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Paris scooter ban serves as wake-up call for micromobility

The pioneering mobility city has voted not to renew the permits for rental e-scooter operators. Megan Lampinen investigates
Paris is positioning itself as a pioneer in new mobility, leading the way on innovative concepts such as electric car-sharing and e-bikes. Paris Mayor Anne Hidalgo has enthusiastically embraced the concept of the 15-minute city, the idea that residents can access all the services they need within their immediate vicinity. Micromobility plays a key role in realising this vision, but recent developments suggest there are considerable obstacles yet to overcome.

In early April 2023, the city held a public referendum on whether or not to ban rental e-scooters. Lime, Tier, and Dott all have permits to operate free-floating schemes where users can rent scooters by the minute. In total there are about 15,000 shared scooters on offer. But not for much longer. Parisians voted overwhelmingly (89%) in favour of not renewing the permits for these operators. However, voter turnout was low at just 7%, and clearly not representative of the wider population.

“This raises the question, why weren’t more people in favour of e-scooters not motivated enough to take part in the vote?” notes Roger Woodman, Assistant Professor (Human Factors) at the University of Warwick. Kersten Heineke, a Partner at McKinsey and the consultancy’s resident micromobility expert, voices a similar view, noting: “The vote shows that there is a certain group of people vividly opposed to scooters, and they have made themselves heard. But scooter operators and supporters were not able to motivate the hundreds and thousands of scooter users to vote in this case, which is a bit of a sad thing.”

Regardless, Mayor Hidalgo will follow through with the vote and allow all existing rental contracts to expire as of 1 September 2023.

Pain points

Scooters have proven controversial globally from the start, with early criticisms of abandoned scooters, cluttered sidewalks, lack of regulation and safety risks. According to data shared by The Guardian, e-scooters have been linked to three deaths and more than 400 injuries in Paris in 2022 alone. “The trouble is that many people use scooters in a way they were never intended, such as riding on sidewalks,” notes Heineke. “It’s true that many are also parked incorrectly, but the same thing happens with cars.” Many scooter users have pointed out that cars parked illegally force them to merge dangerously with other traffic.

Woodman observes that most of the issues around inappropriate parking of scooters and riding on pavements “disproportionally affect those people...
who can’t use them, particularly blind and partially sighted people.” But many other groups are shying away from scooter use as well. “E-scooters in their current form are not very inclusive and require high-levels of concentration and control from the rider in order to operate safely,” notes Woodman. “The main user group is young, able-bodied men.” E-scooter trial statistics from the UK, published by the Department of Transport, shows 77% of regular users of e-scooters are men and 64% are under 35.

Significantly, many of the issues around abandoned scooters and aggressive, inappropriate riding are limited to the rental segment. Woodman suggest that these behaviours are simply “not present with private e-scooters, as people generally take better care of their own vehicles.” The Paris vote addresses only rental scooters, so personally owned units— and there are millions of them— are still allowed. The country as a whole saw more than 750,000 private e-scooters purchased in 2022, following a record 900,000 sales in 2021, according to the Federation of Micro-Mobility Professionals (FPMM). The private market could in fact see a boom following the end of rental services.

**Impact**

The Paris vote is clearly not good news for micromobility at large, but just how big of a setback is it? “All e-scooter rental companies in Europe will likely be affected by this vote, as they are generally operating at low margins and require ongoing funding,” asserts Woodman. “I would imagine that confidence among investors will be reduced, particularly as Paris was seen as a paragon for rental e-scooters. That will result in less funding and rental companies having to diversify or merge.” Diversification has already begun playing out over recent months, with some e-scooter companies expanding their service to cover e-bikes.

Others suggest the Paris vote could prove more of a blip than an impasse. Micromobility operator Dott describes the referendum as “unprecedented” and in contrast to what it is seeing in other markets. Dott recently won a four-year contract in Lyon, while Madrid recently confirmed the company as an operator following a competitive tender. “What we see in other markets is that cities use tenders to ensure that services are implemented in a measured and responsible way that is adapted to their local needs, and we welcome this approach,” a Dott spokesperson told Automotive World.

