numerous opportunities to deploy data to bring that ownership and usage experience more mainstream," Ghate says. "We have some interesting things going on in this segment, and I expect it could really take off this year."

Shining light

The phrase 'data is the new oil' was intended to convey the value of this commodity, but it's quickly becoming outdated. "Oil is a dirty word," says Ghate. "It's also a perishable resource." Instead, he likens data's value to both oxygen and light, explaining: "Like oxygen, it will be necessary, you cannot live without it. You can use it to power several different use cases, and then archive and aggregate it to help future analysis. I also think about data as a light, because it can unveil possibilities that we have not seen before."

It's still early days for the company and its offering. At some point in the future, Ghate expects it could start to layer in data from different, third-party sources. "That could provide a much better, high-resolution image of what the picture is telling you. Imagine layering on anonymised financial data, or crime or accident data, to create a more holistic picture of what is happening at a given time and place. We have the skillset in the team to do that but haven't had the bandwidth so far."

In the near term, though, Mobilisights will be concentrating on scaling the team. "We need to build some muscle so that we can do all the

things we want to," adds Ghate. There will also be more focus on simplification and optimisation. "As a first-year team, we were in start-up mode, building fast. But scaling becomes difficult if you don't have optimised processes."

“

There is too much data. People and organisations are full of it

If all goes to plan, DaaS could go far in helping Stellantis expand its revenue pool beyond the traditional sale and financing of new vehicles. By 2030, the company expects to have 34 million connected vehicles in operation within its family of automotive brands. The data from this fleet could prove incredibly valuable for a whole host of services and features. Under the corporate roadmap unveiled at the Stellantis Software Day in December 2021, global software-defined services should contribute €20bn (US\$21.7bn) in incremental annual revenues by 2030. "We are just a small piece of that," Ghate observes.

Is Lotus defining the future of EV charging technology?

Lotus is developing new technology that it believes could make EV charging faster, more reliable, and more accessible than ever before. By Will Girling



Images © Lotus Cars

Charging infrastructure is paramount to the global automotive industry's electrification efforts. By creating comprehensive networks across countries and continents, consumer trust in electric vehicles (EVs) will grow and sustained sales momentum will allow governments to reach environmental targets. However, determining what approaches and charger technologies are optimal for this goal remains an unanswered question.

From ultra-fast chargers to charger sharing platforms, players in the sector are exploring the feasibility of a wide variety of options. In Q2 2023, Lotus joined the conversation when it deployed a new line-up of liquid-cooled chargers in China for commercial use. The following November, the technology made its European debut at the London EV Show. Developed by the automaker's Lotus Flash Charge (LFC) unit, it believes this contribution could be significant.

"We foresee this technology as the future direction of the industry," says Alan Wang, Vice-President of Lotus Technology and Chief Executive at LFC. He tells *Automotive World* that there are three aspects of charging in which liquid-cooled units can make a difference. "It's more reliable and cost efficient for long term operation, and we are convinced that liquid-cooled will provide long term technological advantages."

Leading the market

An April 2023 poll conducted by the Energy Policy Institute at the University of Chicago found that 80%



A computer rendering of Lotus' liquid-cooled All-in-One DC charger unit

of US customers surveyed cited lack of charging infrastructure as the primary disincentive for purchasing an EV. Subsequently, major OEMs are uniting to find common solutions to problems of charger accessibility, affordability, and speed.

Although not currently a participant of such partnerships, Lotus affirms that its goal is still to make charging easier and faster for all EV drivers. The advantage of using liquid coolant, explains Wang, is a more stable performance even at higher charging speeds. With this boost also comes lower operating noise and "optimised efficiency" across the life of a unit. The automaker claims that its liquid-cooled All-in-One DC charger unit can supply 450kW of power. In practice, this would add



With the majority of EVs still charging at 400V, Lotus' Charging Unit can vary the output speed for those without an 800V architecture

88.5 miles (142km) of range to a compatible vehicle—such as the Lotus Eletre R—in five minutes, making it the quickest ultra-fast charger on the market at the time of writing.

The liquid-cooled portfolio also includes a 480kW Power Cabinet, which increases charging efficiency in high demand locations like highway stations, and a 600A Charging Unit. When paired with a Power Cabinet, the Charging Unit enables four vehicles to be charged simultaneously. “Modular design in the Power Cabinet makes it more adaptive to grid capacity and more feasible to scale,” says Wang. Added features for an enhanced overall user experience include active cable management and a large human-machine interface screen.

A race against time

With global decarbonisation targets in the early to mid 2030s looming, the automotive industry is in a race against time to boost EV adoption as consumer interest falters amid high inflation and other economic challenges. Even if purchase uncertainty can be resolved, charging infrastructure will need to grow sufficiently to support and maintain more EVs on public roads. In the US, which has approximately 150,000 public charging stations, McKinsey & Co estimates that availability would need to increase 20 times to support 50% EV market share by 2030.

For its part, Lotus intends to introduce its new solutions quickly. The company's roll-out strategy will see its liquid-cooled chargers entering the majority of markets in Europe and the Middle East (EMEA) from Q2 2024. Notable exclusions Germany and Austria will be added at an undetermined date afterwards. Although he doesn't disclose a full roadmap for other regions, Wang states that “hardware and software will follow Lotus cars into various markets, based on the same timeline” as EMEA.

An essential part of the company's plan is long term value. Most EVs charge at 400V, with only a handful of examples—such as the Hyundai Ioniq 5 and Audi E-Tron GT—able to fully benefit from the 800V offered by the liquid-cooled charger. Lotus is aware of this gap but states that its charger portfolio can meet EV



Lotus Flash Charge - Full range of liquid-cooled solutions including a wall-mounted Residential Battery Storage System

drivers' current needs. The Charging Unit is capable of varying the output speed for EVs without an 800V architecture and therefore "futureproofed" as the market evolves, and ultra-fast charging becomes more widely accessible. For Wang, this also provides an added incentive for both private and commercial customers considering a near term switch to EVs.

The future of charging

Back in 2018, Lotus announced its commitment to its Vision80 strategy—a plan to become an all-electric luxury brand by 2028. As such, although liquid-cooled charging units could have significant implications for encouraging EV adoption in the medium term, they are not the limit of its ambition. Indeed, Wang confirms they are only one component of a much larger goal to transform the vehicle charging experience.

"Lotus believes the ultimate charging solution will be autonomous charging," states Wang. In December 2023, the

company puts its Flash Charging Robot (FCR) into commercial use for the first time in China. The FCR combines Lotus' charging technology with automated parking capabilities to create a "seamless and fast charging experience" for owners of cars equipped with self-driving features. The unit identifies a vehicle, communicates with it through the on-board sensors, connects a charging cable using a robotic arm, and then unplugs once charging is complete. No driver input is required at any point.

Wang states that the company is working hard to realise this "ultimate charging experience" on a wider scale, with additional launch dates expected in 2024. While further details are unavailable at this time, it's clear that Lotus is pulling ahead in its efforts to shape an indispensable part of the EV ownership experience. If other automakers and industry stakeholders are to collectively manage the electrification transition successfully, they will also need to ensure charger technology and accessibility are among their top priorities.



Ampere IPO cancelled: Renault's plans suffer electric shock

Ian Henry takes a deep dive into the implications of the Ampere IPO cancellation

In November 2023 Renault announced plans to float its newly created electric vehicle (EV) division, Ampere, via an IPO. Less than three months later this plan was cancelled, Renault saying it would instead fund Ampere's development itself. The 2023 announcement set out a detailed plan to create the new separate company. Targets were clear and may yet be met within Renault, although analysts' lack of enthusiasm for the IPO came from doubts about Renault's ambitions and broader EV market trends.

Key highlights of the Ampere strategy are as follows: to produce about 1 million EVs a year by 2031 generating a revenue of €25bn (US\$26.9bn), with a 10% operating margin; for EVs to reach price parity with internal combustion engine (ICE) vehicles by 2027/28, cutting costs of its second generation C-segment EVs by 40% for example; to establish an EV line-up of seven by models by 2031; to develop more vehicles and related services with Alpine, Nissan and Mitsubishi.



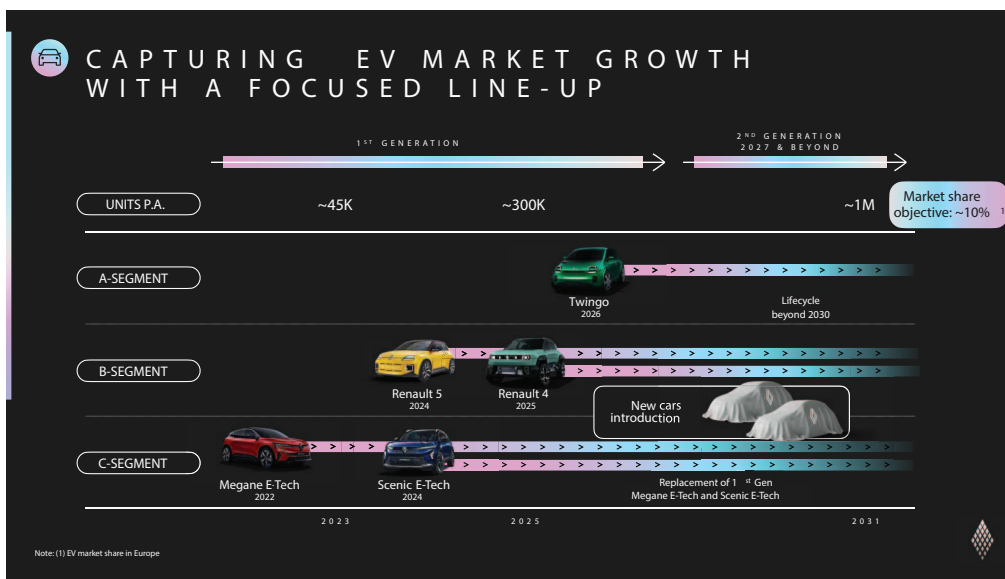
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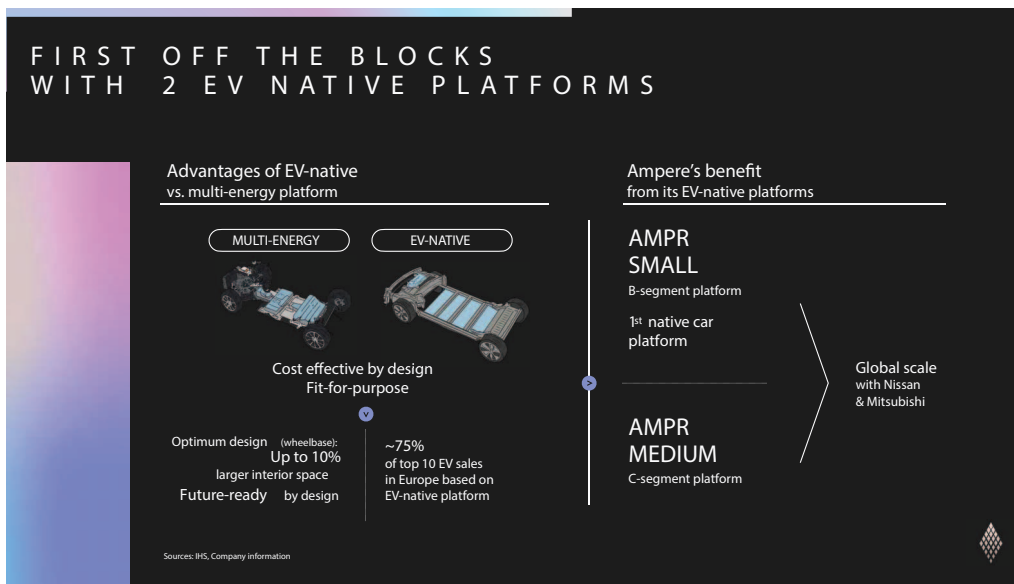
The Ampere range will consist of seven vehicles by 2031

