

Automotive World MAGAZINE

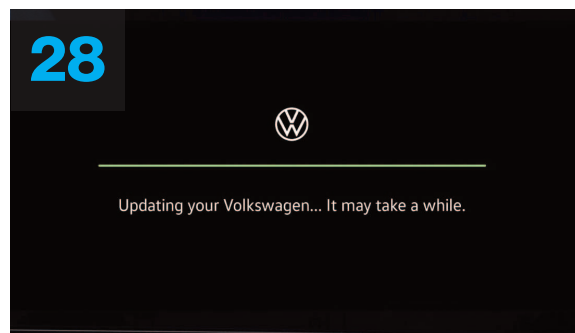
Issue 24 | December 2021

A portrait of Adrian Hallmark, CEO of Bentley, wearing a dark blue suit, light blue shirt, and patterned tie. He is looking directly at the camera with a slight smile. A small Bentley winged logo pin is visible on his lapel.

Bentley CEO on positioning luxury for an electric, autonomous future

COP26 looks beyond the tailpipe | Adrian Hallmark positions **Bentley** for future mobility |
Greenlots CEO argues quality over quantity for charging points | **Russia** accelerates autonomous vehicle testing |
Volkswagen steps up software expertise in push for mobility leadership | **BASF** tackles EV NVH

04 Bentley CEO on positioning luxury for an electric, autonomous future



10 EVs are just the start: transport takeaways from COP26

14 Vision Zero in sight for CV segment

20 Russia plants the seeds for future commercial AV mobility services

Could smart driver monitoring match self-driving safety?

OTA steers the course for Volkswagen's software transformation

What do consumers really want from the connected vehicle?

24

28

32

Copyright statement

© 2021 All content copyright Automotive World Ltd. All rights reserved.

This publication - in whole or in part - may not be shared, copied, reproduced, stored in a retrieval system, or be transmitted in any form by any means electronic, mechanical, photocopying, recording or otherwise without the prior permission of Automotive World Ltd.



- 38** EVs pose new noise and vibration challenges
- 44** Masters of our destiny? The automotive industry needs to widen its gaze
- 48** Tesla's open Supercharger network: publicity stunt or game-changer?
- 54** "General Motors is undervalued," says CEO
- 58** EV battery degradation regulation can reassure consumers
- 62** Russia's truck market braces for another torrid period
- 64** Interoperability crucial for EV charging, says Greenlots CEO

Published in December 2021
by:

Automotive World est. 1992

Automotive World
1-3 Washington Buildings
Stanwell Road, Penarth,
CF64 2AD, UK

www.automotiveworld.com
T: +44 (0) 2920 707 021
support@automotiveworld.com

ISSN: 2634-9531

Registered number: 04242884

VAT number: GB 815 220 173

CEO & Managing Director:

Gareth Davies

Editor at Large:

Megan Lampinen

Contributors:

Jacob Moreton
Jack Hunsley
Freddie Holmes
Inma Martinez

Production:

Anmol Mothy

© Automotive World Ltd 2021

Cover image courtesy of Bentley

A portrait of Adrian Hallmark, Bentley CEO, sitting in the driver's seat of a car. He is wearing a dark suit, a light blue shirt, and a blue and red striped tie. The background is blurred, showing the interior of the car.

Bentley CEO on positioning luxury for an electric, autonomous future

Adrian Hallmark speaks to Megan Lampinen about the challenges and opportunities presented by CASE trends

As the automotive industry powers ahead towards a connected, autonomous, shared and electric (CASE) future, incumbent brands are reinventing themselves. The dominant players over the last 100 years built up expertise in fields that could soon become irrelevant. As electric motors replace internal combustion engines and shoppers prioritise digital experiences over revs per minute, a new playbook is needed. These trends apply across the vehicle spectrum, but pose unique challenges for the luxury segment. How can marques that pride themselves on brand heritage, driving pleasure and handcraftsmanship position for an electric, autonomous future?

Creating a virtue out of luxury

Bentley offers an interesting case study of just that. The Volkswagen Group's luxury brand outlined its roadmap for the future, Beyond 100, in 2020 as part of its centenary celebrations. This is essentially the brand's blueprint for sustainable luxury mobility leadership and includes key targets such as electrifying the full model range (plug-in hybrid or battery electric) by 2026, then moving the entire line-up to full electric by 2030 and achieving end-to-end carbon neutrality by 2030. These are bold and challenging targets, but as Chairman and Chief Executive Adrian Hallmark explains, pivotal to survival in the emerging mobility paradigm.

"When we looked to the future we saw an existential threat to luxury mobility," Hallmark tells *Automotive World*. "That was down to the image of luxury cars compared to small electric vehicles (EVs). We needed to make luxury relevant to the next generation of

consumers. How could we neutralise any of the negatives and create a virtue out of luxury, so that consumers can spend on objects and experiences that are ethically and environmentally sound and sustainable?" The new aim was to create an eco-friendly experience that would drive the premium as much as the trim, specification and performance historically did.

Luckily, consumer attitudes were in line with this new strategy. Every year Bentley conducts a study of luxury car buyers across various brands. Three years ago, 30% of respondents said they would consider buying a luxury EV within the next five years. By the end of 2020, that figure had jumped to 67%. At this time, Bentley had already made its commitment to electrification and the results served as further justification of the new brand positioning. "What started out as strategic self-reflection, and a little bit of a relevance threat, turned to actual alignment with customer needs for the future," says Hallmark. "And it totally energised the organisation."

Driver-oriented in an autonomous future

Luxury brands may well be able to align themselves with the electrification movement, but autonomous driving could prove more challenging. There has long been speculation among some industry watchers that brand value could become less relevant in a future of fully autonomous driving. For Hallmark, that future remains decades away. He notes that it will take an estimated 20 years to renew the full UK fleet, and Level 5 self-driving vehicles are not yet on the market. "If you consider the ramp up of autonomous vehicles, the ramp up of supporting



The Beyond100 programme transforms every aspect of the automaker

infrastructure and the ramp down of the existing fleet, this will take two to three decades before the industry sees full autonomy,” he predicts.

Then there is the challenge of how autonomous vehicles will mix on the road with human-driven vehicles. “The end-state, when all vehicles are autonomous, is easy to imagine,” Hallmark notes. “So is the current state where nothing is autonomous. But how fast would an autonomous vehicle be able to drive on the road today surrounded by two billion non-autonomous ones?”

While Hallmark shies away from commenting on whether or not future Bentley models may eventually come without steering wheels and brakes, he does confirm that “driving will be at the core of our proposition for the foreseeable future.” At the same time, he sees a role for some autonomous functionality within the line-up, specifically taking over the boring and dangerous aspects of driving to make for a more enjoyable user experience. Autonomous, he insists, “will fit perfectly with the luxury experience.” He likens it to chauffeur-driven Bentleys common 50 years ago. “With autonomous we get to not drive



again,” he jokes. “In the meantime, driver-orientation is crucial for us as a brand. We see autonomous driving as a way of covering long distances with zero-emission vehicles and higher safety than today.”

Distinction in the new normal

In the wake of electrification and automated driving, Bentley may need to find new ways to differentiate its design and user experience. Some premium and luxury brands, for instance, invest heavily in precision

tuning for a specific sound design with their models. As batteries and electric motors replace internal combustion engines, the specifics of that approach may evolve but the same strategy remains valid.

“Even without an engine in there we can create a unique environment,” insists Hallmark. “Our biggest engine has 12 cylinders. Put in a battery instead and you have up to 2,000 cells. The battery control module can deliver acceleration, high torque, anything we chose. I would argue that there is more variability and tunability with 2,000 cells than 12 cylinders.”



Hallmark concedes that the future could see some commoditisation of certain aspects of the vehicle, but that is not a new phenomenon. Today, most of the world's automakers source their gearboxes from two or three suppliers. It's the same with a few other components. In the end, the message is that Bentley's historic strengths of technology and craftsmanship will shine through. "I am confident that the future of luxury will be as colourful, inspirational and differentiated as it is today but it won't only be about cylinders or horsepower. It will be about cells and digital capability and this inspirational craftsmanship in the interior of the car."

Near-term focus

With one eye solidly on the future, Hallmark has another looking to the near term priorities such as ensuring new model programmes go to plan and record levels of demand are sustained. Last year, in the midst of the COVID-19 pandemic, the brand hit a 101-year sales record. The order rate has continued to grow through 2022.

Coincidentally, just before lockdown it announced the creation of two separate programmes. One was for the recreation of a 1929 race car, costing £1.5m (US\$2.06m), and limited to a production run of just 12 units. The other was a carbon fibre body coach-built car, also limited to a 12-unit run. It sold them all instantly. "I never met any of the customers but had Zoom and Teams calls with all 24 of them," says Hallmark. "When I asked why they intended to make such an acquisition in the middle of

“

When we looked to the future we saw an existential threat to luxury mobility



Retail sales in H1 2021 grew 50% from a pre-COVID 2019 figure of 4,785 to 7,199

all the COVID craziness, they all said the same thing: ‘We’ll get through this. This is a once in a lifetime opportunity to get what I want. I’m grabbing it. Life is too short’.”

While these particular consumers were buying super luxury vehicles, the same mindset is found in Bentley’s regular customer base, the millionaires as opposed to the billionaires. “There is a whole group of people who have not travelled or invested in things on which they normally spend money,” he points out. “Private mobility has had a renaissance in people’s minds. The

security and independence that cars bring has been accentuated, not diminished, by this crisis.”

And within that private mobility space, luxury mobility in particular is clearly investing where it needs to in order to remain relevant. Bentley’s founder Walter Bentley is noted for stating that his ambition was to build a silent, four-seater car that could do 100mph across continents. That vision, as radical as it may have seemed 100 years ago, is now on the cusp of realisation and will very soon be topped by advances he could not have imagined.



#TogetherForOurPlanet

© UNFCCC

EVs are just the start: transport takeaways from COP26

Automotive World offers first-hand feedback from the most significant climate event since the Paris Agreement. By Megan Lampinen

COP26 put the transport sector's sustainability efforts under the spotlight. The event, the biggest summit ever hosted by the UK, has been hailed as the most significant climate event since the 2015 Paris Agreement. With a dedicated Transport Day (10 November), representatives from the wider mobility ecosystem were out in force. Electric vehicles (EVs) and hydrogen fuel cell technology dominated much of the conversation, with a notable emissions-free vehicle pledge by 2040 from 13 nations and multiple companies. But on the whole, there was an overriding recognition that it was time to look beyond the tailpipe.

Beyond the tailpipe

"All the talk about moving from internal combustion engines (ICE) to electrification is nice, and it's a fundamental first step, but the industry is expecting much more stringent action to clean up the whole value chain," says Arturs Smilkstins, Partner at Boston Consulting Group.

Advanced Electric Machines (AEM) Chairman Peter Fleet raised a similar issue at an event session. "EVs," he told COP26 attendees, "are not the whole answer... Just as a good car is more than the sum of its parts, its environmental impact is defined by more than the CO₂ it emits when driven."

Unlike the bulk of car components, which are made of steel, aluminium or plastic, EV batteries, motors and power electronics contain rare earth metals such as cobalt, neodymium and dysprosium. For every tonne of rare earth metal mined, up to 1.4 tonnes of radioactive waste is produced. Compared to steel

emissions, these are much more harmful. Production of one tonne of steel emits around 2.4 tonnes of CO₂. In comparison, one tonne of rare earth mining can emit nearly 28 tonnes of CO₂. AEM is developing a rare-earth free EV motor, thereby helping make EVs more sustainable.

Polestar was also pushing the wider sustainability message. "Building and selling electric cars isn't the end point, it is the beginning," asserts company Chief Executive Thomas Ingenlath. "We will need at least as much attention on creating a clean supply chain and ultimately recycling. An electric car is a good start, and a pathway to true climate neutral mobility, but clean means clean from start to finish. Polestar is not perfect, but we are working at being better."

Polestar has been publishing the details of the CO₂e footprint of its cars and introduced a Product Sustainability Declaration, which makes it easier for consumers to compare the climate impact of different Polestar vehicles, along with price and range.

Recycling and reuse

As part of this look beyond the tailpipe, COP26 is also homing in on efforts around battery recycling and reuse. As Smilkstins points out, "A big challenge remains around recycling and reusing all those batteries, which are in EVs, hybrids and fuel cells.

There is a real need for the industry to have a discussion around that."

Power electronics systems in general pose significant sustainability concerns. These are pivotal to EVs and are made up of a complex mix of polymers, ceramics, semiconductors and metals like copper, aluminium



EVs may offer zero tailpipe emissions, but they pose other sustainability challenges

and tin along with small amounts of gold and silver. Some of these are difficult or impractical to recycle. In 2019, just 17% of the 53 million tonnes of electronic waste produced was sustainably recycled.

If EV production volumes grow tenfold by the end of the decade, as many expect, that could mean ten times more battery packs, motors and power electronics systems potentially ending up in landfill. That is, if nothing changes. “Power electronics are part of the global e-waste problem,” states Mark Johnson, Director of the EPSRC Centre for Powertrain Electronics at the University of Nottingham. Speaking at an AEM-sponsored event at COP26, Johnson touched on the need to limit the amount of e-waste by addressing the three rs—reduce, reuse and recycle—as well improvements in design.