While the Paris referendum may be the first of its kind, other regions clearly have reservations. The UK does not allow e-scooters on public roads, though it has run limited trials.
Coventry was the first UK city to cancel its e-scooter trial shortly after it started, and Birmingham recently “paused” the scheme in order to evaluate the impact so far.

**Technology to the rescue?**

Heineke believes there is plenty of hope for long-term micromobility success, and ironically perhaps, the Paris situation could provide momentum: “Cities and operators need to collaborate to find solutions to some of the segment’s problems. They have been doing that already, but I hope that the vote triggers an intensification of that dialogue.”

As for specific solutions, new technology could be the key. Heineke offers virtual parking zones as one suggestion. These regions, governed by sensors on infrastructure, could define where rides officially and automatically come to an end and provide a safe, organised parking location. Operators could also install technology that detects if a scooter is on the pavement and automatically lower its speed to reduce the safety risk to others. “There are technologies out there that would make scooters more user friendly and a better fit for the urban environment,” he adds.

On the whole, he remains bullish on the prospects for micromobility and scooters in particular: “This is by no means the end of shared micromobility. It will prevail, but the Paris vote is a wake-up call to work out some of the kinks in the system.”

Dott will be forced to wind down its scooter scheme in Paris after September.
Cupra’s rebellion strategy pays off—and grows up

The Exponential Impulse event shines the spotlight on electric performance and the potential of the virtual world.

By Megan Lampinen
Cupra prides itself on being a rebel in the automotive industry, unashamedly chasing polarising designs. “When you want to create something unique with a strong personality, you cannot please everyone,” Jorge Diaz, head of SEAT Design, told journalists at a recent media event. “Pleasing everyone means losing your identity, your soul.” By chasing the move to electrification, Cupra is very much falling in line with most of its compatriots, but on its own terms.

Electrification meets performance

Cupra started as SEAT’s high-performance motorsport range and has been pushing hard to build a solid name for itself since it launched as a standalone brand five years ago. The timing could have been difficult: it was based on a performance, sporty and driver-focused mentality at a time when the industry was turning to sustainability, automation and service. But Wayne Griffiths, Chief Executive of both Cupra and SEAT, forged a new path that aims to combine these trends.

In 2022, Cupra delivered a record 150,000 vehicles, almost double the previous year’s figure. The Cupra Born, its first all-electric model, accounted for more than 31,000 of the total. “We are proving that electrification and performance are the perfect match,” Griffiths told media. Top management were gathered for the Berlin launch of the latest model, the electric Tavascan. The launch was held in conjunction with Cupra’s Exponential Impulse event and the Formula E weekend, the latter of which arguably epitomises zero-emission performance.

Tavascan will be the brand’s second all-electric model and its first electric SUV coupe. Drawing on Volkswagen’s modular electric drive matrix (MEB) platform, it boasts zero tailpipe emissions with the option of dual-motor all-wheel drive for performance with maximum traction. The Tavascan VZ model can reach 50kph in just 2.4 seconds and completes a 0 to 100kph sprint in 5.6 seconds. “This is a piece of the future you can reach out and touch,” asserts Griffiths. “It is not a response to change, but a vehicle that will create it. Not a crescendo but a prelude. This is no one’s descendent but the first in line. It’s no longer a dream, but one of us.” The aim is to deliver more than 70,000 Tavascans a year.

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Above all the brand is staunchly all about the driver and the joy of driving, even amid the hype around autonomous and automated functionality. “Autonomous driving is not on top of our agenda,” Werner Tietz, Vice President of R&D at SEAT, tells Automotive World. “We don’t want to sleep in the car, we want to drive it.” Tavascan, however, makes some concessions towards automation with certain ADAS

We don’t want to sleep in the car, we want to drive it
offerings. Remote parking assist, for instance, allows the driver to simply position the vehicle near a space, step out, and instruct it to park itself.