These aims will be achieved through manufacturing most of these new EVs in “ElectriCity”, what Renault calls “a geographically compact industrial ecosystem” focused on its vehicle plants at Douai and Maubeuge, a battery case and components plant at the current transmission plant at Ruitz and an electric motor plant at Cleon which currently makes combustion engines. These four plants in north-east France will be supported by a supply chain which will have 75% of its suppliers located within 300kms and especially by new

battery plants established by Envision and Verkor near to Douai. Ampere was moreover tasked with achieving net zero by 2035, and ElectriCity achieving this by 2025.

Future EVs will be based on two “EV-native” platforms, AmpR Small (formerly CMF-B EV) and AmpR Medium (formerly CMF-EV); the increasing production volumes from these platforms should allow for a 50% reduction in battery costs and a 25% reduction in electric powertrain costs per vehicle. Platform costs





should also fall by 25% per vehicle and, despite design differences, upper body costs should fall by 15% per vehicle. These vehicles will be made using centralised electronic architectures, or what the industry now calls ‘software defined vehicle’ technologies; the SDV approach is designed allow the continuous upgrading of the car’s functions, reducing chip costs, maintaining residual vehicle and hopefully boosting customer loyalty

The first Ampere EV was the Megane E-Tech launched in mid-2022; this will be followed by the imminent Scenic E-Tech and over the next three years by the Renault 5, Renault 4 and Legend; the last named model is the replacement for the Twingo and is expected to be made in the current Twingo factory in Slovenia. The other four models, and the new Nissan Micra will be made in Douai and Maubeuge. Two more EVs, including the next Kangoo van, will be made at Maubeuge on the new EV architecture.

Longer term, full electric versions of Renault models made in Spain (ie Captur, Austral, Rafale and Escape)

will also be made on the EV platforms referred to above. An electric version of the current Captur is already available.

These ambitions, set out during Renault’s Capital Markets Day presentation in November 2023, were due to be partly funded through an IPO originally scheduled for the first half of 2024. The IPO, subjected favourable market conditions, would be supported by funding underpinned by Renault and an additional €800m from Nissan and Mitsubishi. Qualcomm was also reported to be planning to invest in Ampere; Renault meanwhile would have retained “a strong majority” stake in Ampere. Having, in its words, funded the creation of Ampere and undertaken the process of separating it from the wider Renault organisation, Renault clearly wanted to crystallise some value in its new entity and spread the future investment burden through the proposed IPO.

As noted, the IPO plan was predicated on market conditions remaining favourable; however, the initial reaction to the IPO was muted, with

some notable concerns expressed. And at the end of January 2024 the IPO was cancelled. Renault had suggested Ampere could be worth €10bn, but financial market analysts suggested a more realistic value could be less than half this value. Having cancelled the IPO, Renault will fund Ampere at least until its planned breakeven date of 2025. It may well have to do so for longer, although Ampere is due to be cash positive by the end of the decade.

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The initial reaction to the IPO was muted, with some notable concerns expressed

Renault plans to continue with the original Ampere model and technology plan; Ampere is also expected to build vehicles for Dacia (or it could transfer Ampere platforms into a Dacia plant). It may also collaborate with Volkswagen for the German VM's entry level EV. This would help Volkswagen save on its own development costs, and simultaneously generate additional value and revenue for Ampere.

Investors had been concerned about what they saw as Ampere's convoluted structure, questioning how truly separate it was from Renault; concerns were also expressed about the threat of the Chinese VMs undercutting European EV producers and the potential slowdown in European EV market growth. The latter concern is becoming more significant by the day, with several VMs and countries cutting back their projected EV sales for this year and beyond. The issue of Chinese VMs' cost advantage over European VMs looms large, even if the EU imposes additional tariffs on Chinese vehicle imports. BYD will soon make EVs in Hungary (avoiding any extra tariffs) and further Chinese EV factories in Europe are almost certain.

It is difficult to criticise Renault's ambitions for Ampere, nor the clarity of its plans. They were necessary for the company to have a chance of surviving the transition to EVs and the rising threat from China. Consumer resistance to EV prices and the slow expansion of supporting charging infrastructure may delay the growth in EV take-up, but unless governments across Europe and elsewhere change policy, the move towards EVs is unstoppable. Tweaking the Euro7 rules means that small ICE models such as the Volkswagen Polo and Skoda Fabia can remain in production for longer than originally expected. This will, in turn, contribute to slowing the switch to EVs but it will not stop it. Renault will soon stop production of the ICE Twingo, and its replacement will be a pure EV; its slightly larger Clio will continue as an ICE or hybrid for one more model cycle: Renault is not entirely giving up on ICE vehicles just yet, despite its enthusiasm for EVs as expressed in its Ampere plans.



Is there a real business case for teledriving?

Remote teleoperation could rewrite car rental. Megan Lampinen reports back from Vay's Vegas command centre

Automated driving comes in many different forms. A couple of luxury brands are starting to offer SAE Level 3 applications, which in certain circumstances allow a human driver to temporarily remove their hands from the steering wheel and their eyes from the road. The Mercedes-Benz Drive Pilot and BMW's Personal Pilot are setting the bar on this front today. There are also a small number of fully driverless ride-hailing services, such as Waymo One, with a computer handling all the driving functions. Then there is teleoperation, where a human remotely operates a vehicle on the road from a command station.

This last use case is not 'driverless' in the full sense, as there is always a human behind the vehicle's operations, but that human is not in the vehicle. Instead, the teleoperator relies on a live visual feed of the road environment from the car's sensors, avoiding dangerous blind spots. They hear the same sounds as any vehicle occupant, alerting them to the presence of emergency vehicles in the same way. Teledrivers generally come from a background in professional driving, often from taxi or ride-hailing services, and are provided with several weeks of training. Only after obtaining certification can they get behind the controls of the teledrive station, consisting of a seat, a steering wheel, pedals, etc., to control the vehicle.



Las Vegas start-up Halo Car is using teleoperation to deliver and recover vehicles as part of its car-rental service. Berlin-based start-up Vay is pursuing a similar approach. Users order one of its electric vehicles (EVs) using an app, and a teleoperator then remotely drives the car to the pick-up point. When the user has finished with it, the teledriver remotely drives the car to the next pick-up point or parks it.

With both Halo and Vay, the big benefit for users is the time savings: no need to pick up a car from an inconvenient location or search for parking in crowded city centres. There are also potential safety benefits on offer, with the professional teledriver setup tackling the top four causes of fatal urban collisions: speeding, intoxication, distraction and fatigue.

Going commercial

Vay has been testing its technology on the roads of Hamburg, Germany for the past five years and remains in talks with local authorities there to introduce a commercial service, but things have moved faster in the US. The company launched its first commercial service in Las Vegas, Nevada in January 2024. “Nevada has a very formalised legislation on technologies like teledriving and a defined legal structure that supports its use on the road,” says Caleb Varner, who is leading Vay’s US business.

Varner, along with several other members of both the Vay and Halo teams, comes from ride-hailing giant Uber. Varner was the Co-Founder and Global General Manager of Uber Rent and Uber Valet before leaving to join



Vay teledrive station

Vay, and that experience is helping to shape the nascent teleoperation offering in Vegas today.

Vay's command centre is located just around the corner from Halo's. "There is room for many players in this space," insists Varner. While on the surface Vay and Halo seem pretty similar, the former insists it is targeting a different use case and demographic. Its initial service in Las Vegas is offered around the University of Nevada, Las Vegas (UNLV) and the Arts District. "We are focussed on early adopters and young professionals, people who are willing to try new technology but are price sensitive," Varner tells *Automotive World*. Notably, Vay allows for rental by the minute, as opposed to Halo's rental by the hour, charging US\$0.30 per minute when driving and

US\$0.03 per minute for stopovers. Vay anticipates that it is more cost-effective than other mobility services. "We expect to be 50-80% of the price of an Uber," Varner adds.

The operational design domain (ODD) is admittedly limited, both in terms of the geographical scope of pick-up and drop-off points and the restriction to daylight hours. The primary constraint, according to Varner, is the existing connectivity infrastructure. Back at base, teledrivers rely on images sent from the vehicle's sensors via mobile data using cell phone towers. "We spent lot of time thinking about where we could drive with absolute safety from a connectivity perspective," he explains. "We use four different sims across four mobile providers, making us quadruple redundant."

Scaling

Persistence Market Research estimated the value of the broader teleoperation market in 2022 at US\$403.2m. This includes teleoperation of not just vehicles but also robotics. The wider market is projected to grow at a CAGR of 24.3% between 2023 and 2033, and automated vehicle applications like those explored by Vay and Halo will account for a growing slice of that market.

“There are tons of different use cases for teledriving,” says Varner. “We are focussed on just one at the moment: providing affordable, sustainable access to EVs that you drive yourself.” According to consumer research, a sizeable portion of the population doesn’t like having a stranger in the car, either for privacy or safety reasons. This could make teleoperation a good fit for ride-hailing operations down the line.