Funding for infrastructure

Another key transport focus at COP26 has been funding the supporting infrastructure for EVs and hydrogen-

powered vehicles. “Both of these areas require much more significant investment than what is currently on offer,” cautions Smilkstins. “We see hundreds of millions of pounds poured into infrastructure and many commitments made, but that’s only the tip of the iceberg. There has not yet been a conversation about planning charging or hydrogen stations across a country.” So far, the bulk of public charging investment has been concentrated on urban centres, but there will also need to be infrastructure between cities and in more rural areas, which may not prove as lucrative.

Charging solution provider EVBox Group attended COP26 with the message that the rollout of charging infrastructure must be accelerated across the globe in order to meet Paris commitments. “COP26 will have to highlight the need for carbon-neutral transport across the globe—not only for the health of our planet but also for our communities and global economy,” said Hugo Pereira, Chief Growth Officer at EVBox Group. “Given that EV charging infrastructure

plays a pivotal role in the adoption of electric mobility, there is a clear need for policymakers to acknowledge the importance of creating a comprehensive plan for the deployment of quality, scalable infrastructure.”

Plenty of other stakeholders have the same message. “We are on the right path already, but more needs to be done. We do not yet have the infrastructure required to take the lead in the EV revolution,” warned Pilgrim Beart, Chief Executive of charging management company DevicePilot. He went on to add that “intervention and investment is sorely needed.”

Collaboration

Not surprisingly, given the nature of COP26, a focal point has been the importance of collaboration. In order to usher in an era of truly sustainable transport, ecosystem players are going to need to work closely with each other in an open and collaborative way. Speaking at the AEM panel event, David Thackray, Sales and Marketing Director at electric truck company Tevva, noted: “This all involves a lot of new technology and there are so many new things to be done. None of us can do it on our own. We have to do it together.”

Smilkstins makes a similar point. “A decade ago when we talked about new cars, customer centricity, and production efficiency, those things could have been solved by individual companies making alliances, which we saw frequently,” he told *Automotive World*. “That’s changing.” As technology evolves so quickly, he anticipates an industry shift towards just a handful of suppliers in each

area, avoiding the need for many smaller companies to pour hefty investments into R&D. The thought is that nobody wants to waste time reinventing the wheel.

“You probably need two or three global suppliers of batteries and other components, and then all the players should very quickly agree on standards and specifications,” Smilkstins suggested. “Automakers will differentiate their products but there will be unified standards and manufacturing of the key components, which should be similar. That stands out from all the previous automotive industry challenges over the decades. This time, working together is the only solution; there’s just too much capex needed in too short a timeframe to solve for these challenges.”

“

Building and selling electric cars isn’t the end point, it is the beginning. We will need at least as much attention on creating a clean supply chain and ultimately recycling

Vision Zero in sight for CV segment

Despite the high cost of technology, progress is being made on automation and ADAS for trucks and buses.

By Jacob Moreton



Approximately 1.3 million people worldwide are killed in road collisions annually, according to the World Health Organisation. Crash injuries are estimated to be the eighth leading cause of death globally, across all age groups, says the US Center for Disease Control. Despite some improvement over the last few decades, there remains a certain inevitability about these statistics. But need it be this way?

That's the motivation behind Vision Zero, a theoretical future that sees no deaths or serious injuries stemming from road collisions. The movement started in Sweden in the 1990s and has since spread throughout Europe and further afield. It shifts the burden of road safety away from being entirely on the shoulders of drivers and places some responsibility on manufacturers and designers.

A unique role

Vision Zero incorporates all vehicles on the road but the commercial vehicle (CV) segment has a unique role to play in fulfilling the industry's road safety ambitions. To start with, the size and weight of trucks and buses present an obvious safety threat to smaller vehicles. According to the US-based Insurance Institute for Highway Safety, trucks can weigh as much as 30 times the average passenger car. Their greater height and ground clearance, meanwhile, means that smaller vehicles can under-ride trucks in collisions.

The professionalism of CV drivers is also important, says Tomas Forsberg, Safety Manager at Volvo Buses. "The

fact that driving is performed while drivers are working makes a difference. Regular driver training and driving rules can be implemented more easily than amongst passenger car drivers."

Moreover, the financial incentive for scaling technology across CV fleets means that the segment is more likely to see progress in safety technology—particularly autonomy and advanced driver assistance systems (ADAS)—than passenger cars. Andreas Wendel, Vice President of Engineering at self-driving truck startup Kodiak Robotics, argues that autonomous technology could be a solution to common crash-causing driver errors. "While the vast majority of human truck operators drive safely, still most of these incidents are due to human error," he says. "The Kodiak Driver will never text and drive, or drive drunk, distracted, or drowsy. Plus, unlike human drivers, our trucks learn in parallel across the fleet: when one truck learns something, they all do."



© Volvo Trucks

All-seeing

For truckmakers looking to improve their chances of achieving Vision Zero, Kodiak's technology might offer a glimpse of the future. The company's fourth-generation trucks include three LiDAR, including two that scan 360 degrees, and four long-range radar sensors, and seven cameras. "All these sensors allow the truck to 'see' long-range and all around the vehicle in a wide variety of weather conditions for safe operation at highway speeds," explains Wendel.

But safe autonomous driving relies on more than just the sensors themselves—it requires a system that can understand this information and make effective decisions. In the case of Kodiak, information from the sensors

is assessed through Kodiak Vision, the company's perception system. This considers the relative strengths and weaknesses of each type of sensor, says Wendel. It "incorporates extra redundancies and cross validates data, adding another layer of safety to the self-driving system."

In trucking, more so than in the passenger vehicle segment, safety is also dependent on more traditional elements of the vehicle platform. For example, long-haul truck drivers must monitor tyre performance over long journeys. Many truck developers, Kodiak included, incorporate tyre mounted sensors and pressure monitoring systems to provide real-time updates on tyre health and ideally avoid dangerous accidents before they occur.



The Kodiak Driver system provides a glimpse of the tech needed to make Vision Zero a reality

© Kodiak



Buses typically use a mixture of camera systems, radar and LiDAR, while coaches rely on just radar and cameras due to their usually high-speed, long-distance journeys

Buses and coaches

Automation is on the rise elsewhere in the CV sector too. Like the Kodiak Driver system, buses typically also use a mixture of camera systems, radar and LiDAR, explains a spokesperson from Alexander Dennis Limited (ADL), while coaches rely on just radar and cameras due to their usually high-speed, long-distance journeys. Many ADL coaches come with features like lane keeping support, adaptive cruise control and automatic emergency braking.

The situation for buses is slightly different, given the more complicated requirements of urban journeys. “Unlike coaches, buses are used in slow moving traffic and heavily pedestrianised areas,” ADL’s

spokesperson says. “This context demands more complex detection and avoidance of pedestrians, cyclists and other road users, while also having to take into account potential standing passengers on board the bus.”

Features like blind spot information, reverse motion detection and advanced emergency braking, all able to detect smaller threats, are currently in development at ADL. The company is also conducting technology studies into low-speed autonomous vehicles for manoeuvring around bus depots as well as a high-speed alternative for travelling on roads. While these features are not currently available for ADL customers, they demonstrate the direction of travel for Vision Zero-friendly technology in the segment.

High cost

Developing such technology can be expensive. Although Vision Zero is an important ambition, could the financial cost be prohibitive for many CV players? “Many companies within the transport industry operate on quite a low margin,” says Volvo Buses’ Forsberg. “This influences their ability and willingness to invest in advanced safety systems—and consequently the truckmaker’s commercial possibilities to introduce safety systems widely.”

That financial stress can also influence driving behaviour, says Forsberg. If a driver is under pressure to fulfil a tight

“

The most important part of Vision Zero work is not the last saved life. It is the many lives that are saved in the process to get there



The safety requirements of an urban bus are quite different to that of a long-haul truck



The majority of truck collisions are linked to driver error

schedule, they might risk speeding, while high workloads could result in a driver taking the wheel while drowsy. In the UK, which is currently facing a severe shortage of truck drivers, the government temporarily relaxed working limit rules to boost supply. But some drivers say this is increasing the danger of their work. “Drivers crash on a daily basis because of exhaustion,” one told the *i* newspaper. Meanwhile, 93% of the world’s road fatalities occur in low- or middle-income countries, despite these countries having only 60% of the world’s vehicles. The intense financial demands on both drivers and truckmakers likely play a role in that statistic.

Constant improvement

Nonetheless, Forsberg argues the industry’s technological readiness offers hope. ADAS and advanced

algorithms are already in use across the segment, he says, to detect dangerous situations and therefore avoid or mitigate accidents. These systems are “constantly improving”, he says, and technology has helped to save many lives already.

But is Vision Zero itself a realistic goal for the CV segment? Forsberg certainly thinks so. “The fact that essentially every accident is preventable already today supports that,” he says, adding that while unfortunate or unpredictable situations will always occur on roads, and that fatal or serious injuries seem to be here for the foreseeable future, that this does not matter in the broader context. “The most important part of Vision Zero work is not the last saved life or avoided accident. It is the many lives that are saved in the process to get there.”

Russia plants the seeds for future commercial AV mobility services

The Russian government has approved a programme to accelerate AV testing and deployment through to 2024. By Jack Hunsley

Plenty of nations see an opportunity to disrupt the automotive status quo through future mobility megatrends. One such nation is Russia and its stakeholders have set a particular focus on introducing commercialised autonomous vehicles (AVs) to its city streets ahead of rival nations.

Regulation

This is not a sudden change in tune. In 2020, Artem Fokin, Head of Business Development at tech giant turned autonomy developer Yandex, spoke positively on the company's deployment progress. In particular, he

stressed to *Automotive World* how Yandex believed it was the first company to launch a robotaxi service in Europe, and how Russia had joined the US and China as one of only three countries with more than 100 autonomous vehicles (AVs) operating on roads daily. "Judging by those numbers, we are in a pretty good company," he said at the time. Yandex now has more than 170 vehicles operating across the world.

There was also growing interest from the Russian government to double down on its autonomy progress. Fokin highlighted how Yandex felt more attention was being paid to AV regulation, a point underlined by special instructions from both Prime





Minister Mikhail Mushustin and President Vladimir Putin for Russia to develop a roadmap for the further introduction of self-driving vehicles.

Russia has begun to deliver on these desires in 2021. In March, First Deputy Prime Minister, Andre Belousov, approved a Transport Ministry developed plan covering the testing and phased launch of fully driverless vehicles. The Transport Ministry hopes the plan can “create the necessary legal conditions to introduce highly automated vehicles into the transport system” from 2021 through to 2024. “Introduction of self-driving transport is dictated by unconditional socioeconomic effects and is one of the principal trends of

digital development of the transport system throughout the world,” added Dmitry Bakanov, head of the Transport Ministry’s Digital Development Department. “The document’s approval is a highly important step on the path of creating the necessary conditions for safe and effective operation of self-drivers in Russia.”

Yandex is one of several developers eager to capitalise on this changing environment, but it urges that more policy efforts are needed. Though praising these initial changes the developer told *Automotive World* that it hopes regulations “will catch up with the technology soon” and that it believes self-driving technology “is



Yandex is looking to expand its self-driving fleet in the next few years

ready for further expansion” in certain districts of Russia’s bigger cities. “We hope that this expansion will become possible as a part of the regulatory sandboxes legislation,” Yandex detailed. “This law was created to allow companies working with innovative technologies to test their solutions in certain conditions or under certain parameters even when these contradict existing legislation.”

For the time being, Yandex has submitted a programme of operations under the current regulatory landscape that is waiting on government approval. Its programme includes proposals to test ‘driver-out’ autonomous operation and a commercial robotaxi service in the Moscow district of Yasenevo. This latter objective was first detailed in September 2021, with Yandex confirming it hopes to have a service in operation before 2022. The company says the Yasenevo launch represents the “first stage” of a larger project, and that eventually more cars and more locations will be added to the programme.

In addition, Yandex hopes to take the next step in Innopolis, a technology campus that opened in 2014, where it plans to transition an existing robotaxi service into a fully driverless operation. The current Innopolis programme has been running since 2018 and has completed 22,000 rides to date—though operating fully driverless AVs is prohibited by current Russian law, as a special economic area Innopolis has the power to dictate its own measures in this space.

Hurdles

Despite these positive forces, there remain key challenges for Russia’s autonomy market. Top of the agenda remains its climate. As Yandex detailed to *Automotive World*, year-round bad weather in many regions has left it with no choice but to build technology capable of combatting snow, ice and rain: “Our technology is capable of planning its acceleration and manoeuvres based on the friction coefficient and much more. Many improvements are made on the

hardware side too. This all helps us safely operate our autonomous vehicles in all seasons.”

Local driving behaviour and road conditions are other hurdles. However, Yandex is confident not only that its systems can handle the unpredictability these factors create, but that this early hard graft will prepare it well for operations worldwide. “Traffic rule violations are an ordinary thing on the streets of Moscow and drivers here can sometimes be assertive or unpredictable,” Yandex’s spokesperson detailed. “Driving in such conditions requires robust and reliable technology. We believe that the Moscow driving experience will help us scale our technology faster to other regions with milder climate and easier traffic conditions.”