**Expansion: both physically and virtually**

The immediate focus for Griffiths and his management team is on delivering the first Tavascans to the market for the second half of 2024 and expanding the wider Cupra brand into new regions. “We need a larger global footprint,” the Chief Executive asserted. Last year it entered Australia, Colombia and Chile. But to be “truly global,” he concedes, it needs to add the US and Canada. Nothing is yet confirmed on this front, but Griffiths hints that things look “promising.”
The brand is also doubling down on digital technology and keen to throw around references to the ‘metaverse’. Exponential Impulse marked the official launch of Cupra’s Metahype, an evolving virtual space accessed via desktop at Metahype.com and soon via mobile. Here, users can socialise, play racing games, explore the Cupra model range, browse brand lifestyle products and put forward ideas for the future design of the next concept model, the DarkRebel. A virtual image of the DarkRebel electric concept took to the stage in Berlin, teasing a combination of sports car and shooting brake architecture. Griffiths described the model as “the ultimate interpretation of Cupra’s design for the future” and one that “proves that EVs are sexy, provocative and certainly not boring.” Harnessing Cupra’s roots in motorsports, the debut in conjunction with Formula E was no coincidence.

A Hyper Configurator within MetaHype will allow users to create their own versions of the show car, with Cupra taking their suggestions into consideration for the end product. “We want to involve the Cupra tribe, to see what people think,” Griffiths told journalists. “In terms of style and design, there are many things Cupra lovers out there can influence. The idea of co-creation is evolving, and I think people will be excited about it.”

What was shown is just a digital suggestion of an idea that could eventually take form in a concept car, which again will only hint at the shape and features of a future Cupra model. “It’s a dream but sometimes dreams come true,” teased Griffiths.
Just how revolutionary is Omniverse for manufacturing?

Nvidia’s computation platform connects the digital and physical worlds, promising “phenomenal” benefits. Megan Lampinen investigates

Smart, digital technologies are rapidly rewriting the rulebook for vehicle manufacturing, a topic highlighted at Nvidia’s recent GTC 2023 event. This is an annual conference at which Founder and Chief Executive Jensen Huang outlines the latest artificial intelligence (AI) technologies shaping various industries. The company, which made a name for itself with gaming graphics processing units, has since diversified to include the chips, systems and software that will underpin numerous other sectors, including the AI factories of the future. The focus today is on Omniverse, and specifically BMW’s application of it.

BMW leads the way

BMW Group has been using Nvidia’s Omniverse platform to plan and validate a new plant in Debrecen, Hungary. The upcoming facility is scheduled to open in 2025 and will build the company’s next generation of electric vehicles (EVs). Today, it’s building them virtually.
Omniverse is a collaborative, cloud-based platform that allows team members from around the world to collaborate in real-time using 3D visualisation and digital twin technology. It taps into other digital solutions traditionally used in automotive shop floor planning and can collect and share data from them in a user-friendly manner. At GTC, there was a live demonstration of team members working together on the best arrangement for manufacturing robots in a specific area of the facility.

“Creating a factory completely virtually alleviates all the mistakes that tend to happen at the end when the factory finally comes together,” Huang told GTC attendees. “Factories are so large and involve so many suppliers and so much equipment that it is impossible to have it perfect until you assemble it.” Until now.

Milan Nedeljković, BMW’s Board Member for Production, described it as “a huge leap forward” that allows for an “innovative, integrated approach to planning processes.” The automaker is particularly excited about the potential improvements in planning precision, speed and efficiency. Moving forward, it intends to extend the use of Omniverse across its global product network.

**What it is, what it isn’t**

The capabilities on offer with Omniverse tie in with Huang’s vision for the next wave of AI, which he views as the fourth wave of development. “This is where software and the digital and physical worlds come together,” he explained. “The vast majority of major global industries—automotive, manufacturing, logistics—are about the physical world, yet we want to do it all in digital.” He sees a coming shift where all industrial aspects are turned into a digital representation. Omniverse is essentially Nvidia’s computation platform that connects the digital and physical worlds. The productivity benefits, Huang promises, “will be phenomenal.”
Nvidia describes the offering as a range of “industrial metaverse applications,” but not everyone agrees that this is indeed an authentic metaverse use case. It certainly doesn’t fit in with Gartner’s requirements, which stipulate that any metaverse application must meet certain standards around interaction, profit generation, interoperability, immersiveness and personal identity. “It’s a step in right direction, but Omniverse still needs to evolve before it gets to metaverse,” says Pedro Pacheco, Senior Research Director at Gartner.