Automakers are also expressing interest in using teleoperation for valet applications such as parking. “We’re hearing that people want the car to go someplace they are not,” says Varner. He also flags package delivery as another promising use case. Today, drivers have to go to the depot where the vehicle is loaded, but in the future, the vehicle could potentially take itself to a warehouse where a human loads it and then drive itself to the delivery point.



Vay is presenting its teledriving technology as an alternative approach to autonomous driving

In all of these, a human driver remains central to the vehicle’s operation, albeit sitting in a remote office. This is a long way from Level 5 autonomy, but it could contribute towards that vision. For now, Vay only says that it intends to introduce more autonomous driving functions in the future, starting with those designed to assist the human driver. In this way such services could foster consumer trust in automation. “Teleoperation is part of the autonomous continuum,” suggests Varner. “By default, we see these two technologies converging at some stage. For today, our focus is on showing users that rental cars can be delivered in a seamless way to a global standard.”

A weak Euro 7 could make EVs the “only route” for net zero

Euro 7’s lack of ambition could ultimately serve to reduce European automotive’s global prestige on environmental issues. By Will Girling

In November 2022, the European Commission (EC) published its impact assessment (IA) for Euro 7, which included three policy options for the standard’s prospective succession of Euro 6/VI. Each was considered either low, medium, or high ambition according to its relative complexity, cost, and projected benefits.

Low ambition for Euro 7 gasoline cars, for example, was almost identical to Euro 6 aside from slightly more stringent carbon monoxide limits (1,000mg/km to 500mg/km). Meanwhile, the high ambition lowered

every limit (nitrogen oxides, particle number, particulate mass, etc.) by around 50-66%. The IA ultimately concluded that a balanced approach between these extremes (medium ambition) would deliver the best health and environmental benefits while also being the most cost-effective for the automotive industry.

“Obviously, we would have preferred high ambition, but medium would have improved light and heavy vehicle pollution, as well as testing,” says Anna Krajinska, Manager of Vehicle Emissions and Air Quality at Transport & Environment (T&E).



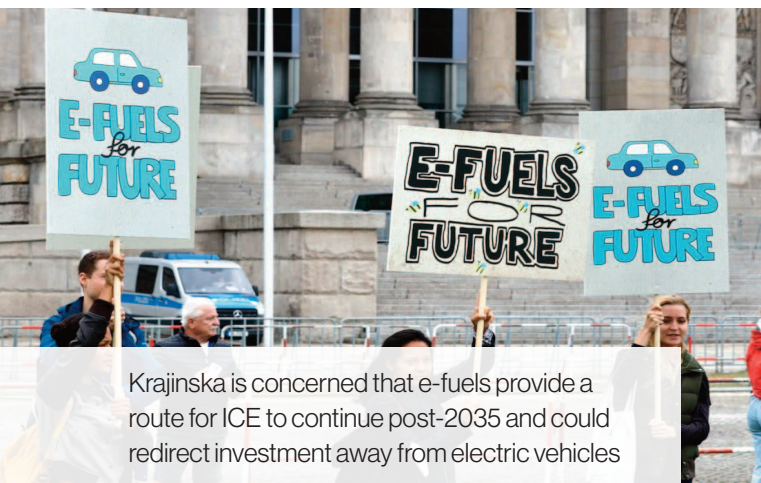


However, a proposed Euro 7 revision in December 2023 made tailpipe emission levels for cars and vans identical to Euro 6—an amendment that Krajinska contends is “illogical”—although it retained lower limits for heavy vehicles.

“It’s disappointing that the EC’s decision has been to pursue something between low and medium ambition,” she laments. With Euro 7 apparently now less efficacious than the EC’s own research originally concluded it needed to be, this raises questions as to whether it can still have a worthwhile environmental impact.

Complications

The European Automobile Manufacturers Association (ACEA) published its criticisms of Euro 7 in May 2023. These included perceived exorbitant costs, unnecessary complexity, and an unrealistic timeframe for implementation. Notably, ACEA also stated that the emissions standard would only apply to new vehicles, a small overall percentage of the global parc. The inference being that Euro 7 would produce small environmental gains relative to the investment required to meet it.



Krajinska is concerned that e-fuels provide a route for ICE to continue post-2035 and could redirect investment away from electric vehicles

“I don’t think that argument is valid,” Krajinska contends. If Euro 7 was approved by 2025 as originally intended, she highlights that this would be a ten-year gap from Euro 6/VI, during which millions of internal combustion engine (ICE) vehicles would have been manufactured. “Some forget that those vehicles will be on the road for decades. It’s not like cars manufactured in 2025 will suddenly disappear—in Europe, the average lifespan is 12 years, but they aren’t scrapped until much later.” Considering the long-term implications of Euro 7 will be crucial for determining whether it can be an environmental success. However, this is complicated by the potential for revisions down the line.

Although Germany [won an exemption](#) for synthetic fuels in the EU’s net zero by 2035 goal, Krajinska notes that the country has been “progressive” in its attitude to Euro 7. Nonetheless, she is concerned that developments that perpetuate ICE could “cannibalise” the battery electric vehicle (BEV) market and have a deleterious effect on air pollution improvement projections. “Carbon neutral fuels

basically pollute in exactly the same way as normal fossil fuels, so they won’t improve air quality.” It should be noted that any broad adoption of synthetic fuels would require [further amendments](#) to Euro 7 and new testing protocols.

Lacking ambition

The majority of Euro 7’s benefits, Krajinska tells *Automotive World*, now come from its restrictions on non-tailpipe emissions, primarily brake and tyre particle limits. “Again, these could have been better, but at least they are included.” The revised text states that brake emission limits will be 3mg/km for BEVs, while all other light vehicle powertrains will be 7mg/km. This constitutes a 40% reduction on current emission averages. However, this is still relatively unambitious: T&E notes that existing European brake filter technology could lower them by a potential 85%.

Krajinska is concerned that Euro 7’s evolution to date demonstrates the EU’s apparent willingness to cede leadership on environmental issues to other regions. “The Chinese and US automotive markets already have stricter limits on emissions. Europe, once considered a global leader, has fallen behind.” For example, the China 6 standard adopted in June 2023 has a light vehicle NO_x restriction of 35mg/km, notably lower than Euro 7’s 60mg/km for gasoline and 80mg/km for diesel. Meanwhile, the US Environmental Protection Agency proposed in April 2023 that 67% of new light vehicles sold nationwide should be electric by 2032—an ambitious tenfold increase.

Regarding the EU's comparative lack of zeal, Krajinska identifies "pressure from OEMs" as the underlying cause. Since the Euro 7 text was first made available, she states there have been "threats of cuts to production and jobs". These have subsequently begun to subside following the proposal to retain Euro 6 tailpipe emission levels. There is also division concerning fleet decarbonisation among EU member states. She identifies that a coalition of eight countries—Bulgaria, Czech Republic, France, Hungary, Italy, Poland, Romania, and Slovakia—has been "key" to efforts aimed at weakening Euro 7.

Ceding leadership?

Based on Euro 7's current form, Krajinska believes recapturing the original 'medium ambition' scope is now highly unlikely. As electrification progresses in Europe, some industry figures have even [questioned](#) whether Euro 7 is worthwhile. Indeed, from an environmental perspective, she suggests that "speeding up electrification" may be the only route left for achieving net zero by 2035.

This goal is also not without challenges, as EV sales volumes are still not large enough to completely offset ICE emissions. To gather more momentum, Europe may need to look to industry leader China. "Its continued ramp-up of sales is due to OEMs targeting every market segment, including small and affordable EVs." In contrast, she states that European automakers generally target the small but valuable premium segment. This may prove a successful top-down strategy for [checking China's growth](#) in the long-term, but, at least for now,

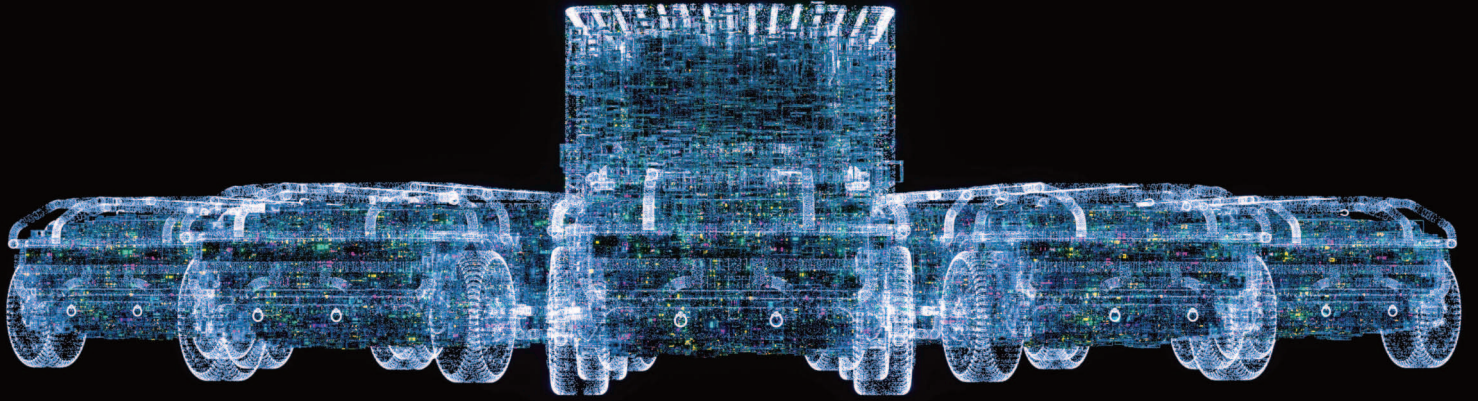
Krajinska opines that it is failing to kindle BEVs' mass market potential and limiting customer access.

BloombergNEF's January 2024 report on the Chinese, European, and US automotive markets also illustrates the importance of continued focus on ICE emissions, forecasting muted EV growth over the next 12 months. However, in its current form, Krajinska regards Euro 7 as nothing

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European automakers may soon find themselves selling cleaner cars in China and the US than they do domestically

but "greenwashing" that allows cars to pollute just as much as previous standards. By ceding global leadership on the issue, the EC could ultimately be relegating the region's automotive industry to a position of reduced global prestige on environmental issues. "European automakers may soon find themselves selling cleaner cars in China and the US than they do domestically," she concludes.



Could universal software stacks make AVs mainstream in 2024?

A software stack capable of leveraging similarities in autonomy between different vehicles could supercharge the AV sector's development. By Will Girling

Confidence in autonomous vehicles (AVs) has been [shaken](#) following high-profile court cases and closures, as well as a perceived deficit of return on investment. Rather than aiming too high too fast, [many industry players](#) now believe honing safety and cultivating immediately applicable use cases should be the sector's primary focus.