And though Russia is ramping up its regulatory efforts in this space it is worth reiterating that plenty of work remains on this front too. For instance, Olga Uskova, Founder and Chief Executive of Moscow-headquartered autonomous driving system developer Cognitive Pilot, believes the early maturity of regulation remains a near-term roadblock for truly rapid autonomy development acceleration in Russia. This issue is further hindered by the lack of private testing grounds for AVs. “We spend quite a lot on renting training ranges in different places around the world, and the creation of Russian training ranges, especially free ones, would be significant support for young businesses,” she told Russia Briefing in March 2021. “Another important thing that we recommend to the authorities is to develop virtual training ranges, where Russian artificial ‘brains’ could

train. Such services are too expensive to buy for start-ups themselves.”

Forward steps

All in all, Russia’s autonomous ecosystem has seen iterative rather than revolutionary progress across the previous 12 months. However, with the nation still taking steps forward rather than backwards Yandex and others remain confident in getting commercialised Russian robotaxi services up and running sooner rather than later. “We expect that in three to four years our self-driving cars will be capable of driving in the centre of a big city in rush hour,” Yandex told *Automotive World*. “The exact timeline and locations of further deployments depend on the regulation. We are ready to expand our presence in Russia and abroad.”

“

We expect that in three to four years our self-driving cars will be capable of driving in the centre of a big city in rush hour

Could smart driver monitoring match self-driving safety?

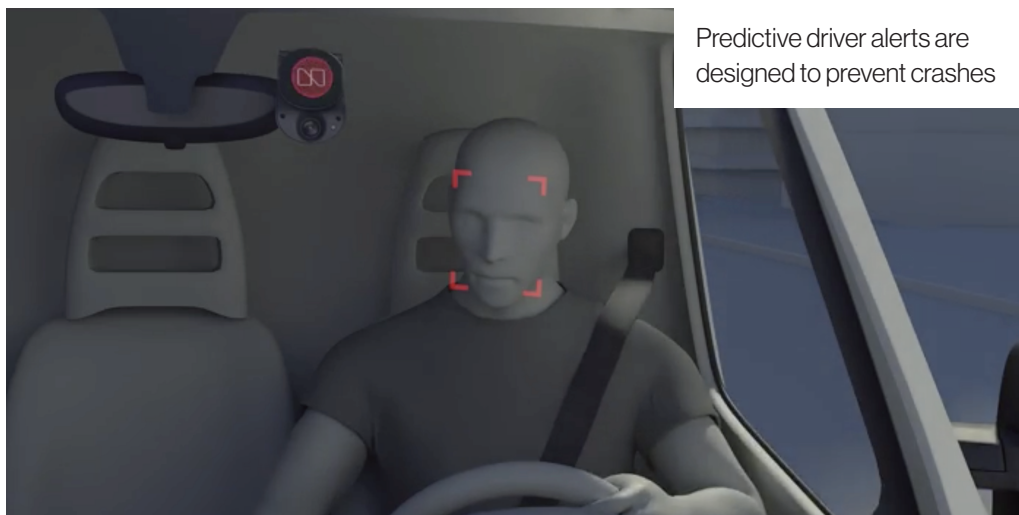
Nauto's CEO makes some bold claims about the potential of its AI camera-based software, writes Megan Lampinen

Smart, connected technology promises tremendous advances in driver safety, particularly for commercial fleets. A number of systems on the market offer insights into what is happening in the cab of a truck and the area immediately outside the vehicle, providing pivotal data in cases of collision and offering the opportunity for on-the-job training.

But not all systems are created equal. Some may simply detect events, like harsh braking, but lack video evidence into what else might have been happening at the time. A delivery driver frequently braking for jaywalkers in a city centre is very different from a delivery driver braking only because he was driving too quickly. Other in-cab monitoring systems leave drivers feeling like Big Brother is constantly intruding on their privacy.

One company is taking on that tricky balance between safety and privacy. Silicon Valley start-up Nauto's edge-to-cloud AI models detect, understand and predict high-risk driving behaviour and events. The system is designed to assist fleets by coaching drivers on safer behaviours in a proactive way, avoiding the sort of 'report and catch later' surveillance approach that requires constant monitoring and intrudes on a driver's privacy. The impact on road safety could be considerable.

When Nauto started, its goal was to 'beat the seat belt' and reduce injuries and collisions by over 20%. Today it is helping prevent 50% to 80% of the collisions reported by its fleet customers. Chief Executive Stefan Heck goes so far as to suggest that the safety benefits it brings are on par with autonomous driving technology, but without the negative impact on driver jobs.



Predictive driver alerts are designed to prevent crashes

What are some of the main pain points for driver monitoring today?

In the early 2000s, fleets started to introduce telematics systems that measure driving characteristics based on vehicle motion such speed, acceleration, and braking and report that data back to centralised databases and applications in fleet headquarters. However, the adoption of unsophisticated driver monitoring systems like video telematics that livestream 24-hour views into the vehicle can lead to privacy concerns and meet with driver resistance. Nobody wants to be monitored 24/7 and there shouldn't be a trade-off for safety and privacy. This might make people doubt that this sort of technology is even worth the effort.

So part of the aim is improving driver safety without compromising on privacy?

Indeed, but that is a complex programme. Solutions need to be predictive and offer timely warnings that allow for collision avoidance, while providing an unintrusive driver experience that protects their privacy—all at the same time. The

behaviour of people is highly unpredictable, and it is almost worse to provide drivers with too many false positive alerts because they simply stop paying attention.

What sort of behaviour might prompt a risk alert?

That includes failure to wear a seat belt, drowsiness, or talking and texting on a mobile phone while driving. The real-time alerts in the cabin provide automatic coaching via behavioural 'nudges', and these can dramatically improve driver performance.

How do you assess the safety impact?

Two out of three drivers improve in as little as two weeks without human intervention. And it's accurate; we have demonstrated the ability to deliver preventive warnings with 95-99% accuracy. Importantly, Nauto has continuous learning that embodies the collective experience of over a billion AI-processed miles from the best drivers to ensure the technology detects and warns the driver about the most serious risks without numerous false positives. The ultimate goal is to

get false positives to below one in 100 events, which for a typical good commercial driver equates to around one false positive a year.

How is Nauto's technology addressing some of the industry's privacy concerns?

Nauto's technology provides real-time AI processing on the edge, and so video is completely optional; 99.99% of the time driver privacy can be configured to remain private. Drivers can receive warnings or feedback and be granted a 'grace period' to reduce risk. In some cases, depending on the settings, it may be that no video at all is sent to the supervisor for monitoring purposes.

The technology analyses subtle indicators of distraction, drowsiness, phone use, and driver attention in the vehicle, combined with vehicle speed, acceleration, and surrounding vehicles and pedestrians to deliver audible alerts when needed and without being recorded. AI sensors can blur drivers' faces, and focus instead on movement, gaze direction and attention, vehicle activity, traffic conditions, and other contextual data to make real-time decisions about imminent risks.

Part of this is also about pinpointing those drivers most in need of coaching. How is that accomplished?

Our VERA system helps identify both the best drivers and those who need additional training. It is weighted by the injury and dollar impact of collisions—so most of the score is driven by collision history and near misses, especially those likely to result in serious injuries. We also make the score and feedback available to drivers. In our experience 80% of

commercial drivers improve automatically without their supervisor ever having to see data or intervene.

How do you stand out from rival systems on the market?

We are an advocate for professional commercial drivers and work closely with unions to design our system to help drivers as a real time safety system. This stands in stark contrast to traditional technologies that are video-based monitoring systems. We have a unique closed loop learning flow where driver and fleet feedback feed immediately into training and improvements of our algorithms. As a result several fleets and independent engineering firms that have evaluated our product in situ have found our accuracy is as much as two times better than competitors and our precision is world class—with many algorithms over 99% accurate. Our safety technology performs across the variable driving conditions professional drivers face every day: varying light conditions, open and dense roads, dry and inclement weather, slow and fast speeds.

What are the key enabling technologies behind this safety offering?

Nauto has built AI and computer vision technology into advanced camera systems that both look inside the vehicle and out on the road. This cutting edge AI technology that is running on the edge can assess road conditions and driver behaviours in real time, identify and alert risky behaviours via in-vehicle alerts (IVAs), and predict and alert on potential collisions. This includes monitoring the driving environment, road conditions, and pedestrians that are in the vicinity. Around 50% of the risks

“

We are helping fleets prevent 50% or more of their collisions and have seen as much as an 85% reduction in collisions, which essentially pulls forward the safety promise of autonomous vehicles to today

we cover through real-time algorithms on board and another 40% using post-accident analysis in the cloud. That equates to 90% of the risk that we cover. Also, our safety technology does not require an upload link and connection to the cloud to function.

In what markets are you active today? Where are you looking to expand next?

We are currently selling in markets on a global level, including the US, Japan, Canada, Western Europe and South Africa. Our customer base is nearly 800 commercial fleets, covering last-mile delivery, passenger fleets, Global 500 service fleets, utilities, construction, oil and gas. We are growing rapidly in all those markets and will add additional geographies; this is usually based on existing

customers asking us to expand with them. We already cover all sizes and types of vehicles from sub compacts—and even some three wheelers—to pick-ups and vans and up to large Class 8 tractor trailers.

Nauto was featured in Automotive World's December 2018 special report, 'Mobility start-ups and unicorns - ten for 2019.' Is it still in the start-up phase today?

We are considered a 'late stage' start-up today in a fully commercialised, high growth expansion phase, while continuing to invest heavily to expand our capabilities. We benefit from accelerated growth in commercial fleets as last-mile delivery services and the gig economy continue to expand. We also have partnerships with industry-leading automakers and with several of the largest global Tier 1 suppliers.

How might your technology help shape the future of mobility?

We measure progress by our ability to reduce the risk of collisions and help save lives. We do so by adding more predictive capabilities to our system, and continuously ensure their accuracy across various vehicle types and driving conditions. These days we are helping fleets prevent 50% or more of their collisions and have seen as much as an 85% reduction in collisions, which essentially pulls forward the safety promise of autonomous vehicles to today without the negative impact of displacing drivers. We believe professional drivers are a critical part of the transportation industry and central to the customer proposition of fleets like package delivery, utilities and building services. Robots will not replace the experience of a great utility technician or courier.

OTA steers the course for Volkswagen's software transformation

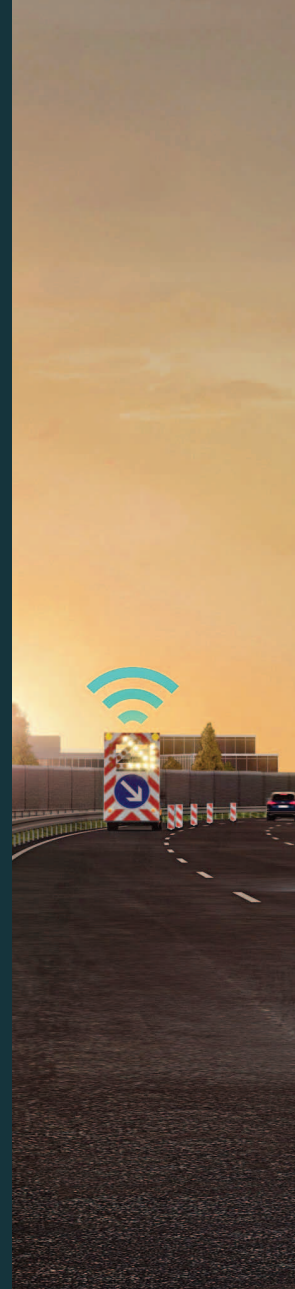
Megan Lampinen takes a closer look at VW's latest step to becoming a software-oriented mobility provider

Automakers are increasingly looking to differentiate themselves with software-based features and services as connectivity gains pace. One forecast from Visiongain expects the global market for automotive software and services to reach US\$640bn by 2031. Brands that move quickly on this software-defined transformation could gain a real advantage.

“Software is redefining mobility and disrupting the entire automotive value chain,” observes Alexandre Audoin, Group Industry Lead for Automotive at Capgemini. He notes that “the new automotive era goes well beyond the

vehicle, and is unlocking new differentiators and opportunities in the manufacturing and business model. OEMs that want to succeed, grow their business and future-proof their organisation need to adopt a broader lens—focusing as much attention on their internal operating model as well as software developments.”