The platform may not be a metaverse application, but it is a significant advancement from the way plants are usually planned and how teams work together. “It’s already common practice to use digital tools to plan factory layout and workflows, and to use virtual reality (VR) to assess the human factor,” observes Pacheco. “The step from analogue to digital has already happened. The real big step that Omniverse delivers is around aspects of collaboration from the team. The benefits realised depends on how team members use the tool.”

Pacheco sums up Omniverse as an “excellent visualisation tool, and from a pure visualisation perspective it is disruptive. But it is just visualisation. If you want the best factory in the world, you need more than visualisation.”
The right time

Omniverse comes at a time of significant manufacturing investment among automakers as they scramble to position themselves for an electric future. A number of new EV plants are on the cards and they will be accompanied by numerous new gigafactories turning out batteries. “BMW is building new EV plants now, and these are multi-billion dollar plants,” notes Huang. “There are several trillion dollars going into EV plant construction around the world, supported by hundreds of billions of dollars of battery plants and chip factories. All of those want to be digitalised from the start so they can be brought online as fast as possible. Omniverse, digitalisation and our Generative AI capability all showed up at the right time.”

For Pacheco, digital tools like Omniverse could help the established automakers introduce more revolutionary changes to their manufacturing operations—something that he believes is pivotal to staving off competition from new arrivals. “More recent players like Tesla, the automakers of the 21st century, look at manufacturing in a completely new way,” he says. “The established players have improved their approaches over the years, but only incrementally. They forgot to question the status quo and are still using old fashioned approaches. The disruption of the automotive sector started in vehicle tech because of connected cars, EVs and autonomous driving, but it is now coming to manufacturing and the established players need to react.” The Omniverse could help them do just that.
Consumer behaviour has evolved rapidly in the wake of the Internet, the digital revolution and the global pandemic. Online purchases have become the norm for almost any type of product. In China, 30% of all retail purchases take place online today. At the same time, COVID normalised remote working and simultaneously accelerated the demand for home delivery services. For Fiat, these trends all pointed in one direction.

“The way we buy things, the way we work, our sense of location—all these things have significantly changed,” says Laurent Diot, Senior Vice President of Marketing and Communications at the Fiat and Abarth brands. “At Fiat, we started asking ourselves, what can we do to respond to that trend?” Metaverse technology offers a potential solution.

**The metaverse store**

What if instead of shoppers going to the dealer, the dealer came to them at home? Most brands already have a website today, with plenty even offering the option to buy online. However, many customers want to speak with someone before making such a big financial commitment. Most have questions about the model offering, particularly new technology areas like connectivity and electrification.

Fiat introduced the world’s first metaverse-powered automotive showroom in late 2022. Modelled heavily on the Apple store concept, it is a virtual interaction between a Fiat Product Genius and the consumer. Customers access it by visiting the Fiat Italy website and clicking on the Metaverse option, which then allows them to book an appointment and later enter into the metaverse showroom. The Product Genius, a real person located anywhere in the world, can then demonstrate the various features of the car using a 3D digital twin model. The Genius
can help shoppers configure the model exactly as they would like it, explain the technical aspects of charging or the advanced features on offer, and answer any questions.

While metaverse technology was needed to make this experience truly immersive, it does not require any special equipment on the part of the consumer. “We wanted to do something very Fiat, which means something pragmatic, simple and smooth, with direct interaction with a real person,” says Diot. “We wanted to avoid any kind of technologies like crypto money, ocular glasses, or an avatar. We were aiming for something extremely real.”

**A fundamental milestone**

Fiat turned to metaverse expert Touchcast to realise its vision. The company specialises in immersive virtual experiences and is currently working with most of the major automotive players. “This technology is being met with great enthusiasm,” notes Touchcast Chief Executive and Founder Edo Segal. “That’s partly because we have something interesting to offer but also simply because it’s in the zeitgeist of where society is heading and how humanity leverages the internet and artificial intelligence (AI).”

This marks a fundamental milestone not dissimilar to the year 2000 and the arrival of e-commerce.
The metaverse represents an evolution from the web, which Segal likens to a modern take on the ancient library of Alexandria: from scrolls on shelves it became web pages on servers. “The web is a massive library, but it’s still a library. Things are static. They’re encoded as documents, just sitting there, and Google helps us find them.” He sees the world moving from this paradigm, where information is available and a person is taken to it, to one where information is generated based on an individual’s interests. Information is not retrieved so much as created, not dissimilar to ChatGPT.