Global AV software developer Oxa (formerly Oxbotica) agrees, although it still believes that ambition for the technology's future should be maintained. When Chief Executive Gavin Jackson spoke to *Automotive World* in January 2023, he made it clear that [current generation AV tech could achieve more](#). Since then, the UK-based company has opened a new office in Florida as it expands into the North American market.

Graeme Smith, Chief Product Engineering Officer at Oxa, offers his view on the route by which AVs could scale, the importance of a universal autonomy software stack, and why 2024 could be a pivotal year for the sector.

What role can the AV software market play in resolving challenges in modern mobility?

The world needs AVs now, or maybe even yesterday. There are more people to transport than ever before but fewer professional drivers, and that must be addressed. Oxa believes that using a 'software driver'—one that can see in every direction, never gets tired, and is always available—can unlock use cases and services for the transportation sector that are only possible with 24/7 functionality.



Graeme Smith,
Chief Product Engineering Officer, Oxa

What is a good starting point for expanding AV operations?

The problem facing robotaxi operators and personal AV developers is that the economics are difficult with the cost of the technology today. We think the most commercially viable market segment sits between cars or taxis and big buses in the form of dynamic new passenger shuttles and industrial logistics.

AV shuttles carrying between eight and 20 people can bridge the gap between personal and traditional mass transit and the economics already work in 2024—we don't have to wait for markets to catch up. Ultimately, the goal is to make them a hail-able form of autonomous shared mobility, exactly the kind of modal choice cities are looking for to reduce congestion and emissions.



Industrial logistics involves AVs moving goods in relatively simple off-road environments like airports and industrial yards or making retail deliveries. This transport can already be automated today, and it allows us and our customers to make revenue while we develop more sophisticated capabilities. In the long-term, we're focused on universal autonomy.

Why does Oxa champion a universal platform instead of focusing on one use case?

It's been our vision since the company was founded. We want autonomy everywhere—not just mid-sized shuttles, but any transportation market vehicle makers think is

commercially viable. There's commonality in what needs to be done to deliver autonomy in these different use cases, so we may as well take advantage of that. It's always better to scale up than scale down, and starting with relatively simple AV segments like passenger shuttling and industrial logistics makes perfect sense today.

It all comes down to two things: customer needs and sector economics. Safety, availability, reduced costs, and overcoming the driver shortage address the first aspect. For the second, Oxa's universal autonomy stack is similar to Arm's approach to semiconductors—it creates a base architecture that is

cheaper and easier to use than companies developing their own. The reality is that most companies won't commit to large-scale autonomy until the business case is clear and the appropriate technology is available.

How diverse are your stack's applications to date?

We've been able to take advantage of the similarities of autonomy between a wide range of vehicles, from delivery vans and heavy logistics vehicles to robotaxis and a Ford Ranger for off-roading.

Importantly, we also operate in a lean hardware environment and are careful about the bill of materials and power consumption. The idea is to produce a low-power solution that enables vehicles to operate for longer. While some other developers might need to rearchitect in the future to incorporate this efficiency, Oxa has built it in from the start.

Beyond vehicle operations, how do your solutions help create the wider data ecosystem necessary for AVs to scale?

Oxa is a huge consumer of real-world data in order to add autonomy to more vehicle types and routes, but we also make use of synthetic data through Oxa MetaDriver. This is a suite of tools that combines AI and digital twin-style technology to generate simulated scenarios that are far more comprehensive than could ever be achieved with real-world testing. It enables us to regression test every software release we put out, as well as take real-world data and alter the lighting or weather conditions in simulation to multiply its value for testing.

2023 was a difficult year for AV development. What sector trends do you think we'll see in 2024?

Of course, safety matters, whether on public roads or closed logistics routes. Safety is and will remain paramount. Apart from that, I think 2024 will be the year that OEMs properly join the 'autonomy party'.

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I think this will be the year that OEMs properly join the 'autonomy party'

Previously, they couldn't commit to AVs because suitable technology wasn't available. Now, I anticipate vehicles being designed from the ground up with autonomy in mind. Soon all of the AV redundancy, sensors, and controls will be at a level that's safe enough for human attendants to be taken out of vehicles. We're very close to seeing fully driverless vehicles deployed widely as countries such as the UK lay down detailed regulations and others, such as the US, focus on how to build public trust.

Repurposed power sources to extend EV charging network

A pilot by BT will upgrade decommissioned green cabinets into electric vehicle charge points.
By Megan Lampinen

Lack of public charging infrastructure poses a real threat to the long-term success of electric vehicles (EVs), and players are tackling the problem from various angles. Etc., the digital incubation arm of British telecoms giant BT, is pursuing a novel approach that combines repurposing obsolete infrastructure for new chargers. Specifically, it proposes upgrading decommissioned green cabinets previously used for broadband and telephone wiring into charging ports for EVs.

“Part of our role is about finding new areas of growth for BT in adjacent markets but using its strengths,” explains Etc. Product Director Jess Kyte. “We already have these green cabinets up and down the UK, and with the fibre rollout, they will become unnecessary. At their core, they are points of power.” That’s important, as it means there is no need to create a new source of power for the chargers, a sizeable challenge for certain parts of the world seeking to reposition for electric mobility infrastructure.

Government in the spotlight

“The pilot is less about technology innovation in itself and more about how we can help with the infrastructure challenge the UK is facing,” she adds. “Because we already have power with these cabinets, we can help build out the network a bit quicker.”

Data from ZapMap shows that, as of the end of December 2023, the UK had 53,906 public EV charging points at 31,056 locations. While this represents a 45% increase in the total number of charging devices since December 2022, it’s not yet enough to convince some consumers to switch. BT research found that 78% of its customers regarded charging as a barrier to EV adoption. “There is not enough infrastructure to support EV growth. That’s a hard fact the UK cannot ignore,” emphasises Kyte.

The UK government has said it expects around 300,000 public chargers “as a minimum” by 2030. With not quite 54,000 in place today, there’s a huge gap yet to fill.

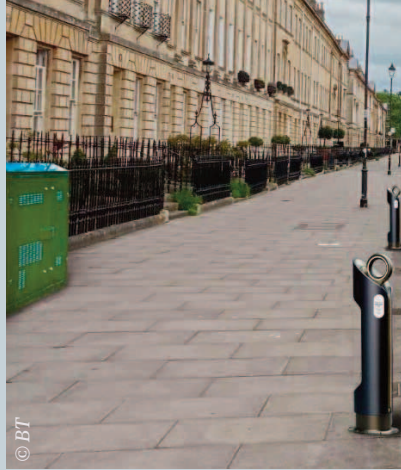
Plenty of ecosystem players seized on the Etc. announcement to voice their concerns about a perceived lack of government support in realising this infrastructure target. Dunstan Power, Director of EV charging design consultancy Versinetic, describes the project as “commendable” but

emphasises that it “underscores the need for more direct and substantial action from governmental bodies.” He adds, “The reliance on private sector ingenuity to fill gaps in the charging infrastructure, while valuable, should not overshadow the government’s role in spearheading and accelerating the development of such essential services. The current pace and scale of the rollout, as evidenced by the need for such stopgap solutions, suggest a shortfall in addressing the urgency of the EV revolution.”

Dominic Rowles, Head of Automotive at NTT Data UK&I, suggests that government charger installation targets may have been overly optimistic and regards the Etc. project as “a chance to trial more innovative solutions”. He describes the cabinet conversions as “a smart move that addresses the current shortfall in charging infrastructure, particularly in residential areas and smaller towns where the need is acute.”

Fact-finding

For Etc., it’s still very early days. The viability of the conversion will be tested first with a pilot in East Lothian, Scotland, with a separate project under consideration for Northern Ireland. Around 500-600 converted chargers will initially be offered for use by BT Group employees before being extended to the public. If taken beyond the pilot stage, early projections suggest that



Etc will convert street cabinets like the one on the left of this photo into EV chargers

up to 60,000 cabinets across the UK may be suitable for conversion.

The converted green boxes will offer two sockets and 7.4kW of power, which can charge a vehicle in about six to eight hours. “It will serve the overnight charging needs of people who don’t have off-street parking,” Kyte tells *Automotive World*. This is a pivotal and challenging demographic. “To make the EV transition we need to figure out where these residents can carry out regular charging.”

How this does or doesn’t meet the needs of residents will be uncovered over the course of the two-year pilot, and the team very much regards it as more of a fact-finding mission than anything else. Etc. will also be considering what business model makes the most sense and whether or not it should partner on charger operation in the future.

A global challenge

Etc. was recognised as a CES Innovation Award 2024 Honoree within the Vehicle Tech & Advanced Mobility category. The annual competition honours

outstanding design and engineering across various product categories, distinguishing the highest rated in each. While the pilot has only just begun, the idea of repurposing street furniture could make an important contribution to decarbonising the transport system.

Shell subsidiary ubitricity has been converting lampposts into EV charge points around the UK for years. In the coming months and years, Rowles expects to see a wave of innovative business models and solutions emerge around charging. “I foresee these new players adopting strategies similar to digital disruptors, focusing on seamless user experiences and even creating a marketplace akin to Airbnb for car charging,” he predicts.

And this vision of the future is certainly not limited to the UK. While the Etc. pilot is squarely focussed on this particular market, BT itself is a multinational company. “The US in particular sees a similar problem in terms of infrastructure,” observes Kyte. “There are a mere 160,000 public chargers in the US for 2.4 million EVs. We are conscious this is a global challenge.”

Here Technologies: new CEO, new innovation pathway

Innovation and standardisation are central to Mike Nefkens' strategy, writes Megan Lampinen

Location data and spatial intelligence pioneer Here Technologies is helping to revolutionise the way people and goods move around the world's roads. Its automotive-grade maps are powering navigation, advanced driver assistance systems (ADAS), automated driving (AD) and electric vehicle (EV) services for players across e-commerce, transportation, logistics, and the public sector. Here's location data and software services are used in 180 million vehicles globally, with more than 34 million cars featuring its maps for ADAS and AD. Backed by owners Audi, BMW and Mercedes-Benz, it's a potential powerhouse of location data. And it's heading off on a new course, under new leadership.