Volkswagen is one automaker determined to do just that. “Software is the game-changer in the automotive world,” asserts Thomas Ulbrich, Member of the Board of Management for Technical Development at the Volkswagen Brand. But software doesn't stand still for long, and that





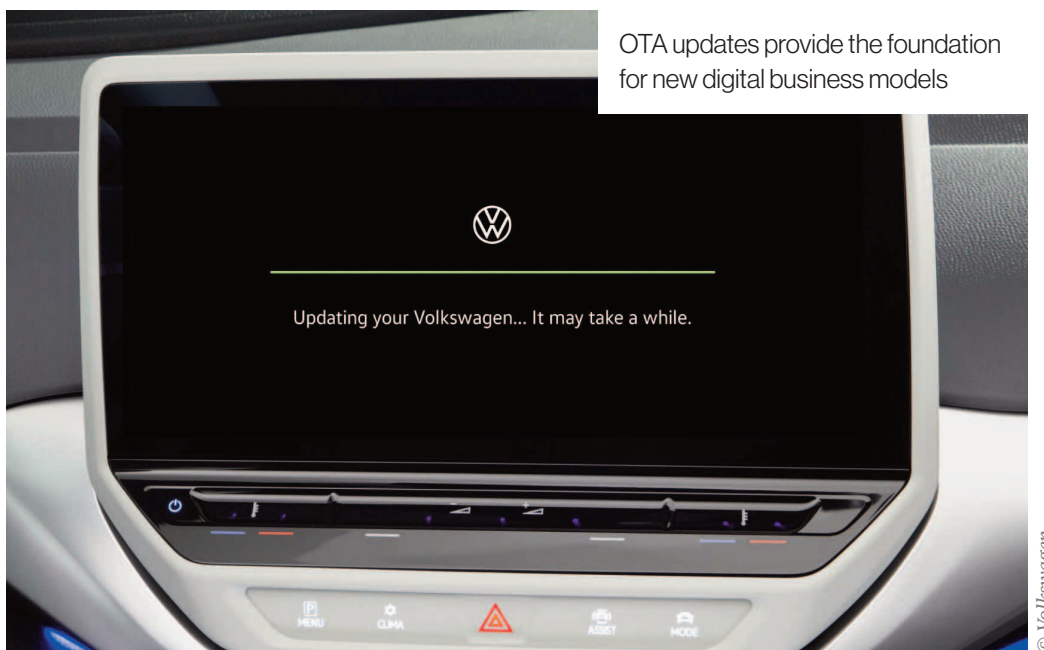
© Volkswagen

means over-the-air (OTA) updates will become essential. “Given the important role of software in our vehicles nowadays and the huge increase it will see in the next few years, it is indispensable that software is continuously updated, especially with focus on autonomous driving,” Ulbrich tells *Automotive World*. “OTA updates are the only way to arrange this in a customer-friendly way.”

Committing to OTA

Volkswagen broke new ground earlier this year when it introduced OTA updates for all models in the ID family

of electric vehicles (EVs). That makes it the first high volume manufacturer to make such a commitment, and the updates will roll out about every 12 weeks. The link to electrification is not coincidental. As Ulbrich explains: “The automotive industry is facing a huge change, which is primarily software-driven. Electromobility has pushed this trend and many new systems had to be developed.” That includes power electronics, battery management systems, charging infrastructure and connectivity links to smartphones. With the eventual move to autonomous driving, which VW aims to bring to market in 2026, OTA becomes inevitable.



OTA updates provide the foundation for new digital business models

Only 4% of automakers today offer any kind of OTA update, as it is not a quick or easy feature to introduce.

Compared to updating a phone or other consumer electronics device, updating a car introduces a whole new level of safety concerns. “Securing this technologically is a mammoth task in itself,” notes Ulbrich. From an engineering perspective, he describes OTA updates as “a major technological step that requires a completely different electronics architecture.” For the ID range, VW introduced a new electronics architecture where up to 35 electronic control units can be controlled via two central computers, along with a new operating system called vw.OS.

Notably, Volkswagen Group is positioning to become a software powerhouse itself with the establishment of the fully owned software company Cariad. This is a different approach from the likes of Ford and General Motors, who are collaborating closely with independent Big Tech companies Google and Microsoft. That doesn’t mean that VW is working entirely

alone, though. For OTA, Cariad is calling on the expertise of Continental and Harman Redbend, partnerships that Ulbrich believes will make the company faster to market with new innovation.

From product to service

In explaining its reasons for standardising OTA in the ID family, VW cited the push to improve the customer experience and to generate more revenue with new, data-based business models. “OTA updates lay the foundation for new business models and customer-centric product optimisation,” says Klaus Zellmer, Member of the Board of Management for Sales, Marketing and After Sales at the Volkswagen Brand. “That’s of huge importance for us, as software opens the door to new business models and we aim to generate additional revenues of some three-digit million euros in just a couple of years from now. These revenues will be derived from services and functions that customers can order whenever they are needed.”



Updates can be put to almost any purpose, but the first one from VW helps drivers benefit from optimised surroundings recognition and more intuitive operability of the infotainment system. In the future, the company plans to offer software pay per use features like a driving assistant for a long trip. The possibilities become even more adventurous in the long term. “One of my favourite offerings will be autonomous driving for €7 to €9 (US\$9.50-US\$12) per hour. By simply pressing a button you can turn your car into a time machine that allows you to spend the drive doing activities like reading, gaming, watching a movie or working,” says Zellmer. “This could become reality with Project Trinity from 2026 onwards.”

VW’s Project Trinity is developing a new flagship EV with a focus on highly automated driving. Notably, it will come standard with a handful of options but consumers will be able to purchase and ‘unlock’ additional features through OTA updates.

Before launching OTA updates across the ID range, VW had trialled them among drivers who had registered with the ID. First Movers Club. This is simply a platform that allows people to chat about the joy of driving EVs, share their stories, tips and tricks and learn from one another. Feedback from these initial testers was “positive and encouraging,” notes Zellmer. “Over the past couple of months we have proven that we can do this,” he tells *Automotive World*. “We tend to talk about milestones. The start of our OTA indeed is a milestone. In this regard we know that our First Movers Club made a significant contribution to the improvement of our product over the last year.”

Automakers are all striving to create the ideal user experience. What that looks like will vary among brands and evolve, but the focus on this area is likely to remain firmly in place. “An excellent digital customer experience is crucial,” Zellmer emphasises. “Car manufacturers missing out on digital connectivity—just like we know from other consumer electronics—have already lost out.”



What do consumers really want from the connected vehicle?

Intuitive vehicle interfaces will be critical to realising the promise of connected vehicle software. By Jacob Moreton

The phrase “software-driven transformation” may best define the automotive industry’s direction of travel in 2021. According to contemporary wisdom, the future will be found in ever more advanced connected vehicle software solutions—after all, that is what consumers want from their favourite automotive brands. Or so the logic goes.

No test drive?

That view is also reflected by automotive insiders. Carla Bailo, President and Chief Executive of the Center for Automotive Research, argues that the industry has seen a complete transformation in the very reasons customers want to purchase a car—namely from questions of performance to in-vehicle experience.

“

The customer doesn’t understand why the vehicle is beeping at them, they don’t understand they can adjust the sensitivity of the lane-change

There is some evidence to support that assumption. A 2020 McKinsey consumer survey found that 37% of respondents would go so far as to switch brands for a better connected vehicle experience. That trend is even more pronounced in certain markets; in China for example, an extraordinary 56% of would be willing to do so, the survey found. Additionally, 39% said they were interested in accessing additional features as they purchased their vehicle. “Given connectivity’s increasing importance, OEMs that fail to meet the bar risk losing customers,” wrote members of the McKinsey Centre for Future Mobility in a February 2021 article.

Whereas before prospective customers would assess a vehicle’s power, ride and handling, a large proportion aren’t even test driving vehicles now, she claims. “They simply want to know if they can use Apple CarPlay or Android Auto. The ability to do things seamlessly really contributes to that experience. So it has shifted pretty dramatically.”

Is it true, then, that customers want their connected cars to be a smartphone or computer on wheels, as is sometimes said of this new breed of vehicle? “I hate to say this, being an automotive advocate, but yes,” says Bailo. “They want a vehicle to simplify their lives, they want to be able to

connect their car and their calendar and everything together, their house, their appliances, whatever.”

Digital continuity

That view is shared by others too. “Digital continuity” is expected to be a particular area of improvement for software-defined vehicles in coming years, says Jean-Marie Lapeyre, Chief Technology and Innovation Officer for Automotive at Capgemini. That digital continuity, he explains, “allows drivers, safely and legally, to continue their ‘digital life’ while at the wheel.” In other words, automakers will prioritise a connected vehicle experience that functions as an extension of the technology a driver has at home.

In fact, connectivity between smartphones and vehicles has become “quite sophisticated”, such that this technology is now “very well accepted by consumers,” says Brian Moody, Executive Editor at Autotrader. For instance, Hyundai’s 2020 update of the Sonata allowed drivers to lock and unlock the vehicle with their smartphone using Near Field Communication (NFC) technology—the same used by Android and Apple in some mobile payments. Lincoln, meanwhile, provides a phone-as-a-key service, which uses Bluetooth but fulfils a similar function.

New revenue streams

As this connectivity grows, drivers may well want to access in-vehicle software products, which could in turn lead to new revenue streams for automakers, Moody adds. “Purchases like books from Audible, music from a Spotify-like service, or providing the

ability to order and pay for food before arriving at the drive-through will all make more sense as a new generation of drivers sees vehicles as simply another connected device that helps them get through the day,” he says. “Imagine, for example, securing a space and paying for parking on the way to an event.” Bosch is working on an automated parking solution which would see drivers simply initiate the parking process with their phone, allowing the vehicle to autonomously park, and later exit, without driver involvement.

Safety is also a crucial benefit of connected vehicles for many consumers, says Moody. Although the industry may be some distance away from full autonomy, drivers already benefit from advanced driver assistance systems (ADAS). Only a handful of vehicles currently use connectivity to support ADAS features—for instance through real-time map updates to keep vehicles informed of upcoming hazards—but they nonetheless represent a vital part of the wider connected vehicle system. “As these features improve—and they do improve every year—customer satisfaction will increase,” Moody adds. This software is expensive to produce, and is at least partly responsible for rising vehicle costs, but it nonetheless is “greatly improving vehicle safety and driving convenience,” he says.

That said, it is usually the least complex safety features—blind-spot monitoring, automatic cruise control and back up cameras—that appear most popular. That’s because drivers “routinely see them working” and therefore understand the benefits, says a spokesperson from Cox Automotive. “They are also very easy to use—there is no significant learning curve.”

Unintuitive

Unlike smartphone-connected features, some ADAS features are hard for drivers to use, and therefore lack broad appeal, which raises questions about their place in connected vehicles of the future. “Many of them are not intuitive,” says Bailo. “The customer doesn’t understand why the vehicle is beeping at them, they don’t understand they can adjust the sensitivity of the lane-change.” That’s a problem, she says, because many drivers respond by simply turning these features off. “There’s a lot of technology in cars today that quite frankly is not being used or understood.”

This education gap is a problem that starts at dealerships, Bailo says, and is likely to increase as customers switch to unfamiliar vehicle formats like battery electric and eventually even autonomous vehicles. “Automakers need to think about how dealers can become smarter, because a consumer today is quite well educated, and oftentimes knows more than the person dealing with them at the dealership,” she says. The dealership experience can be fraught with difficulty, particularly in the US, and some automakers are now looking to deal directly with customers—the model most associated with Tesla.

Direct to consumers

Directly dealing with manufacturers therefore might be a way to achieve customer buy-in on expensive safety features. Bailo sees the merits of that approach: “Some automakers will give you a call again a week later to say, ‘hey, anything I can explain to you?’ and then again at two weeks.” It’s more like a concierge service, in that

as you get to know the car you can ask questions.” In time, voice assistance technology could even allow customers to ask the car itself for further information, but that’s easier said than done. “We’re not quite there yet,” Bailo admits.

“

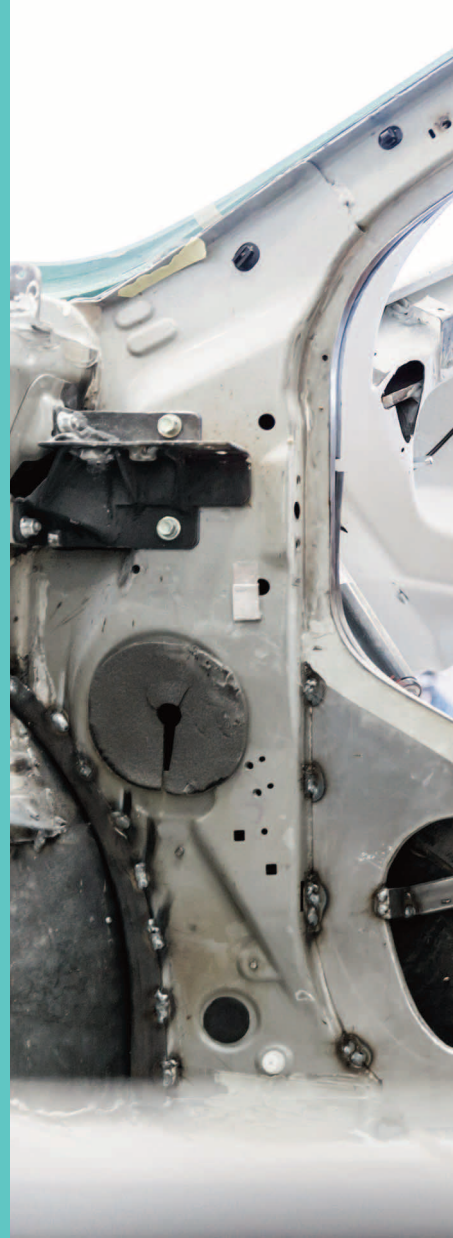
**Simplification
is what the
customer is
screaming for**

Even as voice technology advances, it will rely on similar advances in a connected vehicle’s human-machine interface. It is this that will attract future customers and enable them to actually use the features provided by automakers. “The number one concern we’re seeing through surveys is about the human-machine interface,” says Bailo. “Specifically, the ability for the car to understand your voice commands, and for the driver to not have to go through four or five submenus to do an easy task.”