“We are moving from recorded, asynchronous content to a living digital version of our world that is powered by tremendous AI capabilities,” Segal tells *Automotive World*. “It is world changing. This marks a fundamental milestone not dissimilar to the year 2000 and the arrival of e-commerce.”

While metaverse applications are still in their infancy, Segal believes the automotive sector could prove a pioneer due to its history with 3D models and digital twins. “Automotive is the natural starting point for the metaverse, just like books were the natural starting point when Jeff Bezos launched Amazon,” he explains. “The automotive industry already has a digital twin of its products and the entire design department of every automaker today is working on a 3D model of the car before they build it. They’re future-ready.”

There may need to be some budget adjustment, though. Segal estimates the cost of a metaverse experience as slightly more expensive than setting up a website, which in itself “is not insignificant.” This expense, he adds, should come down over time with scale and maturing.

**One car, one country—for now**

Today there is just one Fiat metaverse store, located in Italy, focussed on one model, the electric Fiat 500 La Prima. The plan is to expand next into France, Germany, the UK and potentially the US. While it is still early days for the approach, initial
findings suggest it is filling a real need for shoppers. For instance, the average interaction with a Product Genius is nearly 45 minutes, more than double the 20 minutes Fiat had expected. Feedback from the Geniuses suggests that consumers are very relaxed and pose more questions than they would at a dealership.

“People aren’t just being sold to here, they’re being educated,” Segal clarifies. “At this stage in the industry’s evolution, people need that education. EVs have people very curious and they want to know more. This technology is the best way to communicate that.”

Shoppers visiting the metaverse showroom also tend to make up their minds about a purchase faster than when visiting a dealer in person. The average time lapse between the moment people start talking with a Product Genius and the moment they order the car is around six weeks. That compares to an average of three or four months using online research and in-person visits. “This is very positive because it means that people are more convinced and better understand the technology,” says Diot.

**Foundational communication technology**

Fiat is positioning its metaverse store as a complementary retail channel alongside dealers. The idea is to add more models—potentially the entire line-up—to offer consumers even more choice and convenience. “We want to offer an easy, all-inclusive, on-demand approach,” Diot emphasises. “But it has to be extremely simple. Paradoxically, that is a complex thing to do.” Looking forward, he expects to see dealers use these kinds of tools to form and maintain customer relationships and improve operational efficiency.

As for Segal, he believes that every major automaker will be offering its own metaverse experience by the end of the decade, just as they offer their own website today. “That metaverse experience basically lives in the browser on their website,” he clarifies. “You’re not going to go to Facebook’s metaverse where it controls everything and takes money to connect you to your customers. Brands will have their own fully controllable place and they will decide how to drive the customers there. Simply speaking, it’s an evolution of how we convert leads into customers, train our dealers, and launch our cars. It’s ultimately a foundational communication technology.”
Between 2021 and 2022, electric vehicles (EVs) grew from representing 6% of China’s total passenger vehicle market to 26%, according to financial services corporation ING Group. In 2022, approximately one in four cars sold was an electric model, and the country accounted for over 50% of global EV sales. However, in its Q1 2023 analysis, ING concluded that sales are beginning to stagnate. This coincides with Reuters’ findings that China’s overall passenger vehicle market slumped 20% in January and February.

Is China’s EV market still competitive without incentives?

China’s electric vehicle sales projections for 2023 are expected to be almost 30% lower than last year. By Will Girling
Momentum slows

Felipe Munoz, Senior Analyst at automotive business intelligence firm Jato Dynamics, tells Automotive World that the slowdown is not surprising. In addition to the continuing shortages of semiconductors and battery material affecting production, the Chinese government’s gradual reduction of EV purchase incentives since 2020 has had a clear impact by raising the cost of ownership. “Although the industry has been successfully reducing the end price of EVs and batteries, the segment is still strongly dependent on incentives. Without them, EVs are not yet competitive compared to internal combustion engine models.”