In April 2023, after seven years at the helm, Chief Executive Edzard Overbeek announced his intention to step down. While neither Overbeek nor

Here's press department provided any explanation for the move, reports suggested competition was heating up from TomTom, Google, and Apple. The company had also seen seven consecutive years of negative cashflow, accompanied by rumours of possible IPOs and SPACs.

served as President and Chief Executive of Honeywell spin-off Resideo Technologies and President of HP Enterprise Services, responsible for a US\$20bn P&L. On top of this, he's also a commercial pilot. "The basis of flying is really the mapping content that sits in an aeroplane," Nefkens

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We have to be very clear on what we're going to be great at and what we're not

In January 2024, Overbeek officially passed the reins to Mike Nefkens, who came out of retirement to accept the new position. Nefkens formerly

tells *Automotive World*. "If someone were going to tell me that there is no map available for a flight, I would not be on that plane."

While it's still very early days for the new Chief Executive, he's done his due diligence thoroughly and has some very clear ideas of what it will take to get this location specialist heading in the right direction.

A sharper focus

“Part of joining as a Chief Executive is about timing,” he asserts. 2023 marked a year of growth for the company and the first time that Here has been cashflow positive in the last seven years. “We were able to pay back some of our shareholder loans and are now in a position to innovate. That was the most important part of coming in.”

Innovation is a big part of what Nefkens wants to do with Here. Indeed, he concedes that some of his previous roles were more about “slash and burn” tactics, but not now. “I’m not doing that again. I want to build the business, to innovate. Now we just need to be clear to the market on where we’re going to win.” He believes the business has been spread too thin and there’s been a compromise on quality. “In certain areas we’ve become average.” That’s going to change.

Towards independence

Here’s biggest wins in 2023 were with companies other than Audi, BMW and Mercedes-Benz. January 2024 kicked off with Uber and Here confirming a long-term collaboration in which Here serves as a preferred location provider, delivering mapping and geolocation data to improve the user experience on Uber’s ride-



Mike Nefkens,
Chief Executive, Here Technologies

sharing and food delivery services. For Nefkens, the diversification trend signifies that “Here is finally operating like an independent company.”

The other big change supporting this is the introduction of four independent board members: Sanjay Brahmawar, Chief Executive of Software AG; Robert Siegel, a Lecturer in Management at the Stanford Graduate School of Business; Pekka Ala-Pietilä, Chairman of the Board of Huhtamäki and Sanoma Corporation; and Adine Grate, Co-Founder of Skiff Capital Advisor. From a governance perspective, this is significant.

“I’m a process and governance expert,” states Nefkens. “We have the three shareholders on our Board, but these have been joined now by four independents, so we’re able to [pursue business] with the Fords, the GMs, the Hyundais, the Land Rovers, without undue pressure from some of our shareholders.”



Here's software solutions provide automakers with direct access to fresh map information tailored for ISA and ADAS

Future focus

Location data can be used for numerous applications, but one of the big ones is ADAS. Here's mapping technology can help overcome the limitations of vehicle sensors to see around upcoming turns or through inclement weather conditions.

Adding more data about the road ahead can improve the decision-making process. It can also help with new regulations around Intelligent Speed Assistance (ISA) by combining additional features with vehicle cameras to more accurately convey speed limits. "What's happening with ISA is really important, especially in Europe," Nefkens suggests. New regulations will make ISA mandatory for all new cars sold in Europe from July 2024.

"The future of our business is going to be in ADAS and AD," he asserts. While most of the industry is working around SAE Level 1 and 2 systems, Level 3 is gaining ground. Here's HD Live map provides pivotal environmental data for both BMW's Personal Pilot and Mercedes-Benz's

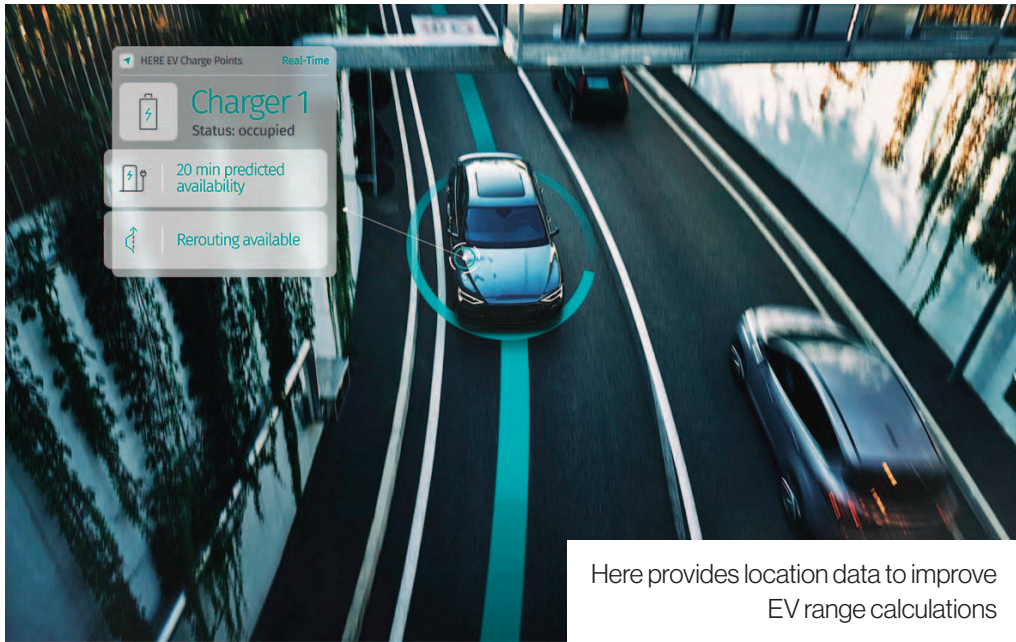
Drive Pilot Level 3 ADAS features.

"We believe the HD map is the core of the AD evolution, though others are betting on different technologies. Our job is to show the OEMs that it is all about the integration of the HD map with the other systems, like LiDAR and camera."

The supplier is also doubling down on EV-related location services, launching EV Range Factors in January 2024. This service is targeted at automakers building their own in-house EV routing solutions and adds data on road topography, temperature and wind. The idea is to improve the accuracy of EV battery range forecasts and on-route, distance to empty calculations. In contrast, most range predictions today rely primarily on historical data from previous trips.

Data and AI

Nefkens flags UniMap as another pivotal piece of Here's offering moving forward. Unveiled at CES 2023, this highly automated mapping



technology helps to rapidly create digital maps and location products. “Think of this as our content ingestion engine,” he says. “It’s how we take in all the data.” Here is one of AWS’ largest customers and is currently looking into the use of artificial intelligence (AI) to improve data processing efficiency. Nefkens suggests that the holy grail of location data is efficient data processing, and Here’s “secret sauce” is in the way it approaches that. “It takes so much effort, work and cost to create HD maps for AD. The only way that we win is to master a dynamic and quick-paced loop, integrating it with all the other systems in the vehicle.”

As an example of the level of data that Here has access to, Nefkens relates how one customer approached the company and complained that Google’s mapping solution was not meeting its expectations—the maps lacked details on bridge height and weight limits. As a result, the customer’s trucks would find themselves at a bridge they couldn’t pass and need to reroute. “It

was a nightmare for them, but it just shows our ability to provide custom attributes. We’re going to continue to double down on that.”

While custom attributes will remain central to the business model, they need to come on top of a sizeable portion of standardised product. Nefkens is keen to move away from complex, customised deals: “We start from zero almost on every solution we build for a customer. We need to have 50% of it prebuilt into almost a standard mapping capability and then build the custom layers on top of that.” Such a shift could drastically slash costs for customers.

Under Nefkens’ leadership, Here will be saying “no” to deals that require a ground-up product and focussing on areas with an element of a prebuilt offering. “The competition is growing, as are the demands from the OEMs,” he concludes. “We have to be very clear on what we’re going to be great at and what we’re not. For us, less is more; we’re only focusing on the important things.”



Could a merger help address European automotive's struggles?

Rumours of a Renault-Stellantis merger reveal the growing demand for bold action to help European automakers compete against China. By Stewart Burnett

The European auto industry is at a crossroads. Its legacy automakers are facing challenges on a variety of fronts, particularly diminished cost competitiveness on electric vehicles (EVs) compared with segment leaders like Tesla. The German industry's output shrank by 3.5% in August 2023, with Volkswagen ordering several temporary closures of its Emden EV plant as a consequence of flagging demand.

However, the greatest challenge is coming from China, which has positioned itself to dominate the all-electric future. BloombergNEF estimated that the country was responsible for 77% of all battery manufacturing capacity in 2022 (893 GWh). Due to supply chain leadership and lower labour costs, China has gained a significant cost advantage. In January 2024, Stellantis Chief Executive Carlos Tavares warned of a "bloodbath" should Western automakers try to compete with Chinese brands on price, adding that Stellantis was "ready for any kind of consolidation."

Subsequently, Italian daily newspaper *Il Messaggero* reported on 4 February that the French government—Renault's largest shareholder, as well as a shareholder in Stellantis—was researching the possibility of a merger between the two automakers, citing off-the-record sources. Shares in Renault climbed 4% the following day as traders thought the story credible. However, Stellantis Chairman John Elkann swiftly issued a denial, stating that "there is no plan under consideration regarding merger operations with other manufacturers."

Regardless of the rumour's veracity, that it was taken seriously may speak to the need for drastic measures to shore up the European industry. "It shows how vulnerable European OEMs are to new competitors," warns Roger Lanctot, Service Director, Automotive Connected Mobility at analysis firm TechInsights. "The existential threat to the incumbents is real."

Scale is necessary

The challenges facing European OEMs stem largely from their relative sluggishness in embracing electrification compared to China. While the latter began developing EV technologies as early as 2001 through its '863 Programme', European OEMs have continued to display hesitance. In September 2023, BMW Chief Executive Oliver Zipse questioned the EU's 2035 zero emissions targets, citing a lack of infrastructural readiness and the limited quantities of available raw materials for battery manufacture. He further lambasted the EU for its comparative lack of support for e-fuels.

This reluctance will only make it more difficult for the legacy OEMs to achieve the economies of scale required to compete with China in areas such as cost and the supply chain. Kevin Mak, Principal Analyst for Automotive Market Analysis at TechInsights, believes the rumoured merger speaks to a growing demand in Europe for bold and decisive action. He explains to *Automotive World* that unless the EU resorts to "World Trade Organisation busting" trade tariffs, the continent's automakers will continue to lack the necessary scale to compete effectively against cheaper imports.