Whatever area of the connected vehicle is in question—infotainment, navigation, safety and beyond—what consumers don’t want is more complexity, she suggests. “Simplification is what the customer is screaming for.” It appears that what consumers want from the connected vehicle is intuitive, useful and safe solutions—without being overloaded with advanced technology they don’t need.

EVs pose new noise and vibration challenges

The combustion engine has been masking noises that drivers may not have noticed; EVs require a rethink, writes Freddie Holmes



Noise, vibration and harshness (NVH) has been an engineering problem for decades, but electric powertrains and evolving interior layouts are creating new challenges.

The problem is that an internal combustion engine (ICE) has helped to muffle certain sounds, be it wind rushing past the vehicle or tyre roar as the vehicle rolls on the road. By removing the clatter of an ICE, electric vehicles (EVs) are now vulnerable to a range of creaks, rattles and whines that might have gone unheard. And at higher speeds, road and wind noise is amplified. It is a problem that the entire industry has been working on, but with autonomous vehicles looming,

there could be further hurdles down the road on the NVH front.

Much focus may go toward the automakers and their Tier 1s, but materials specialists also play a key role in tackling NVH. Chemical giant BASF has positioned itself as an expert in this regard, consulting with OEMs to find the right solution for the job. Its development teams are working to understand the properties and characteristics of different materials, balancing not only NVH performance but also cost, weight, safety and sustainability.

“EVs require completely new concepts,” says Marc Ingelmann, Head of New NVH at BASF. Speaking during



© BASF

a recent Mobex webinar, he explained how new EV architectures are bringing changes across the board for NVH teams: “The old vehicle structure is a kind of dinosaur, which is fading out. At the same time, the interior is becoming an extension of your living room, which creates new demands in terms of acoustics, NVH and haptics.”

The impact of frequency

Passengers can easily recognise poor NVH performance. The cabin will not feel particularly well isolated from outside noise and vibrations, which can be felt in the steering wheel, pedals and seats. Whines and whirrs

from electric motors will be easily heard and the experience will altogether feel a little agricultural. Particularly for today’s premium EVs, this is not acceptable. And for next generation autonomous vehicles where passengers will not be concentrating on driving, any unwanted noise or harshness could lead to poor customer feedback.

“Any EV is far less noisy than a normal combustion engine car. This means that you can easily recognise new sources of NVH—things that may have been covered by the ICE. This is driving customer demands to a new level,” said Ingelmann. “This is a challenge we will all be facing over the coming years.”

NVH essentially comes down to frequencies. Some are only felt, while others are only heard. At low frequencies of between 1 hertz (Hz) and 10Hz, the user may only feel gentle vibrations, but between 10Hz and 100Hz, these will become audible and much harsher. From 100Hz to 20 kilohertz (kHz), there will be loud, clearly intrusive noise. The challenge is that an ICE creates a much different frequency range than an electric motor, which means NVH solutions from the past are no longer suitable.

Staniford explained that NVH targets can be met by focussing on two key areas: structure-borne noise and air-borne noise. The latter focuses on managing acoustic absorption and transmission, which might require the use of porous structures such as foams that can absorb sounds efficiently. Such materials could be used in a headliner for the interior, carpet underlays or—in an ICE—an engine cover. These materials also help to reduce the transmission of frequencies that can be felt. Structural borne noises can be effectively managed by

“

If vibrations are absorbed by the chassis, they will be transferred to the passenger cabin

From chassis to interior

The NVH behaviour of an engine is very different to an EV powertrain. A comparison of road and wind noise at different speeds shows that at speeds of below 50kph (31mph), engine noise is most prevalent, while at 80kph wind noise becomes the most dominant. In an EV, road noise tends to dominate across both speeds. One path to address this would be to adjust the aerodynamics of a vehicle, but as Mark Staniford, Segment Manager, Interior Transportation at BASF, pointed out, “this is not exactly an easy solution.”

‘de-coupling’ the interior from the chassis: if vibrations are absorbed by the chassis, they will be transferred to the passenger cabin.

Broadly speaking, structural-borne noise can be reduced by addressing components such as the battery mount, coil spring isolator and other chassis components. Air-borne noise can be tackled by changing the materials used for the headliner, firewall and parcel shelf at the back, as well as by simply changing the carpet that runs through the vehicle. Staniford explained that to come up with the best results—an EV that is as

Nissan's acoustic meta-material can help make car cabins quieter while also boosting energy efficiency



quiet and relaxing to drive as consumers will expect—OEMs must work closely with specialists at an early stage: “We are always keen to work together and find NVH solutions.”

Automaker activity

EV makers are aware of the need to tackle emerging NVH challenges around EVs. Nissan, for example, has been working on its own acoustic ‘meta-material’, a lightweight lattice structure that aims to isolate noise from the cabin. It will be used in the Ariya electric SUV that is expected to launch in 2022. In an advert for an

NVH Test Engineer posted in 2021, Tesla notes the importance of reducing the noise created by rotating machinery, electric motors and fans.

In September 2021, Mercedes-Benz noted that its EQB electric SUV was developed to provide a “balance between noise and ride comfort,” with a particular focus on reducing the noise of the drivetrain and electric powertrain. The automaker uses the analogy of building a house, where efforts first focus on the ‘skeleton’ and then look at interior isolation and damping. “These efforts ensure that no irritating noises are perceptible inside the vehicle,” the automaker states.



© Nuro

Masters of our destiny? The automotive industry needs to widen its gaze

Inma Martinez explores how mobility will evolve to tackle healthcare, quality of life, societal equity, and the looming energy crisis

There is an emerging wave of transformational change elevating the automotive industry to a catalyst role in the future of many industries. This challenge demands going beyond the core business of products and services. It puts the automotive industry in centre stage to drive societal welfare by becoming an agent of change for global issues that civilisation is trying to resolve at mass scale. The automotive industry has evolved as it is forced to deal with issues such as the climate crises, but it also faces wider challenges reaching out to healthcare, quality of life, societal equity, and above all, the energy crisis of 2050.

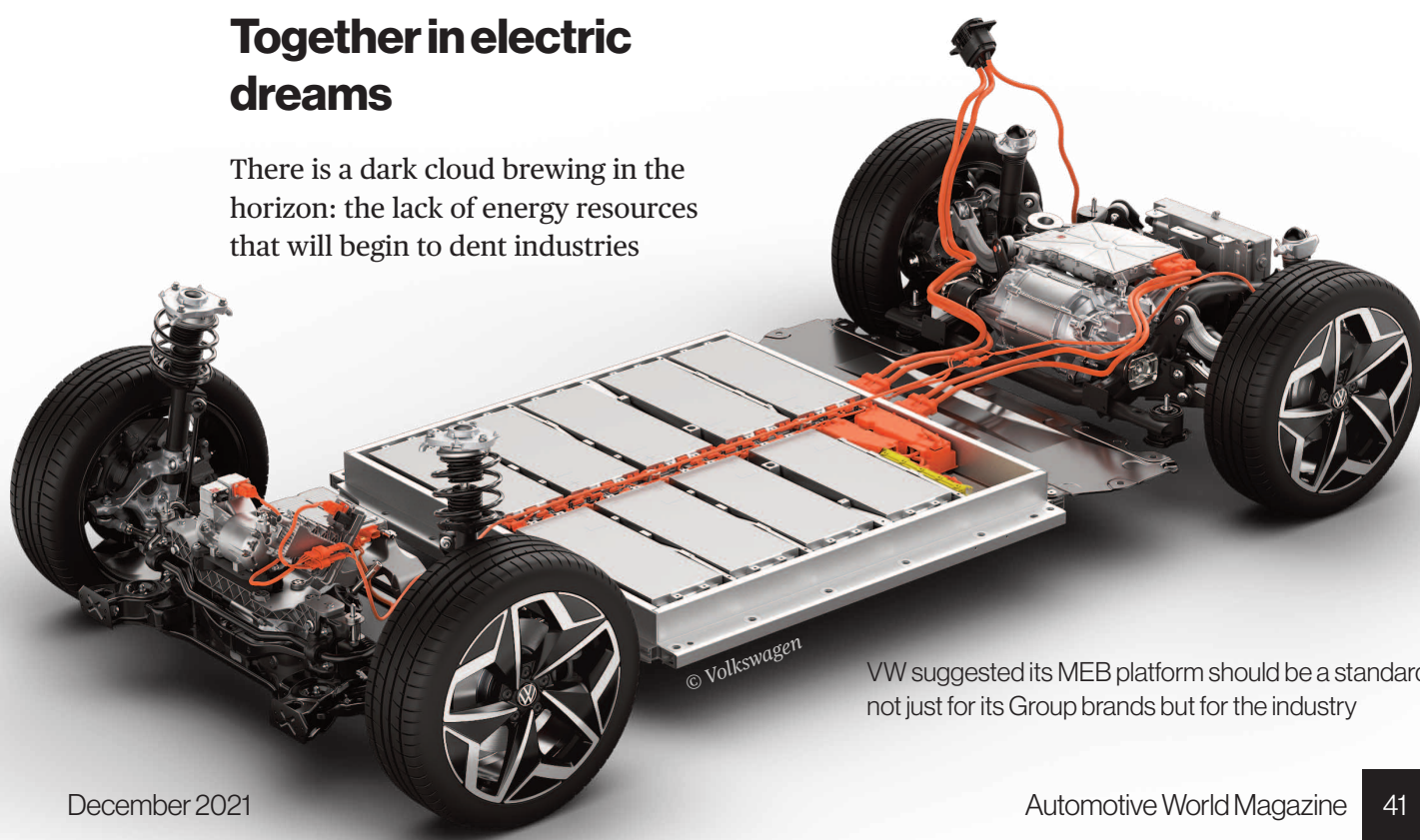
Away from the mainstream themes of automated driving and the worthiness of switching to an electric vehicle (EV), the conversation must also address the unique circumstances that the automotive industry is currently undergoing and appreciate the kaleidoscopic nature of its many innovations beyond current industry developments and futuristic vehicle concepts.

around 2040 revealing that electricity alone will not suffice to power civilisation. There seems to be the assumption that the sustainable, green future of zero CO2 emissions will reside on the success of EV adoption alone, but it doesn't work that way. The consensus within the energy sector is that the green future will also have to be delivered via other transformative approaches built around combustion-efficient power engines and the development of green byproducts. The hard reality is that by 2050 there will be an electrical energy constrain not just on the supply side, but also in the cogeneration.

As Jeff Bezos simply put it in an address in 2019 to his space company employees: "We are going to space because we need to explore new sources of energy beyond renewables." The image that he painted was as raw and straightforward as it could possibly be: "Even if we were to plant photovoltaic fields on every surface of the Earth, the demand for electricity would outstrip supply."

Together in electric dreams

There is a dark cloud brewing in the horizon: the lack of energy resources that will begin to dent industries



VW suggested its MEB platform should be a standard not just for its Group brands but for the industry



Bezos is not alone in uttering this acute prognosis. According to the World Energy Council, the world energy mix by 2050 will continue to be mainly derived from fossil fuels even if global electricity generation will increase between 123% and 150% by mid-century. This outlook was a challenge attained and accepted by the oil and gas sector about 15 years ago when it became clear that upstream activities, that is, prospecting and drilling for fossil fuels, was coming to an end in terms of Earth resources. Moreover, that their business model was unsustainable and crass because they had created a monster-industry that treated prime resources as if they were disposable commodities, burning them to power cars and deriving single-use plastic products that people and companies threw in their bins. The hard realisations of where the change had to happen have recently transformed this industry into one that seeks a very green and sustainable business model: re-utilisation.

Extracting the highest potential of everything

This is a trend that will permeate every aspect of the auto industry in the years to come. It is evident now in Volkswagen Group's plans for EV leasing programmes: same battery and chassis under a completely new everything-else every two-three years. A typical car today has an average lifespan of around 300,000 km. The batteries in EVs can take it to between 500,00 and 1 million km, so their reutilisation potential is off the charts.

Where it comes to energy re-utilisation, the fossil fuel energy sector stopped production output quite a few years ago, focusing instead on optimising its uses. Quite simply, we are no longer drilling for oil, but extracting further uses off the current reserves that we have barrelled in order to improve efficiency and reduce emissions and costs in fossil fuel energies (mid- and downstream activities). As of January 2020 the

average net profit margin for the oil and gas drilling industry was just 6.8%, with McKinsey & Co. reporting a third price collapse in the last 12 years. Upstream is dead as a business model, so the innovation efforts are focused now on sustainable approaches that will contribute to the success of the engineering advances of internal combustion engines, in specific of compression ignition and its potential to deliver almost zero emissions in the future.

Additionally, an emerging new approach is bound to create a real revolution in combustion engineering: 3D printing engines. This is what Scottish start-up Orbex has managed to do with its rocket engine, designed to work with bio-propane, a clean-burning, renewable fuel source that cuts carbon emissions by 90% compared to fossil hydrocarbon fuels. It's a 3D printed engine that can sustain the thermal and velocity forces that come into play when you dare leave Earth's gravity, not just a Formula 1 five-ring circus of speed. It is not only common sense but good business and sensible strategy to work on combined approaches to power units because the electric future will be bamboozled by a third element of distress, one that goes beyond environmental sustainability: energy equity.