However, Sam Adham, Head of Battery Metals for business intelligence company CRU Sustainability, is more sanguine. “It is common for start-of-year EV sales to be down—not just in China but also Europe—due to a rush in the previous December to meet annual sales targets, either mandated or internal.” He also notes that deteriorating domestic sales coincided with the Chinese Lunar New Year. With CRU’s analysis concluding that 2022 was a “bumper year” that would be difficult to replicate, it projects 2.5 million EVs sold in 2023 (a 28.6% year-on-year decrease). Nevertheless, “China is the best placed of any region to reach its EV ambitions” and “half of all Chinese auto sales are expected to be full battery electric by 2030.”
Both Munoz and Adham believe the Q1 2023 results should not necessarily be used to extrapolate long-term trends. But, until the issue resolves, what could be the short-term implications for Chinese OEMs? Adham states that while smaller companies may have to “fight for the remaining market share,” Tesla and BYD are maintaining large order backlogs that could shield them from the impact. The former’s price war, which led to reductions of up to 20% for some models, has seen it gain an advantage while also maintaining profit margins and alienating rivals. Xpeng, Nio, Volkswagen, Mercedes-Benz, and Ford have all lowered their prices in reaction to Tesla, according to Bloomberg. However, on 22 March 2023, the China Association of Automobile Manufacturers called the price war an unsustainable solution for the country’s low sales/high stock problem.

“Luxury EVs are not likely to feel the consequences [of the reduced sales],” says Munoz. He adds that China’s growth strategy, unlike Europe and the US, has been based on the production of high-volume models instead of premium cars. Some industry commentators believe this ‘top-down’ approach may actually be some markets’ best strategy for competing against Chinese EVs’ affordability. However, while China’s focus has allowed its domestic market to flourish quickly, Munoz highlights that cheaper vehicles have lower margins, are “more price sensitive,” and therefore more dependent on government incentives.

This hasn’t stopped automakers like Geely from announcing new product lines—it unveiled its Galaxy line-up of a plug-in hybrid (L7) and a full EV (Light) in February. Ashley Sutcliffe, Global Communications Director for Geely, confirms to Automotive World that “the global market is changing rapidly,” both in terms of material costs and Chinese customer demands. Sutcliffe also hinted that Geely’s Galaxy range would bring a new perspective on how EVs could be “packaged, offered and delivered to the customer at a certain price point.” He did not reveal the specifics of which consumer demographic will be targeted.
Market opportunities

One solution to the Chinese domestic market’s reduced dynamism could be to enhance its international offerings. “[Chinese OEMs] are already doing this, and they are expected to grow fast in regions like South America, the Middle East, and Southeast Asia. Europe and the US will take more time,” suggests Munoz. Indeed, he proposes that the “second phase of China’s car dominance” will be to offer appealing and competitively priced EVs that Western OEMs cannot yet provide.

While conceding that China’s global expansion will naturally occur, Adham doesn’t believe it will adequately cover for “blips” in domestic sales. “For instance, Chinese battery EV (BEV) exports to Europe last year were around 225,000. Although this reflects significant growth, it only represents 4% of Chinese BEV production at the moment.” Since Western markets have also slowed down in Q1 2023 versus the previous quarter, he believes it would be a fallacy to suggest that simply expanding the market will compensate. Munoz agrees: “The global industry is already facing big challenges in Europe, impacted predominantly by the war in Ukraine and the energy crisis, and the US’ inflation and high interest rates.”

Adham concludes that the Chinese domestic market still exhibits strong enough growth potential to make addition EV market acceleration unnecessary. “There will always be short- and long-term hurdles to growth, but Chinese manufacturers already have a strong regulatory foundation in place along with supply, technical and cost advantages over other regions.” The influence of China’s government also cannot be overstated, which he believes will enact policies on the central and local level as appropriate to meet the targets it has set. “In the past, this was somewhat reactionary, but the pace of legislative change is starting to stabilise as organic BEV demand has increased.” Current policies include a credit system that rewards manufacturers for hitting BEV production quotas, similar to the EU’s own.

“Chinese manufacturers already have a strong regulatory foundation in place along with supply, technical and cost advantages over other regions.”