Renault has struggled to penetrate Chinese markets with its range of EVs

© Renault

Furthermore, while mergers promise increased scale, several logistical issues can hamper their efficacy. “Suppliers will be concerned the newly merged OEM might ask for volume discounts and reduce the number of companies it works with,” he states. “There would be too many mass market brands under a single umbrella for all of them to survive.” Jonathan Storey of Automotive Reports believes a prospective Stellantis-Renault merger might have been shot down very quickly. “I can understand the motivation for merger talks. However, there would be major issues around EU competition and markets law,” he tells *Automotive World*.

Mergers in other industries using China as a pretext have been blocked over monopolisation concerns in the past. For instance, Siemens and Alstom’s proposed merger to build a high-speed rail “champion” that

could match the Chinese state-owned rail giant CRRC collapsed in 2019 under regulatory scrutiny. Subsequently, France and Germany called for an overhaul of EU competition policy to better address emergent global challenges. At the time of writing, no overhaul has yet taken place.

No easy solutions

The EU has not been at a complete standstill in tackling China. As Storey observes, the EU’s anti-subsidy investigation into Chinese EV imports—announced by European Commission President Ursula von der Leyen in September 2023—is likely to help the domestic industry. It may well lead to higher tariffs on Chinese imports, something that Stellantis’ Tavares called for in October 2022. However, it could also set in motion a series of retaliatory measures that

hurt the bottom line of OEMs on the continent, including restrictions on what they can sell in China. At present, China is the largest export market for German luxury vehicles and was responsible for more than a third of global sales for BMW's 7-Series and Mercedes-Benz's S-Class.

Tu Le, Founder and Managing Director of Beijing consultancy Sino Auto Insights, highlights that not all European OEMs have enjoyed this profit stream, with Renault and Stellantis both experiencing recent struggles. In July 2023, all four directors representing Renault Group left the board of its joint venture with Jiangling Motors Group, signalling an intent to divest following slow sales and a liquidity crisis on the part of the latter.

Le is sceptical that a merger between Stellantis and Renault would have done anything to improve either automaker's performance in China, but he does believe that it is reasonable to explore the possibility. "It would be malpractice if [Renault's Chief Executive] Luca de Meo and Tavares weren't talking to organisations about ways to save costs and make the whole stronger." However, at a time when Europe needs to increase its pace, he believes a merger would only create more bureaucracy. Any potential cost savings would be "drowned out" by the challenges that stem from post-merger integration.

TechInsights' Mak is equally unconvinced on the merits of a merger but does see a path towards greater sales impact in China through collaborations with the state's EV start-ups, using their platforms to develop models specific to the

region. In September, Zipse announced that, as of 2026, BMW would start producing certain Neue Klasse EV models exclusively for the Chinese market.

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It would be malpractice if Luca de Meo and Tavares weren't talking to organisations about ways to save costs and make the whole stronger

On the other hand, Mak sees no alternative that could help address the domestic challenges currently faced by the European industry. One temporary saving grace may be Chinese OEMs' relatively slow pace building out dealer networks in Europe, with only SAIC making significant progress to date. As a result of European automakers' historic—and ongoing—hesitations about electrification, the damage may already be done. "The next few years are going to be a state of flux for the European industry—that's for sure," he concludes.

AutoGl: vehicle intelligence redefined

Stellantis subsidiary aiMotive presents an AI concept that anticipates the complexities of human intelligence.
By Megan Lampinen

Applications of artificial intelligence (AI) promise a step change in the mobility ecosystem, impacting both the design and development of advanced driver assistance systems (ADAS) and autonomous driving (AD). The market for AI within automotive specifically was valued at about US\$6bn in 2022, according to Global Market Insights, and is projected to grow at a CAGR of 55% between 2023 and 2032. During that time, the

industry can expect to see not only new applications of AI but also new definitions.

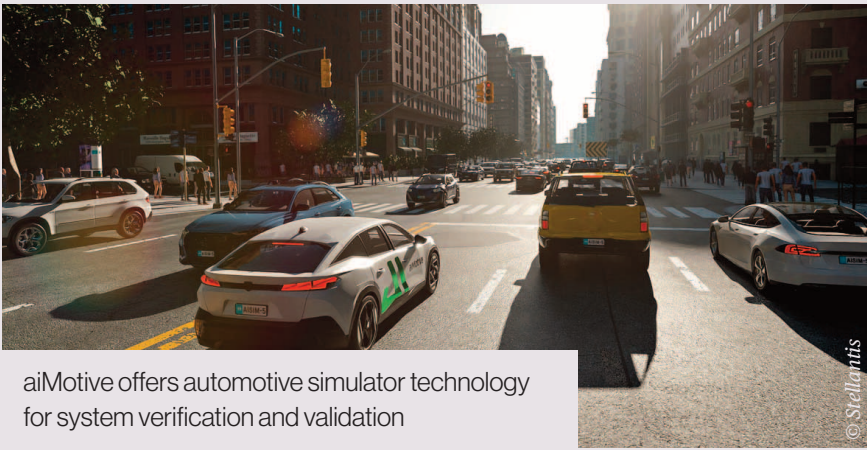
Worth watching

The mobility ecosystem is full of potential disruptors, but one worth watching is Hungarian company aiMotive. It claims to be the largest independent technology team working on ADAS and AD technologies today and is currently questioning the fundamental interpretation of AI and how it can reshape mobility.

Established in Budapest in 2015, aiMotive was acquired by Stellantis in 2022 to accelerate the development of the latter's automated driving platform, STLA AutoDrive. Its tools help test and validate automated driving systems as well as optimise the collection and processing of multisensory vehicle data for deep neural network-based product development. The company describes its approach as holistic, as it addresses the challenges around ADAS and AD tooling and embedded solutions.

“We started with automated driving simulation software development and soon realised that there were no efficient, high-fidelity tools to test and validate this specific segment around automated driving,” says Szabolcs Janky, Product Strategy Senior Vice President. “The other problem we saw was how developers were collecting data from cars on the road. All the automated driving companies, including Waymo, have test vehicles producing vast amounts of data and looking for edge cases.”

aiMotive's original product, the aiDrive software stack, is now exclusive to Stellantis, but the rest of its product offering is open to the wider market. “The embedded software that goes into a car is always very specific to the brand and requires a lot of customisations,” Janky adds. “But when it comes to the tooling, we remain independent.”



aiMotive offers automotive simulator technology for system verification and validation

The next level of AI

The tooling line-up in itself is noteworthy, with stand-out offerings in automated data collection, annotation and processing, as well as synthetic data generation. “Our aim was to make development more cost efficient and time efficient,” says Peter Kovacs, Senior Vice President for aiData. And it does just that, but perhaps the most disruptive innovation comes from what the company is calling Automotive General Intelligence (AutoGI).

“2024 will be all about this AutoGI for us,” says Janky. This is a new term that aiMotive has just introduced, which refers to an application of the latest AI advances that leverage algorithms from the wider AI domain. There are plenty of buzzwords in the marketing jargon there, but it’s essentially AI with more situational intelligence.

“We do not just want to develop automotive systems that only understand and adhere to the traffic rules,” explains Bence

Boda, Marketing Director. “We also want to have cars with some sort of a situational awareness.”

aiMotive Chief Executive László Kishonti likes to use the ‘balloon scenario’ to illustrate what it means: while driving, you see balloons in the middle of the road. Subconsciously a human driver would probably think about children, because balloons are associated with children’s parties, children’s games, etc. As a result, you will assume the presence of children near the road and drive more cautiously. You would also choose to hit the balloons over hitting a child if the choice came down to it. Take this even further and human drivers would know that hitting a balloon would not damage the car, so they would not necessarily need to brake hard if a balloon collision was unavoidable.

This sort of intelligence and reaction is what aiMotive wants to bring to vehicles with AutoGI. In this case, the balloon essentially becomes a cue for the system to trigger a more

nuanced driving response. The company is careful to emphasise that it doesn’t represent any sort of “superhuman” intelligence but rather a form of “general” intelligence. As it explains, the goal is not to replicate human thinking but rather to expand the AI capabilities beyond conventional automotive-centric intelligence.

Where next?

Avoiding children along a residential street is just the tip of the iceberg, as this sort of AI could apply to almost anything, even to requirements developers don’t yet realise they have. “You need to recognise that perhaps in one year from now, we may need a completely different thing that we are not aware of today,” Janky tells *Automotive World*. “Then, when we know the question we need to ask, we can use the latest AI developments.”

The coming months will see aiMotive threshing out exactly how AutoGI translates into its product portfolio, including aiSim, aiData, and aiWare. It’s early days for any concrete details yet, but the supplier generally prioritises scalability along with cost and time optimisation. Janky adds that “AI is very good at recognising patterns,” leaving the door for speculation wide open. It is now down to the human teams at the supplier to decide how this might play out for the mobility sector.

Polestar falls behind: Volvo does not wait

Volvo Cars is handing back control of Polestar to Geely. Ian Henry explores the implications of the move



Making a success in the electric vehicle (EV) market is not easy for established companies; for a new entrant it is equally, if not more challenging. Even Tesla for all its apparent success faces innumerable challenges. But many of the EV start-ups are struggling: Arrival has all but collapsed, while Rivian's volumes are modest, and well below expectations. Lucid may have backing from Saudi Arabia but this financial heft does not guarantee market success. And now Polestar's major shareholder, Volvo Car (itself part owned and controlled by Geely), has decided that it cannot support Polestar anymore. It is effectively handing back control to Geely, whose chairman holds a direct stake in Polestar, while Volvo's 48% stake will be much reduced.

Polestar's value has slumped in recent months, with its share price now a fraction of what it was when it was floated in New York via an IPO and SPAC, a new form of financial entity designed to bring technology start-ups to market quickly. The Polestar IPO took place when the stock market believed that the EV market would grow rapidly and remain strong. A number of headwinds have blown in and Volvo has concluded it cannot continue to support Polestar without damaging its own future. Volvo's shares rose 26% on the news that it was handing responsibility for Polestar to Geely, while Polestar's own shares fell by 14% to a new low. At the start of February, the FT reported that Polestar shares had fallen by over 80% since floatation

It is worth noting that this news was quickly followed by Renault realising that it could not float off its own EV

business ([Ampere](#)) for a variety of reasons, notably financial analysts' concerns over market growth and ambitious valuations for Ampere. At the same time, the many challenges facing Tesla have led to a fall in its share price, by 12% alone in late January when it warned that growth in 2024 would be notably lower than in 2023. Elsewhere in the EV market, Ford has cut production plans for its F-150 Lightning model, while GM (which had been effectively spending US\$36m a day on its EV programmes) has indicated it will slow investment in EVs. Meanwhile, another new entrant, Fisker, has had to refinance its debt to continue operations.