Equity, not just inclusion

If the world population is expected to reach between 8.7 and 9.4 billion people by 2050, the needs and energy affordability of each individual will have to be taken into account across the economic divides of the developed and underdeveloped countries. A palpable trend permeating every



government today is the need for inclusion, not just social or economic but of facilitating access to services. There is growing consensus in completely steering away from the energy consumption paradigm within consumer pricing scenarios, and re-imagining a subscription to the grid model for those consumers who give unused energy from their homes and EVs back to the grid.

The trouble is that this model is built for a handful of countries in the developed world and it is not expected to fit into other electricity markets. According to the US Energy Information Administration (EIA), even when renewables will make up 47% of the world's sources of energy portfolio, the biggest contingency to manage will be demand for energy and the prioritisation of what gets to take prevalence in the need for power. How will the grid cope with over-

“

The globalisation of business, geopolitics, and macro-economics of industries have also forced the automotive sector to create synergies across other peripheral industries such as telecommunications and computer science

dysfunctional economics of second hand cars now costing almost 15% more than new ones because some people cannot wait any longer for their Porsche Targas. The globalisation of business, geopolitics, and macro-economics of industries have also forced the automotive sector to create synergies across other peripheral industries such as telecommunications and computer science.

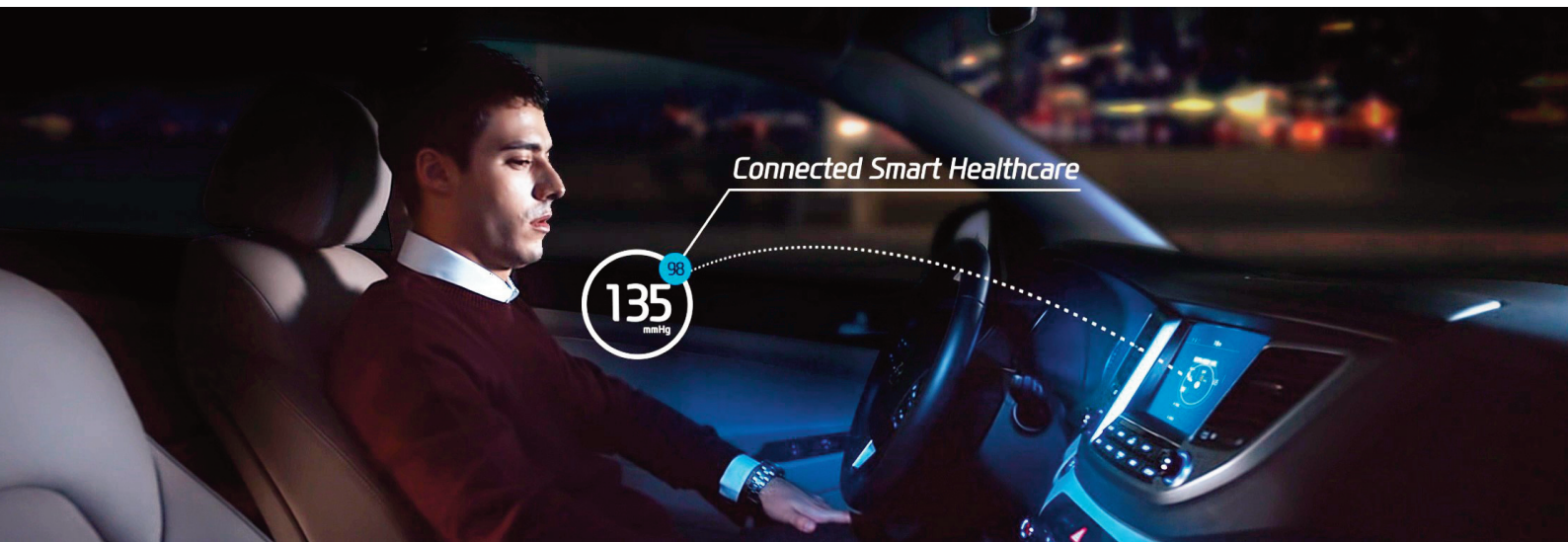
As higher degrees of autonomy makes their way into vehicles, the success of vehicular communications will be intimately dependent on the success of all mobile spectrums, not just 5G. In as much as the zero emissions take the headlines, the underlying challenge of the automotive industry continues to be safety, and here is where urban planning will be added to the mix.

There is a push to create bigger awareness with governments and local authorities about the urgent need to develop vehicular ad hoc networks (VANETs) that will connect and manage vehicle travelling data and their communications to other vehicles and the roads. There seems to be a gap in the autonomous vehicle narrative that focuses on the praises of computer vision for situational awareness. It completely neglects to mention that, above and beyond being able to visually identify objects in its path and surrounds, a vehicle will need to be connected to everything (V2X). For this, VANETs will have to be designed with cyber-physical systems (CPS) where computer-based algorithms will reveal how the flow of traffic is smoother or denser, slower or faster, in order to avoid accidents and traffic jams, send vehicles to recalculated routes, and prevent clogging the approach pathways to urban centres. Transportation will

demand if we are proposing to build a self-distributed network that mainly moves old energy around and we are incapable of generating new electricity in the ways that science and engineering have devised to-date? Equitable energy the way that renewables are currently put to work today will not suffice.

Street smart beyond just AI

The automotive future is thus heavily reliant on the innovation pathways of industries outside of its remit. As a case in point, consider the current crisis of microchips affecting the manufacturing of new vehicles across every single automaker, and the



increasingly merge with telecommunications and urban planning in the next 20 years and this needs to be brought to the discussions. When VANETs roll-out and Road Side Units turn the motorways into smart highways, the twentieth century traffic infrastructure will be lifted off the pavements, because vehicles shall not need to see traffic signs or red lights, but urban infrastructure peppered with humans, bikes, trees and animals. In the architecture circles we talk about “reclaiming the streets”: making the cities more “liveable”, more human-centric, more fit for the purpose of a life lived with quality.

Health self-empowerment

There is another area that will emerge from the automotive sector in the next ten years: driver

biometrics as a new health data layer. The vehicle cabins currently designed for concept cars are fitted with biometric sensors able to predict the early development of Alzheimer's, or if you are undergoing an unexpected brain stroke. Some automakers have seized the opportunity and are currently working on personalised health monitoring systems at scale that take vital signs readings, store them and keep track of a driver's health. Traditional health check-ups can only deliver ad hoc, one-off results. Healthcare, thanks to technology, is becoming a preventative industry, one that is seeking partnerships and alliances outside of the traditional clusters. For the first time, the automotive and the healthcare sectors are having product design collaborations because the future is about self-empowerment, not just about transportation arrangements.

About the author: Inma Martinez is a technologist who pioneered the mobile Internet and an A.I. scientist who has worked across a variety of sectors, including the aerospace and the automotive industries. Her latest book “The Future of the Automotive Industry: The Disruptive Forces of AI, Data Analytics and Digitisation” is out now on worldwide release by Apress Media New York.



Tesla's open Supercharger network: publicity stunt or game-changer?

Megan Lampinen takes a deep dive into the potential implications of Tesla's move to open up its proprietary charging infrastructure to other brands

The commercial success of electric vehicles (EVs) is tied inextricably to the charging network, and particularly to a visible and convenient network of public charging infrastructure. Makers of EVs are keen to support the build out of this network, and several automakers have taken a more active role. Stellantis, for instance, is participating in the Atlante project, a collaboration geared at establishing a fast charging network across Italy, France, Spain and Portugal.

The Atlante project came in response to the European Commission's Fit for 55 plan outlined in July this year, which aims to ditch fossil fuel vehicles by 2035. Other automakers have been more active on this front, but perhaps none so active as Tesla. The California EV maker has been investing heavily in its proprietary Supercharger network for years, and now boasts 30,000 individual charging stalls globally. These chargers are for Tesla owners only, but

possibly not for long. On 1 November the automaker launched a pilot in the Netherlands, opening up ten select locations for use by other brands. Ten locations in one country, limited strictly to residents and not open to visitors, will have limited impact but it marks the first step on what could become a game-changing strategy shift.

‘Critical’ for e-mobility

The company has long talked about sharing its own-brand network with non-Tesla vehicles in a bid to promote e-mobility in general. In explaining its decision to open the Dutch chargers, a company blog post elaborates: “Access to an extensive, convenient and reliable fast-charging network is critical for large-scale EV adoption.”

Opening up these chargers is expected to encourage more drivers to make the switch to EV, presumably

on the basis that they feel more comfortable about accessing charging on the go. “This move directly supports our mission to accelerate the world’s transition to sustainable energy,” the company emphasises. Pivotal, it also exposes drivers of other makes to the Tesla brand experience, essentially serving as a form advertising—but an advert for which the user pays.

In the Dutch pilot, which only applies to ten locations, non-Tesla users are hit with a higher tariff than that applied to Tesla drivers. Provided their vehicle complies with the Combined Charging System (CCS) they can then download the Tesla app and create a user account. Tesla has reassured its own drivers that they are still better off than others with their lower pricing rate and “the seamless integration of charge post and vehicle, optimised route planning and battery pre-conditioning.”

Stellantis is one automaker taking an active role in the establishment of EV charging infrastructure



Industry reaction

What does the wider industry think of Tesla's move? Felipe Munoz, Global Automotive Analyst at Jato Dynamics, sees benefits for both the automaker and the wider e-mobility segment. "This shows that Tesla is still taking leadership in a move that is vital for the EV market," he suggests. "Of course, it benefits competitors, but Tesla is at a point where the competitors are still trailing behind. In terms of brand awareness, Tesla is the reference point and the first brand that comes to mind when thinking of EVs." Basically, the company can afford to help out other brands who might benefit from the network it paid for, without any serious threat to itself.

“

Collaboration is key in the journey to revolutionising the mobility industry, and this is a perfect example of that

"As charging becomes more universal," adds Munoz, "it will be better for all, but especially for those at the top; in this case, Tesla."

Geoff McGrath, Managing Director of data innovation company CKDelta, observes that "the widening of accessibility for consumers is greatly needed" if the industry is to reach targets around phasing out fossil fuel-powered vehicles.

In general, most industry players think the decision could help stimulate interest in and sales of EVs. HERE Technologies, a location data specialist, is closely following developments on the charging infrastructure front as they could impact its maps and routing features. Filip Klippel, Product Marketing Manager, Automotive at HERE Technologies, believes opening up Tesla's network will "make great strides in increasing the number of charging stations across Europe, which will directly address an integral infrastructure issue regarding EV charging stations."

Navigation specialist TomTom also welcomes the opening up of the charging network. Robin van den Berg, Product Manager EV at TomTom, hailed it as "great news for the industry and for EV drivers everywhere." TomTom has been incorporating charging point locations within its maps but found that information on Tesla Superchargers has been restricted so far due to the limited availability for non-Tesla drivers. "With this news, the charging network expands immeasurably and allows us to begin to show drivers the status of more charging points on TomTom Maps than ever before, helping to ease fears of range anxiety," van den Berg tells *Automotive World*.

"Collaboration is key in the journey to revolutionising the mobility industry, and this is a perfect example of that."



Tesla's network of Superchargers are considered public but have so far been limited to Tesla owners only

© Tesla

Just the start


Down the line, Tesla could decide to share all of its global charging network with other brands, but even then, much more work would be needed. “Even with the potential for Tesla to open up more of its network to competitors, this only begins to address a small percentage of the challenge ahead of us,” warns CKDelta’s McGrath.

Back in 2020 Transport & Environment warned that the European Union would need around three million public charging points for 44 million EVs by 2030 if the region was to effectively decarbonise road transport. At the time of the research (January 2020), the EU had just 185,000 charging points. Remember, Tesla’s global network totals just 30,000 chargers today.

“While admirable, Tesla’s decision to open its network needs to be met with firmer action on a national level to install more charge points and provide consumers with choice, and to ensure

that all regional and local authorities have the remit, frameworks, support and funding to act proactively,” says McGrath. “Installing more charge points is only half the battle. They need to be installed in locations where they will be used and are easy to discover and access, in order to provide a sufficient ROI for investors and avoid them becoming expensive white elephants.”

This is where companies like CKDelta come in. With its expertise in data analytics, it can facilitate a strategic charging roll out based on changing and evolving behaviours. “It is unlikely that the charge point network deployed by a single vehicle manufacturer will have been built with wider strategic issues such as electric network capacity in mind,” he adds. “Companies such as Tesla must work with the broader industry and local stakeholders to create a network that is accessible, sustainable, and meets the needs of users. Otherwise, their act of generosity in opening up the network becomes little more than a PR stunt designed to elicit conversation.”



“General Motors is undervalued,” says CEO

Mary Barra stands firm against suggestions that new entrants are edging ahead on electric and autonomous vehicles. By Freddie Holmes

“Measured” would best describe Mary Barra’s responses to journalist Andrew Sorkin’s line of questioning during the DealBook Online Summit, a virtual conference recently held by *The New York Times*. As Editor-at-Large at the NYT, Sorkin was keen to find out where General Motors’ Chief Executive really stands on a number of key issues, probing for candid responses to topical issues.