The importance of government support is similarly emphasised by Munoz, who believes the reintroduction of improved incentive schemes will be crucial to the industry’s ongoing success. “At the same time, Chinese OEMs must decrease their dependence on local demand by increasing exports or local production abroad,” he says. With Europe concerned that competition from China is coming to a head, the appeal of the latter’s EV offerings is clearly being felt by the wider industry. Subsequently, he believes that the duration of the setback will ultimately be determined by the Chinese government. Short of the introduction of EVs that are cheaper to produce and purchase, bringing back incentives is likely to prove the most impactful market stimulant.
EV and AV tech advances lessen design limitations

Xpeng wants to prove that a tech-oriented company also understands automotive design. Megan Lampinen hears more.
The digital revolution has sent automakers scrambling to transition to mobility providers. The focus is less on sheet metal and horsepower and more on software and services. The rise of electrification and autonomous driving are pushing vehicle development in new directions. Vision, courage and curiosity are the new must-haves for product planners.

That’s according to Martin Stegelmeier, Head of Product Planning for Europe at Xpeng. The Chinese electric vehicle (EV) brand has made a name for itself in its home market over the past nine years and recently began expanding into Europe with its smart, highly automated, premium EVs. “We wanted to prove that a tech-oriented company also understands automotive design,” he tells Automotive World. Its ambitions are nothing if not lofty—literally. As well as SUVs and sports sedans, Xpeng is also keen to get in on the eVTOL (electric vertical take-off and landing) market.

**Global and electric**

Stegelmeier’s remit centres on Xpeng’s road-going vehicles, where he describes the design philosophy as “dynamic, elegant, timeless.” While the design department is located in Guangzhou, the design team is international, and the sales footprint is increasingly global. “In general, China has taken a lot of reference from European design aesthetics over the years, particularly from the German automakers that brought their cars into the country in the 1990s,” he explains. “That’s partly why there’s a universal approach to our design today.”

The move to electric propulsion is another industry trend shaping vehicle design. “Like all EV manufacturers, we have a real benefit in the fact that the lack of an engine and transmission enlarges the cabin, especially in the rear seats,” elaborates Stegelmeier. “That’s given us room to create a living space on wheels. All EV manufacturers can capitalise on this, but they also have to put in a lot of effort to make it happen.”

**Automated driving**

The potential around this living space should increase in line with the level of automated driving on offer. Xpeng’s Highway Navigation Guided Pilot (NGP) is already handling sections of driving autonomously. In September 2022, it launched the pilot programme of City Navigation Guided Pilot (City NGP), representing the next stage of the automated driving evolution. Xpeng claims City NGP covers 90% of a driver’s needs, and its launch makes the automaker one of only two companies to have developed and mass-produced cars with this level of automated driving complexity.

“I’m very interested in the design implications once we move into SAE Level 3 and Level 4 automated driving and how we use the car in those scenarios,” says Stegelmeier. “Does it become an extended office, an extended living room, or a little bit of both?” Beyond that, he’s inspired by futuristic vehicle concepts such as the Lexus 2054...
used in the film Minority Report, a one-off coupe depicting Lexus’ vision for a performance car decades in the future. “We’re obviously not there yet, but it points to the sort of things that can be imagined. And if it doesn’t impact safety, why not go for it?”

When today’s drivers are freed from the task of driving, they could also have greater freedom of movement within the vehicle. For instance, seating positions need not be forward facing, upright or even static. Infotainment screens could be placed in and viewed from many different locations around the cabin. “Once we have achieved an autonomous driving level that guarantees the same safety as what a human can offer—ideally even more—then there is no boundary on what we can do,” he enthuses. “In terms of design, we will be looking at a lot of crazy cool things.”

Future options include rotating seats, folding tables and theatre mode infotainment for all occupants. Various automakers are already playing with the cinema concept, as seen with the BMW i7’s 31-inch Theatre Screen, billed as a ‘private cinema lounge’ for the rear seat. In China, Xpeng P5 owners can choose to configure the interior into a full-width cinema featuring eight speakers and a projection screen, or alternatively a full-length, private sleeping compartment.

**Car to life connection**

Passenger vehicles are essentially instruments of mobility, but brands are increasingly taking them further and incorporating them into the wider consumer lifestyle. A Lynk & Co vehicle subscription often comes with cinema tickets, restaurant discounts and priority
status for events. Chinese automaker Nio—whose stated mission is ‘building a joyful lifestyle’—actively pursues a non-automotive product line-up including luggage, home goods, food, and technology products. It also regularly holds events for owners, like picnics and concerts.