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Volvo has concluded it cannot continue to support Polestar without damaging its own future

Volvo itself is wedded to an all-electric future, although internal combustion engine (ICE) and plug-in hybrid (PHEV) sales will likely remain in the US at least for some time and even in Europe as EV demand slows. It would not be surprising to see PHEV versions of

popular Volvos, notably XC40 and XC60, continuing for longer than Volvo originally planned.

Volvo itself has numerous new EVs to launch and a new factory in Europe to complete and run. This is undoubtedly fully occupying its management and financial resources, and funding a second brand at the same time appear to be too much. Polestar's Chief Executive Thomas Ingenlath has said that Polestar would be profitable within three years, but with sales last year of less than 55,000 units (against plans to sell just 80,000) and losses of more than US\$730m, it is not entirely surprising that Volvo has grown cold feet. Its own EV business has problems, with software issues delaying the launch of the new small EX30, for example. To date, Polestar has relied on corporate buyers, ie rental companies (such as Hertz

which is reducing its planned purchase of Polestars) and company fleets, rather than retail customers which are harder to acquire from established, mainly German, prestige brands, or indeed from Volvo itself.

According to Volvo, handing responsibility for Polestar to Geely means "clarity" for Volvo investors; Thomas Ingenlath of Polestar says that the new arrangements are "totally positive", adding that Geely's commitment to Polestar is "crystal clear". All good words, but the reality may be a bit more complex and challenging.

Moreover, despite the plan to separate Volvo and Polestar, in practice this may be difficult. Volvo has suggested that new Polestars owe more to Geely engineering than to Volvo. That may be true, but the understanding across the industry,

Despite the shareholding adjustment, Volvo Cars will remain a strategic partner in R&D, manufacturing, after sales and commercial





Polestar 4 production ceremony at Hangzhou Bay production facility, China

including supply chain companies, is that Polestars would be made not just in China but also at Volvo plants in Europe and the US. If the Polestars to be made in Volvo plants are indeed made on different platforms to the Volvo models, this can only increase, rather than decrease, operating costs in these factories and render supply chains and inbound logistics more complex.

At this time, it seems implausible that Polestar will build its own factories in Europe or North America, so shared production with Volvo seems inevitable, unless it decides to make all its cars in China. That may be economically worthwhile and practical in a logistics sense if Polestars share technology underpinnings with Geely rather than Volvo. However, it raises a number of

other issues. First, can Volvo generate enough volume to fill its US and European plants, including the new factory in the Czech Republic, on its own? And secondly, for Polestar, if it relies solely on Chinese production, while this may give Polestar a significant production cost advantage, it will expose Polestar to the risk of enhanced tariffs on Chinese imports into Europe and the US. The EU is investigating whether Chinese EV companies are unfairly subsidised by Chinese government support and may well increase tariffs above the standard 10% levied today. In the US, Chinese imports are already subject to a 25% tariff on top of to the normal 2.5% levy on imports; the possible re-election of Donald Trump would likely lead to additional tariffs. A new set of headwinds will soon be blowing Polestar's way.

Marketing cars on TikTok makes authenticity an OEM priority

TikTok could be a valuable platform for building brand communities, but it will require a new mindset from other forms of legacy media. By Will Girling



As automotive retail evolves, [some commentators](#) believe manufacturers will enter an “age of curiosity” as they seek to engage with new demographics. This will likely be characterised by innovative approaches that make use of social commerce through new digital channels, using entertainment and brand affiliates to build communities centred on products.

Success will be determined by moulding marketing content to fit with the dynamic of the most popular platforms. For many younger customers, this means TikTok. Currently available in more than 160 countries, the short-form video hosting service claimed to have approximately 1.7 billion users worldwide in 2022. By 2025, Statista forecasts this figure will grow to around 2.25 billion. As of October 2023, 36.2% of users are aged 18-24 (Gen Z) and 32.1% aged 25-34 (millennials).

“For the last two years, companies have been wondering how to do TikTok ‘in the right way’,” Jack Carter, Automotive Lead for the UK at TikTok, tells *Automotive World*. Although the automotive industry has experience with a range of legacy media formats (television, radio, printed, etc.), he believes a period of strategic adjustment will be required. “Automotive is one of the most difficult industries in which to develop great creative stories—it’s not quick, easy, or cheap.”

A new form of content

TikTok, explains Carter, is fundamentally an entertainment platform, not social media—instead of being based on following others, the

experience is curated according to user interests. Once these are ascertained, the platform’s algorithm then recommends the video content with which each user is most likely to engage, introducing an element of discovery while still keeping the viewer within a defined sphere of relevance. In terms of marketing, this can help streamline conversions—the ‘TikTok Made Me Buy It’ hashtag emerged in 2020 as a result.

At the time of writing, car centric TikTok content (‘#CarTok’) has generated more than 65 billion views. In order for automakers to leverage this exposure, Carter emphasises the necessity of community and creator engagement. “Tapping into them in a way that feels authentic to an automotive brand and the content’s audience is both the opportunity and the challenge.” Depending on the brand, this could encompass several stages of the marketing funnel, from ‘awareness’ to ‘consideration’.

While it is important to inform and entertain, driving returns to a business through conversions is the ultimate goal. What won’t work, Carter adds, is simply placing a TV-style advertisement in video feeds, which would look out of place in the context of TikTok. “61% of users expect and want to see different content from OEMs than TV.” Therefore, automakers need to produce content that matches the native TikTok paradigm.

Brand authenticity

Carter cites several automakers that are successfully using TikTok to generate organic content for their brand. “Mercedes and Lamborghini were among the first to have a



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presence on TikTok. Since then, they've been joined by Aston Martin, Bentley, Ferrari, and Porsche.” Significantly, he continues, these luxury brands recognised the value of new digital channels for reaching the “customer of tomorrow” by building aspiration. Subsequently, more mainstream OEMs are also examining how TikTok can be valuable to them.

In order to create appropriate content, automakers must first determine what they wish to represent from a marketing perspective. “There’s a level of parity in the industry, particularly with electric vehicles, which operate using very similar technologies and design points,” says Carter. Differentiation, as with most forms of product marketing, is critical. However, TikTok often requires a subtle

approach, where vehicles themselves are not necessarily the focus, but the brand’s unique identity still constitutes an essential element.

Peugeot’s ‘Always-in’ campaign involved collaborating with five creators who related to its key marketing pillars such as fashion and design. “For example, it worked with a 3D printing video creator, who then produced a vase modelled on the Peugeot 408.” The three-month campaign was considered a success—it generated thousands of views and boosted overall brand favourability (+31%) and consumer intent to purchase (+76%).

Defender, part of Jaguar Land Rover’s new house of brands, wanted to angle its market image away from off-roading and towards the music space, leading to a TikTok collaboration with

British rapper and actor Kano. Elsewhere, Vauxhall partnered with travel content creators in a series of videos exploring lesser-known tourist attractions in the UK. “These partnerships can work if they feel authentic to the brand,” Carter clarifies. It is only by doing this that genuine community engagement can be achieved. “It’s all well and good having a presence on a platform, but if things aren’t active, no one will care.”

Purchase today, not just tomorrow

Although there is currently a range of experience with TikTok among automaker marketing teams, Carter’s general experience to date has been one of education and familiarisation. However, interest is building: “In the last year, there has been cross-industry recognition that it’s a platform that can help from a marketing perspective.” Over time, he predicts that curiosity in TikTok’s potential will extend from dealerships up to C-suite executives.

Ultimately, Carter believes TikTok could develop as a form of online showroom that helps quickly build brand rapport and easily facilitates vehicle purchases. The journey to realising that vision will be iterative; he states that the platform is currently investigating the potential for selling accessories online, “a much easier conversion,” before full cars. “For us, the main focus is helping all car brands use TikTok in a way that helps them achieve their business aims, whether that means lead generation, directing customers to car configurators, or simply brand awareness.”

While luxury OEMs may have taken the early initiative in using TikTok to build brand preference, high volume manufacturers will also need a sound route for selling cars. This requires a dual approach that seeks to both secure the future business of younger users and attract older customers who are ready to buy now. Carter believes this can be achieved: even though the majority of TikTok’s users are either Gen Z or millennials, he states that the platform is not quite as young as some might think.

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The main focus is helping all car brands use TikTok in a way that helps them achieve their business aims

“Because the app experience is based on users’ interests, there’s no reason that TikTok engagement should be restricted by age demographics.” Indeed, 31.6% of users are reportedly more than 35 years old, of which 6.4% (approximately 11 million people) are older than 55. “A recent campaign by Fiat had a very effective cost per lead,” Carter concludes. “That shows there are users already on the platform who can purchase today, not just tomorrow.”

Supplier distress signals: effective management is vital

Early identification of supplier distress can help to mitigate risks before a crisis sets in, writes Steve Savoy and Ryan Gross

Distress is an inherent part of a company's lifecycle. Effectively managing and preemptively addressing this stress is vital to avoid bankruptcy, maintain worker productivity, and sustain the overall economy. This is especially critical in industries like automotive, which rely on extensive supply chains with interdependent vendors. To ensure the company's success, managers, lenders and advisors should be well-versed in recognising the common signs of distress and taking proactive measures to steer the company towards growth.

Early indicators

There are several early indicators that serve as red flags. Slowing sales over a prolonged period, particularly during an upturn in the market and when competitors thrive, demand immediate attention. Consistent volume swings also suggest pricing issues that can significantly impact manufacturing. These factors, if left unaddressed, can lead to more detrimental problems, including deteriorating margins, delivery, and quality issues, and even workforce reduction. While these issues can manifest in various ways, it is essential to read and be able to interpret financial metrics to fully understand the severity of the potential problems. Breaching covenants can escalate the situation rapidly.

Sales

Slowing sales demand careful scrutiny. For mature firms, flat sales on a seasonally adjusted basis generally pose no immediate danger. However, sustained sales decline requires action to prevent further issues such as sales declining below the minimum required to cover fixed costs. A business with traditional annual revenue in the range of US\$100m cannot cover fixed costs (e.g., rent, salaries, and utilities) when that revenue drops to only US\$60m. The lack of revenue will eliminate profits. Possible steps include increasing revenue with existing or new customers or re-sizing the business to operate efficiently at the lower revenue. Unusual volume swings pose a management concern. Various factors can cause these fluctuations, some of which may be typical for the industry.