But as could reasonably be expected of any chief executive, Barra toed the company line and hammered home a number of key points—even if at times they seemed to sidestep the question at hand. “I’d rather talk about GM!” she joked in response to a question relating to Tesla.

There are several key takeaways from the fireside chat. Barra firmly believes that General Motors is leading the

charge for autonomous vehicles (AVs) through its work with Cruise; that it has an unrivalled position in the electric vehicle (EV) market and is heavily undervalued compared to some of its competitors; and that the company is ready to benefit from new federal incentives designed to stimulate local EV manufacturing in the US.

Speaking in a session titled “recharging an industry”, the first topic was that of growing competition to produce affordable, desirable and well-made EVs at scale. Increasingly, General Motors faces competition not only from household names such as Ford, Daimler or Volkswagen, but also from relatively young companies that, in the space of a few years, already boast similar valuations on the stock market. General Motors is currently worth around US\$85bn and Ford about US\$79bn. Lucid is valued at around US\$72bn, and just a week since its IPO,

“

General Motors is so undervalued

Rivian is already worth around US\$66.5bn. Tesla is now worth US\$1tr.

While there was limited discussion around whether some companies are overvalued, Barra suggested that General Motors embraces competition. “I look at every competitor as somebody that I respect,” she said. “If anything, it motivates me to work even harder. We have to be better, faster and have vehicles that consumers want.”



Cadillac Lyriq

Pressing the matter, Sorkin asked whether these sky-high valuations personally made sense to Barra. “What it highlights to me is the huge opportunity. General Motors is so undervalued,” replied Barra, who quickly detailed a flurry of upcoming milestones such as the launch of the new electric Hummer and the Cadillac Lyriq in 2022 as evidence of the automaker’s “steady runway” of growth. All this, she emphasised, is “a huge opportunity for us to capture more value. And with autonomous driving—be it SuperCruise, UltraCruise or Cruise—I think we have a tremendous opportunity to grow.”

The autonomous driving market is just as fiercely contested as the EV space. Sorkin asked how Barra views General Motors’ position compared to the likes of Waymo, Tesla and other major players. Unsurprisingly, Barra pressed

home that despite much of the media interest that other companies have generated, the work being done between Cruise and General Motors behind the scenes is unrivalled.

“Cruise is incredibly well positioned. In San Francisco, it is one permit away from being able to charge for rides. It will be the only AV company working in a dense urban environment, and we know that is a tougher AV solution to solve,” Barra detailed. “You have to look at who actually has vehicles out on the road. In a space where there is not much transparency, I look at what we are doing and think that legitimately puts us in the lead. I wouldn’t trade our autonomy position with anyone.”

The subject of Tesla cropped up multiple times during the conversation, often as a result of



GMC Hummer EV



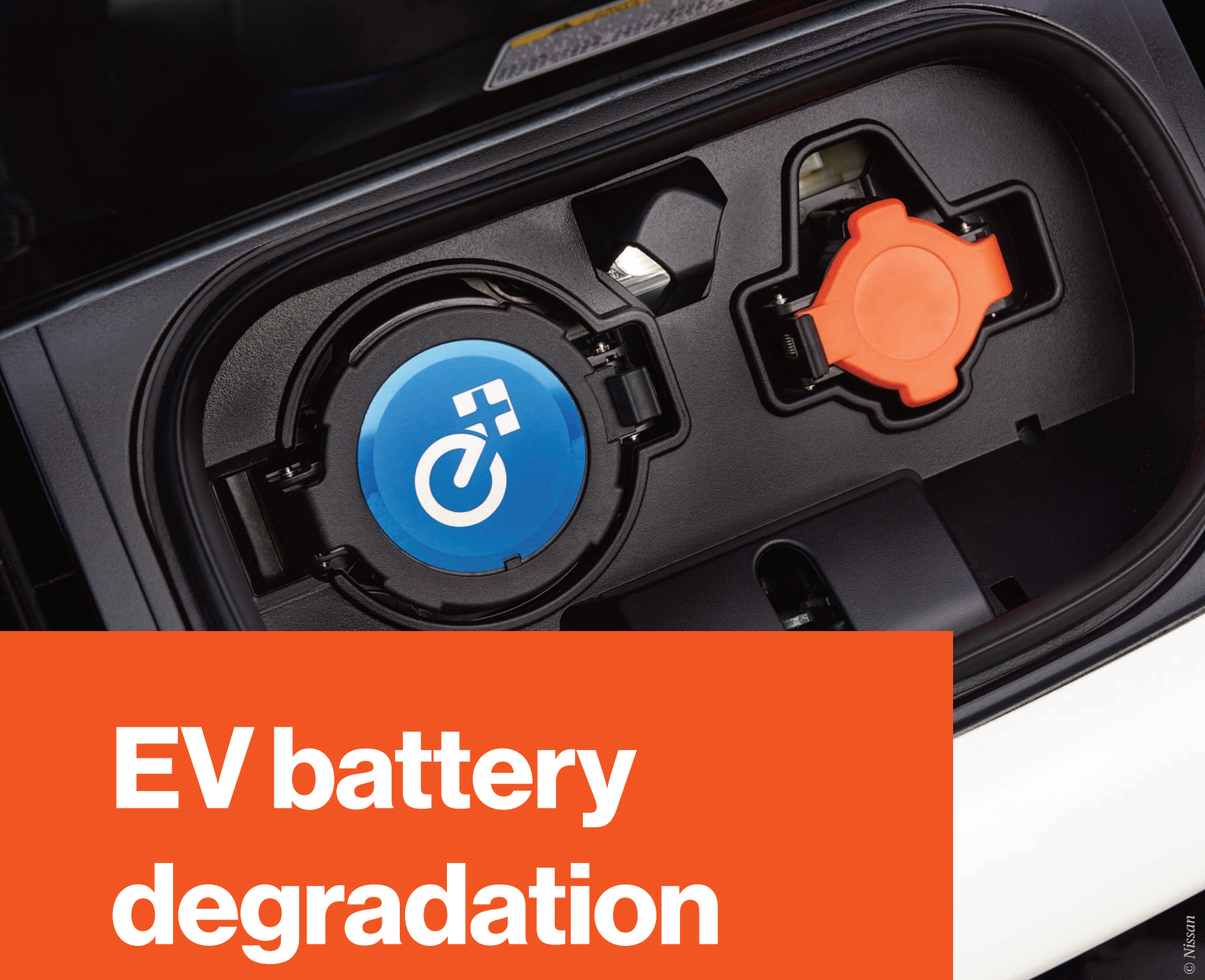
BrightDrop EV410

addressing wider industry trends. One topic was the idea of a national network of interoperable charging stations, and what impact this might have on EV makers trying to foster brand loyalty. Tesla, for example, has been able to create a “lock-in effect” through its proprietary Supercharger network, which Sorkin suggested has encouraged buyers to stick with Tesla. Should General Motors try to replicate its own charging network or follow a more collaborative approach?

“Ultimately, having a charging infrastructure that is open to everyone is the way that we are going to accelerate EVs faster,” said Barra, confirming that General Motors would prefer an interoperable charging network. “We know that there needs to be a trusted infrastructure, and we are working with a number of start-ups,

because we believe people need to charge at work, at home and on the road.” It should be noted that while Tesla has found great success from operating its own charging network, it is currently running a small trial in the Netherlands that will allow other brands of EV to use a cluster of stations.

Concluding the relatively brief discussion, Barra emphasised once more that General Motors is going all in on EVs. “We are transitioning as fast as we can,” she explained, highlighting the company’s wider master plan for all light duty vehicles sold in the US to be electric by 2030. “We are working to accelerate that plan; I can’t speak for other automakers,” she continued. “In many cases we have set the path that others are now following, but we are going full steam ahead—or I should say, full EV ahead.”



EV battery degradation regulation can reassure consumers

Regulatory bodies look set to clamp down on poor electric vehicle battery performance and durability. By Jack Hunsley

Early electric vehicles (EVs) such as the Nissan Leaf are often labelled pioneers of the automotive industry's now ongoing shift to electrified mobility, without which it is unclear how quickly and enthusiastically the sector would have taken to this new technology. However, with EVs having undergone a decade's worth of development, the early iterations of these vehicles are now no match for modern models.

Those in the industry are more than aware that the range and charging times of early EVs, though once laudable, are now substandard when stacked against recently released and upcoming electric models. However, for casual consumers, these vehicles' dwindling performance continues to stain electric mobility's reputation, with range anxiety still a key adoption hurdle. Convincing anxious EV buyers to transition will almost certainly require regulatory intervention.

Consumer insight

Moves from major markets to prevent the sale of new internal combustion engine (ICE) vehicles in the coming years will act as a vital adoption catalyst, but to help the EV further shed its existing reputation regulators are also designing additional measures to reassure consumers that today's tech can meet their driving needs. One area of particular focus is on battery degradation.

In the US, alongside the California Air Resources Board's (CARB's) Advanced Clean Cars II framework—which set out objectives to make 80% of new light vehicle sales electric by 2035—the board also gave details on its future expectations for EV battery health and lifespan in May 2021. The proposal

suggests that from model year 2026 an EV battery must maintain 80% of its certified range for either 15 years or 150,000 miles. Vehicle owners would also have to be provided access to a 'readable state of health metric' that would allow them to judge the state of health of their vehicle's battery without the need for any special tools.

Of note in CARB's framework is the specific reference to the need to disclose information "for all propulsion-related components" as well as a call to standardise the procedure for reading vehicle diagnostics data. In practice, this measure would heavily support the 'right to repair' movement that is seeing growing momentum in the tech sector. In the context of automotive, this measure's inclusion would likely draw the ire of Tesla: the automaker has a shaky track record in this space, even extending to lobbying customers in Massachusetts in 2020 via email to vote against the state's proposal to implement a Right to Repair law.

The European Union is setting out a very similar path to CARB, having proposed its regulation on sustainable batteries in April 2021 with the use of 'sustainable' taking on a particular focus in the EU's proposal. The EU's framework suggested that from July 2024 rechargeable EV batteries be delivered with a carbon footprint declaration. This roadmap would then see these batteries classified into carbon footprint performance classes from 2026 before they must also comply with maximum lifecycle carbon footprint thresholds from July 2027.

The EU also outlined plans to crack down on the sourcing, supply and use of raw materials in today's lithium-ion (Li-ion) EV batteries—[the industry's existing supply sources have drawn significant criticism in some cases, both](#)



EV tech has advanced greatly since the early 2010s

[from environmental and ethical perspectives](#). Also from 2027, manufacturers would be required to declare the content of recycled cobalt, lead, lithium and nickel that their batteries contain. Come 2030, the proposal then suggests that manufacturers be asked to meet minimum thresholds for this recycled content (12% for cobalt, 85% lead, 4% lithium and 4% nickel) with the minimum levels for cobalt (20%), lithium (10%) and nickel (12%) all then being increased further in 2035.

On the same page

Though individual markets developing internal legislation is a great initial step, an ideal world would see unity beyond market borders. This may yet come to fruition in this context via the United Nations Economic Commission for Europe (UNECE) which detailed plans to implement minimum durability requirements in November 2021. This marked the first international effort to develop regulations specifically surrounding EV battery degradation.

The UNECE's proposal would require manufacturers to certify that batteries fitted in their EVs will lose no more than

20% of their initial capacity over five years or across 100,000km and less than 30% over eight years or 160,000km. The UNECE says this would "prevent the use of low-quality batteries." The agreed proposal is to be put to a vote at the upcoming WP.29 session in March 2022. Those that vote in favour—this could include the likes of China, Japan, South Korea, the UK, the US and the EU—will be required to transpose the suggestions into their legislation with a potential enforcement date as early as 2023.

"Under the proposed regulation, accurate information about the health and remaining capacity of the battery will be made freely available to the vehicle owner," said André Rijnders, Chair of the Working Party on Pollution and Energy, which developed the proposal. "This will provide valuable information for used and second-hand EV transactions and other changes of vehicle owner."

Testing

With EV battery tech maturing and evolving quickly, it will be critical that manufacturers keep up with the very latest developments to remain

competitive in the space as well as ensure to the best of their abilities that their designs can match tightening regulatory requirements. This will require fast and efficient testing and validation efforts to ensure that any proposed battery designs do indeed conform to the required degradation standard.

“

To catch up with
this high
innovation speed
and very short
innovation cycles
that we have,
you need very
powerful and fast
testing

As Hartung Wilstermann, Executive Vice President of Webasto Battery Systems, detailed to *Automotive World*, battery manufacturers such as Webasto are working hard to develop rigorous test procedures to ensure battery reliability and durability. For instance, Webasto specifically has designed a ‘multi-axis shaker table’ as well as a climate testing chamber at a facility in its native Germany to aid these efforts.

On the latter, Webasto uses its chamber to subject its batteries to ‘extreme’ environmental conditions to assess battery performance across a range of climates. “This ensures that the battery systems function reliably

over their entire service life, even under conditions encountered in off-road use,” Wilstermann added. “In addition, Li-ion batteries can be charged and discharged during the test thanks to state-of-the-art safety technology.” As a further measure, Webasto has also established an identical test facility in China which it uses to compare and exchange test results to ensure consistency.