July and December shutdown periods predictably impact revenue in the automotive industry. To mitigate their impact, companies should address the root causes and develop comprehensive plans. Unrealistic customer expectations and conflicts between sales and operations are common culprits. Additionally, failure to anticipate sudden schedule changes for influxes or drops in demand can exacerbate the situation.

Delivery and quality

Delivery and quality issues, which often intertwine with the aforementioned problems, are commonly observed operational challenges that can lead to distress and the resulting customer dissatisfaction may be the root cause

for sales volume declines. Large order requests within a short timeframe can force firms to prioritise quantity over quality, compromising product excellence. This may also disrupt shipping plans, leading to non-standard shipping, delayed orders, and subsequent cash flow issues. Firms sometimes feel pressure to cut corners when they take business with low margins; this can drive firms to cut costs or capital expenditures, impacting production quality and delivery reliability.

Conversely, producing products with quality issues or facing consistent delivery problems can lead to customer dissatisfaction, remakes, or customers switching to alternative suppliers. This can result in declining sales and margins. Resolving these issues involves examining scrap rates, implementing preventative maintenance, and considering capital expenditures, including increased automation. However, implementing these solutions can be costly, and if a company is struggling with other operational aspects, generating the necessary funds can be challenging. Seeking external expertise becomes invaluable in managing debt within covenant limits and effectively addressing operational issues.

Margin deterioration

Clearly deteriorating margins stand out as a lagging indicator of significant trouble. Apart from declining sales, this issue severely affects a company's health for several reasons. It erodes EBITDA, increases the working capital required to run the firm, and creates an unhealthy mix that can push a company towards covenant breaches and



When sales decline or margins contract, managers may consider downsizing the workforce

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increased debt. Diagnosing the problem involves asking critical questions, such as the reasons behind the deterioration, the duration of the issue, and identifying the customers responsible for the decline. Armed with this information, managers can develop plans to rectify the situation and address the fallout. If financial metrics indicate emerging issues and encroachment on covenant breaches, seeking external advice becomes crucial to manage cash flow and right-size the company.

More issues lurk beneath the surface

It is important to recognise that these warning signs often lead to additional issues within the company. One significant knock-on effect is a shrinking workforce. When sales decline or margins contract, managers may consider downsizing the workforce to align with company needs. However, this can be a

symptom of an underlying problem. Additionally, workers may leave due to a pessimistic outlook resulting from declining margins or other issues mentioned earlier. Moreover, high volume swings may require the use of temporary labor to meet customer demands. This can increase training costs and lower morale among temporary workers who have limited opportunities for advancement. Ultimately, these issues can impact plant culture, creating a tense work environment that perpetuates a negative cycle of distress.

Importance of financial metrics

Financial metrics act as vital indicators of a company's struggle before it becomes a serious issue, particularly as banks and institutions rely on this information for covenants. Important ratios and judgment-based factors must be

monitored. Soft metrics, such as customer and supplier concentration, hold significant relevance in the manufacturing space. Overly concentrated customers can expose the company to aggressive market downturns, leading to volume swings, slowing sales, and margin deterioration. Similarly, supplier concentration can cause delays in inputs, resulting in delayed orders and the need to find alternative suppliers. These issues can bring underlying problems to the forefront.

Formal financial metrics that warrant close attention include EBITDA, debt to EBITDA, debt to revenue, and the current ratio. EBITDA below 6% indicates inadequate cash flow for future profitability. While standard EBITDA margins across the S&P 500 reach around 15%, the manufacturing sector, especially at the middle market level, typically achieves around 10% for a healthy company. Evaluating debt to EBITDA ratio provides insights into cash flow, with a ratio exceeding 3.5 to 1 indicating an unfavourable position to repay debt, raising concerns for investors and banks. Similarly, a debt to revenue ratio exceeding 1:2 implies inadequate revenue to support a high debt burden. Lastly, the current ratio, reflecting the ratio of current assets to current liabilities, should not drop below 2:1, indicating an inability to settle immediate liabilities and making suppliers and banks cautious about extending further credit. The presence of one or more of these indicators signifies business struggle, demanding immediate corrective action.

Addressing weaknesses and building resilience

Effectively managing and addressing distress signals in a company is vital for its survival and the broader economy. Industries with intricate supply chains, such as automotive, are particularly vulnerable. Slowing sales, volume swings, deteriorating margins, delivery and quality issues, and a shrinking workforce are common warning signs. Financial metrics, including EBITDA, debt ratios, and the current ratio, play a crucial role in identifying and resolving these issues. Taking prompt action, such as analysing operations, adjusting pricing strategies, seeking external advice, and implementing necessary changes, is essential. By proactively managing these indicators, companies can navigate through distress, maintain their operations, and ensure long-term sustainability.

Given the evolving landscape outlined above, it's important that suppliers across the automotive industry undertake a 'health check', leveraging the independent and unbiased services of a qualified and experienced third party consultant. Closely reviewing financials and operations and identifying potential inefficiencies or problems that may not otherwise be obvious to those within the business, should be considered as a risk mitigation best practice- even if a company is performing well.

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Can China make battery swap work for heavy-duty vehicles?

A blend of strong market forces and state intervention may give China a unique advantage in enabling battery swapping for trucks. By Stewart Burnett

Over the last two decades, China has endeavoured to become the world leader in clean energy transportation. It has the highest rates of domestic battery electric vehicle (BEV) adoption anywhere in the world—October 2023 saw BEVs accounting for 39% of total car sales. That same month, the country surpassed 6.2 million BEV sales in a calendar year—800,000 more than 2022, and 4.8 million more than in the US across all of 2023.

China is also ramping up its experimentation with battery swapping in the commercial vehicle segment. In October 2021, the government initiated a two-year pilot programme intended to put 100,000 swap

capable trucks on the road, as well as 1,000 swapping stations. In 2022, 49.5% of all electric trucks sold in China were swap capable.

Gregor Sebastian, Senior Analyst at independent research organisation Rhodium Group, believes that China's push towards leadership in battery swapping technology is a logical extension of its dominance in lithium-ion batteries. Deploying the technology in commercial vehicles would not only help the country reach its goal of net zero by 2060 but also make economic and political sense. "From China's perspective, investing in battery technologies has proven a really smart move historically," he tells *Automotive World*. "It has paid dividends."

A strong use case

China's domestic uptake of heavy duty BEVs (HDEVs) is, at present, the highest anywhere in the world. "No other country has come close in annual sales," remarks Tu Le, Founder and Managing Director of Beijing consultancy Sino Auto Insights. "The discrepancies are enormous." While around 52,000 new electric trucks were sold in China in 2022, fewer than 2,000 were sold in the EU.

However, battery electric has weaknesses that are particularly pronounced in the heavy-duty segment. One example is range: producing batteries suitable for the rigours of long-haul transportation is expensive.



In 2022, 49.5% of all trucks sold in China were swap-capable, including those made by FAW Jiepeng

The National Renewable Energy Laboratory estimates that the average HDEV cost around US\$575,000 in 2022, compared to US\$170,000 for an equivalent diesel truck. The battery is responsible for most of the additional cost.

Despite this, range remains limited compared to passenger BEVs. For instance, Scania's electric regional tractor unit offers a maximum range of only 250km at maximum load. Scaling up battery capacity may also prove challenging, as China's expertise largely concerns lithium-iron-phosphate (LFP) cells. While this composition is cheap to produce, it cannot currently compete with the ranges offered by chemistries such as nickel-manganese-cobalt (NMC). In Sebastian's view, this is why battery swapping would integrate well with the country's existing strengths. By combining cheaper LFP batteries with swap capabilities, manufacturers can more easily electrify trucks in the first instance and then enable them to operate efficiently.

China's advantages

In order for battery swapping to become more feasible, commercial vehicle batteries must first be standardised. Automakers would need to agree on a common design that would be compatible across all truck models. Regulating this in a Western country would require significant amounts of time and resources and could still fail entirely. Sebastian emphasises that, unlike other countries, China can pair its strong market forces with a "huge" amount of state intervention. If it wants to push for standardisation, it can.

Indeed, China has already implemented regulations in support of battery swapping. In May 2021, the government adopted rules specifying the safety requirements, test methods and inspection rules for swap capable HDEVs. At the time of writing, no other government has moved to explicitly support the technology.

The other issue is the significant capital cost associated with manufacturing sufficient quantities

of batteries to support widespread swapping infrastructure. For most countries, this would not be possible because of their lack of manufacturing strength and access to battery raw materials. Le sees China as the sole outlier in this regard: “In absolute terms, it’s the largest country in the world and has the second largest GDP (US\$17.5tn in 2023). When China goes into something wholeheartedly, it’s going to land in the global top two or three.”

LG and Panasonic and forging ahead with investments in firms like CATL.” The gamble paid off—as of 2024, six of the world’s top ten battery manufacturing companies are headquartered in China.

Many options

While battery swapping might struggle to gather momentum in other regions, the pace of its adoption among Chinese fleets is increasing, with CATL often

in the taxi segment too. In a contemporaneous newsletter, Sino Auto Insights described this development as likely to “eliminate a lot of doubt about whether swapping is viable.”

Despite this, the success of battery swapping in China’s heavy-duty segment is not guaranteed. “China is also facing some issues with debt,” Sebastian highlights. “There’s always this two-way problem. On the one hand, it’s undoubtedly the most suited economy in the world to battery swapping in terms of standardisation and capital intensity. But we have to acknowledge the reality that it might want to abandon some of its ongoing experiments.” Notably, the Chinese government is also considering other avenues for fleet decarbonisation. In March 2022, it committed to putting 50,000 (primarily heavy-duty) hydrogen vehicles on roads by 2025. However, he acknowledges that battery swapping has likely seen the most support to date.

What may seal the deal for the technology, in Le’s view, is its optionality: a swap capable truck does not necessarily need to take advantage of this functionality. “For commercial vehicles in China, I don’t view battery swapping as an ‘either/or’; I view it as a ‘yes/and’,” he concludes. “If China decides a technology is going to be viable domestically, it usually is, and that creates an opportunity for other countries too.”

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If China decides a technology is going to be viable domestically, it usually is, and that creates an opportunity for other countries too

The country’s battery technology leadership to date is a pertinent example. In Sebastian’s view, China’s success in this market stemmed from a desire not to rely on international companies for its advanced technology needs. “There was a strong commercial rationale for excluding the major incumbents in the space like

at the forefront of such developments. 2023 saw the company enter several agreements with state road infrastructure firms, including Fujian Expressway Group and Shandong High-Speed Group, to deploy swap stations along major highways. In January 2024, it partnered with ride hailing app Didi to expand battery swapping infrastructure