Developers may also wish to deploy and develop means of virtual testing. As Wilstermann explained, testing batteries via simulation can significantly ramp up development cycles—“Instead of having 18-month tests you can do this in a couple of months”—provided efforts are made to ensure any virtual tests marry up with real-world results.

“What we’re doing today is consistently increasing the virtual part, where we get results very early from virtual data, and then we’re calibrating these outcomes with some real testing later on,” he said. “The cycle time in which you have to update your product, especially the batteries, requires an incredibly high innovation speed. If you stuck with the current typical vehicle lifecycle length you would never catch up with the best technology and therefore could not benefit from the technology improvement. To catch up with the high innovation speed and very short innovation cycles that we have, you need very powerful and fast testing.”

Given the UNECE’s proposal is only set to go to a vote in 2022, this is still a very early stage regulatory environment. However, with clear impetus from relevant bodies to fix targets in stone, it is unlikely to be long until EV batteries will have clear performance and lifecycle expectations placed upon them.

Russia's truck market braces for another torrid period

Sales are rebounding, but with ongoing COVID-19 strains and global chip shortages it is crises aplenty for Russian truckmakers.

By Freddie Holmes

Russia's passenger car market remains volatile, but the truck sector has shown signs of resilience. Order backlogs are in part due to rising demand, but also a sign of supply chain constraints. The hope is that things will get back on track mid-way through 2022, but nothing is certain at this stage. For now, recovery appears to be ongoing.

One of the country's leading domestic brands, Kamaz, reported in October that revenue had surged to more than Roubles 169.09bn (US\$2.37bn) over the first nine months of 2021, up from around Roubles 128.37bn the year prior. There are positive signs also for brands such as Scania, Mercedes-Benz and MAN, with output from foreign brands rising 88.9% in the first four months of 2021. Figures for the second half of 2021 are yet to be released, but the production pipeline appears strong; so strong in fact that Kamaz has amended its normal vacation schedule to handle increased order volumes in January 2022.



DAF says the build quality and fuel efficiency offered by its latest models is attracting new buyers

But as if a global pandemic were not challenging enough, manufacturers have also had to navigate the global chip crisis and rising raw material costs. Russia's heavy commercial vehicles may not be at the cutting-edge of autonomous and electric driving, but they still need semiconductors to support even basic functionality. A spokesperson for DAF Trucks told *Automotive World* that while the company has faced "huge demand" in 2021, the components shortage means it may be unable to service this demand.

"We were sold out for 2021 in March and now we are already sold out for 2022," they advised. "DAF experiences shortages of materials and components, especially microchips. The situation with chips supply recovery remains uncertain." DAF's supply chain department is working to find solutions and avoid delayed deliveries to customers, they added.

Finding a footing

Occupying something of a niche premium segment in Russia's truck market, DAF does not match the output of mass-market brands such as Kamaz. Instead, it competes more closely with the likes of other European brands such as Scania and MAN Truck & Bus. Despite this, the spokesperson noted, DAF is making inroads with fleets that might previously have bought Russian. "Historically and according to our strategy, the main competitors for DAF in Russia are West European brands. Nevertheless, we are proud to notice that this year we have started to work with new customers and former local trucks owners," the spokesperson advised.

Part of the appeal compared to mass market truckmakers is noticeably improved build quality and fuel efficiency. "Customers appreciate

this,” they explained. “The waiting list of orders for 2023 is proof of it.” Following the launch of DAF’s latest generation of trucks in Europe, many customers are “waiting patiently” for sales to begin in Russia.

“

We really hope
to have hybrid
trucks in Russia
in the visible
future

Autonomous and electric

Near-term recovery will remain the focus for Russia’s truck sector, but manufacturers will be acutely aware of the technological advances taking place elsewhere. With long distances between major cities, autonomous driving could prove useful for the truck sector, relieving some of the strain placed on drivers and perhaps removing the driver from the equation entirely. DAF says its executive team has been fielding a growing number of enquiries around semi- and fully-automated trucks from Russian customers. This is partly due to “the growth of freight traffic and lack of professional drivers,” which could limit the prospects for expansion of their fleets.

In 2018, the Russian government issued new regulation that would permit the testing of driverless vehicles on public roads and began a three-year trial in Moscow and

Tatarstan that will conclude in March 2022. Kamaz has been running its own project, dubbed Odyssey, to trial driverless cabs at its factory in Naberezhnye Chelny to the east of Kazan. These will be used to transport components around the site as opposed to long-haul freight.

In the US, DAF is working with its parent company Paccar and autonomous driving firm Aurora to develop self-driving trucks. There is scope for solutions to eventually filter into Russia, suggested the spokesperson, but this would come down to how the regulatory environment takes shape. “This future of semi- and fully-automated trucks is already visible in Russia,” they observed. “We experience the interest in the market and consider self-driving trucks to be part of the future in Russia. Obviously this is a question of infrastructure and legislation.”

At the same time, Russia’s long, open roads could prove challenging for the rollout of electric trucks, which cannot match the range provided by a diesel or natural gas model. The government has already introduced a subsidy to catalyse sales of electric passenger cars, and in August 2021 approved a draft decree to support the wider development of electric transport through to 2030.

At the international commercial vehicle show Comtrans, held in Moscow in September, several manufacturers showcased upcoming diesel hybrid models which will soon hit the market. A hydrogen bus was also demoed, the first to be produced by Kamaz, which will be tested in Moscow in 2022. The city already boasts a large and growing fleet of battery electric buses.



The prospects for zero emission trucks and buses look rosy

© GAZ

The DAF spokesperson noted that many of its Russian customers have shown interest in using electric trucks for last-mile delivery around cities. The truckmaker also expects its activities testing hybrid and electric trucks in Europe to eventually expand to Russia. “We really hope to have hybrid trucks in Russia in the visible future,” they emphasised.

“

A once robust global supply chain has been completely turned on its head

Uncertainty prevails

Russia’s automotive market has seen turbulent geo-politics and economic disruption over the years, which often present setbacks for

manufacturers. Even at times of calm, accurately forecasting the next few years is tricky to say the least. Given the latest string of challenges, the outlook for 2022 is uncertain once more.

“Unfortunately, given the current reality, no truck manufacturers can meet Russian customers’ demands for 2022,” the DAF Trucks spokesperson advised, noting that across the industry there is an “absence of production slots.” Despite this, the company remains hopeful that it can “solve most of the issues with chips and components” and fulfil its orders. “A once robust global supply chain has been completely turned on its head and created an environment of uncertainty in both product availability and cost,” they concluded. “We hope that situation will improve next year.”

Toward the end of 2020, [expectations from Russia’s truckmakers were that challenges would remain](#) despite optimism around a gradual recovery. This has largely proved true. Looking ahead to 2022 and beyond, it may well be more of the same.

Interoperability crucial for EV charging, says Greenlots CEO

A widely distributed charging network is only useful if stations work when needed. Greenlots aims to tackle the problem, writes Freddie Holmes

Electric vehicle (EV) sales are booming, but there are still some creases to iron out around the user experience. Plugging in at home or work is a breeze and the experience is the same day in, day out. Stopping to charge up when out on the road can be a different story: with many different charging providers, each with their own payment methods, charging speeds and hardware, finding a station that works and is easy to use is not always straightforward.

US-based Greenlots was bought out by Shell back in 2019, and in November was folded into the wider Shell group

under the banner of Shell Recharge Solutions, a division that will lead the company's EV charging transition. With strong funding and an improved ability to scale, Greenlots is looking to tackle several challenges associated with the charging experience. Rather than simply building more stations, it says that more effort should go toward improving the reliability and intuitiveness of existing charge points.

Automotive World caught up with Andreas Lips, Chief Executive of Greenlots, to discuss the significance of the rebrand and how the EV charging space is set to evolve in coming years.



What does Greenlots gain from being part of the Shell group?

The deal further solidifies Shell's keen interest in EV charging and builds on Shell's earlier acquisition of the European NewMotion charging network in 2017. The new rebrand is about unifying our Shell heritage with Greenlots and NewMotion to better position ourselves to serve customers around the world.

There is the initial cash injection from the acquisition, but we are also now part of Shell's capital allocation process. If we present the right metrics and business cases, we gain

access to long-term funding. In addition, Shell is an active player in the energy transition that can help us to quickly scale up. Many companies in this area are still not in a profitable space and the big challenge is to scale small start-ups to global powerhouses. That needs a lot of cash.

When Shell acquired Greenlots and NewMotion, they were start-ups on the cusp of becoming scale-ups. But if you want to run a global business and become a global leader you have to scale aggressively—which Shell has plenty of experience in. And importantly, Shell has already been working with customers that will be



Greenlots is now under the Shell Recharge Solutions brand

© Greenlots

approaching EV charging, so there is a natural transition for our fleet customers, for example, to help them through that energy transition.

What will your new funding be going toward over the long term?

Our investment is mainly in people, which will help to drive further innovation. Greenlots does not traditionally own the charging stations, and so we do not have large capital requirements from an infrastructure perspective. Most of the money we receive from Shell is going more toward staffing around software engineering and operations. We want to make sure our solutions on the software side remain industry-leading, so that requires continuous and increased investment.

How important is M&A for oil giants like Shell, which have needed to accelerate their efforts to support e-mobility?

Shell already sees itself as an energy company, and in the US is one of the

biggest power traders in the market. Shell is investing in renewables, hydrogen, battery storage and an increasing part of its investment is going into this space.

By bringing Greenlots and NewMotion under Shell Recharge Solutions, we are really showing our commitment toward EV charging. For Greenlots, the Shell name brings a level of trust for both consumers and B2B customers that EV charging is a solution we are building for the long term.

With one brand, we will become synonymous with EV expertise and know-how, and will blend all the capabilities of Shell, Greenlots and NewMotion which we believe is a winning formula.

What emerging trends are you seeing around EV charging technology?

One of the biggest pain points for the charging industry is reliability. This year, we launched a programme called Greenlots Care that guarantees

customers up to 98% uptime for their chargers. That is being delivered by our operations team, combined with our analytics, to make sure that chargers work every time they are used.

The industry is still very young, and so we have our own innovation labs in downtown Los Angeles and in Europe where we are working on the next generation of charging technology. Every couple of weeks, new charger types come to the market, while we must also consider future solutions such as integrated microgrids, battery storage innovation, wireless charging and vehicle-to-grid (V2G) and how that all plays together.

V2G-capable—or vehicle-to-home if you follow the narrative of the new F-150 Lightning.

It is important that we try to solve the challenges around the grid in general. If you imagine a world where there is not just 3% of vehicles that are fully electric but 30%, 50% or 100% eventually, you have these huge batteries sitting in garages and parking lots that serve as a huge, distributed battery storage system. This could add value if used to balance the grid. Let's say there is too much renewable energy coming into the grid: you have an outlet in all these EV batteries, and vice versa. If

“

We must consider future solutions such as integrated microgrids, battery storage innovation, wireless charging and vehicle-to-grid

What's your perspective on V2G—will it become a mainstream solution?

It is hard to predict because the industry is still maturing and there are so many new technologies coming in. I believe it will certainly become part of the mix, and also more vehicles are becoming

there is a shortage of energy—such as in California when everyone switches on their air conditioning, causing rolling blackouts—you can use some of the energy in your car that is sitting in the garage.

It is exciting to look at these future applications that provide more optionality.



One of Greenlots' goals is to improve the usability of public charging networks. How important is interoperability and seamless payment?

Interoperability is critical, and you can make comparisons with the telecoms industry: I might have a T-Mobile chip in my phone, but I can use the AT&T network when T-Mobile is not available. When all the EV companies started they all developed their own solutions, they didn't work together, which meant we have multiple payment cards, apps on your phone, and multiple adaptors for your car. It makes it all the more complicated for the driver, and that is not beneficial for the industry.

With the Shell Recharge App in Europe, our roaming agreements enable you to, with one app, access around 250,000 charge points from different providers. This year we launched a roaming agreement in North America where, through the Greenlots app, you can access almost 60,000 chargers in a seamless way. We also work with automakers to see how we can integrate this kind of experience into the vehicle; we developed the Ford Pass, for example, so that the vehicle itself has a way of accessing multiple networks at the same time.

Greenlots is also a founding member of the Open Charge Alliance, where we really try to push for all companies to



“

One of the biggest pain points for the charging industry is reliability

follow the recommendations that will drive interoperability. There are plenty of stories of people driving around looking for chargers and arriving at stations that do not work. That is worst thing that can happen not only for drivers but also the industry if it continues.

The US recently passed a hotly anticipated infrastructure bill, which aims to create a nationwide network of EV charging stations. What does this mean for companies in the EV charging space?

It is fantastic news for the industry. This bill is a positive signal for the entire industry and is an indication

that there is more positive change to come for the EV world overall. I absolutely believe that this will impact the scale and accessibility of EVs.

As a B2B provider of charging solutions within the Shell Recharge Solutions brand, we are really looking forward to helping our customers understand what this funding opportunity means for them, and to help them access new funding under this bill. We are eager to work with the US government, cities and companies to leverage this new funding to the full.