Xpeng sees a similar role for itself beyond the vehicles, and that’s clearly spelled out on its website: “At Xpeng, we don’t just move people from A to B. We inspire new life experiences.” In the not-too-distant future, that could be linked to energy services thanks to vehicle-to-grid technology. “With the EV battery, there is a potential for the vehicle to become a powerplant on wheels,” says Stegelmeier. “That will be coming up in the future, once the regulatory framework is in place and once the OEMs see a viable business case. It could open up an amazing opportunity for how we integrate the vehicle experience into our lives. The car won’t be just a mode of transportation; it will be an extension of things that we already have in our home and become increasingly interactive with smart devices.”

**Pushing the envelope**

What this means for vehicle design remains unclear, but Stegelmeier and his team are actively monitoring such trends that will inevitably impact their strategy and product offering. “We are always exploring,” he states. “We need to be curious about sustainability and technology possibilities that we can integrate into the car to change the overall driving experience.”

Such exploration is not for the faint hearted. “To design the vehicle of the future definitely takes a lot of courage,” he adds. “New mobility is an unexplored field. We can learn from experience, but with EVs and autonomous driving, we are pushing the envelope of what it means to drive a car.”
Economics of electrification crucial for 2030 auto industry

Could disparate approaches and circumstances ultimately cause industry resistance to electrification in the 2030s? Will Girling hears more
For Europe and parts of North America, the 2030s will represent a watershed moment for the automotive industry—when sales of new light vehicles will be restricted to zero emission models. As such, some commentators believe that achieving consensus on the industry’s electrification strategy will be essential to managing the transition.

However, there are pockets of resistance to the change. For instance, in Q1 2023, representatives in the US states of Virginia and Wyoming pushed against adopting California’s regulatory goal for 100% of new car sales to be zero emission by 2035. Their motivations varied from the inadequacy of electric infrastructure to the perception that electric vehicles (EVs) could threaten local economies.

Tensions arise because territories are experiencing the shift differently, but how tenable is resistance to electrification? Furthermore, to what extent could political and economic pressures affect its direction in the next decade?

**Disparate infrastructure**

Ian McVicar, Senior Director at NTT Data, tells *Automotive World* that achieving consensus in the automotive industry is difficult because CASE (connected, automated, shared, electric) trends are causing a general “re-evaluation of everything.” NTT Data is a consultancy specialising in helping industries adapt to the digital age. McVicar observes that varying levels of access to new mobility technology across markets will ultimately shape electrification’s reception in the 2030s.

In his view, the ongoing adoption of EVs primarily rests on battery technology and charging infrastructure. For as long as range anxiety continues to colour consumer reception of electric mobility, it makes sense for the industry to focus on boosting the former’s energy density and the latter’s accessibility. “Unfortunately, scaling charging infrastructure has been relatively neglected compared to developing EVs themselves,” states McVicar.

In the UK, it is estimated that 1,170 charge points will be needed per 100km by 2032 (325,000 total). However, the UK Climate Change Committee stated in 2022 that only 25% of this capacity will be ready in time at current installation rates.
This is by no means a unique situation: S&P Global Mobility calculated in January 2023 that the US will need to increase its 160,000 public chargers to more than 2.2 million by 2030. So far, supply shortages of semiconductors and a widening gap in EV-tech-specific skills is making progress sluggish.

Furthermore, regional markets are maintaining disparate approaches to technology. “Europe and the US are focusing on fast charger networks, while in China, where 50% of all EVs are sold, there is a greater emphasis on battery swapping.” On the other hand, McVicar finds that Europe and China have achieved a degree of standardisation in their charging port tech, whereas the US has a multitude of chargers, adapters and service access steps that complicate the process. “The overall cohesiveness of global electrification is clearly mixed, and governments will have a critical role to play in smoothing that out in the 2030s and beyond,” says McVicar.

**Opposition in the US**

If governments can’t agree on a common goal, progress could be slow. Despite EVs gaining momentum exponentially—they are forecast to capture 50% of global new car sales by 2035, according to Goldman Sachs Research—some political discontent has emerged.

Senator Jim Anderson from Wyoming introduced the ‘State Senate Joint Resolution No. SJ0004’ bill in January 2023 as a bid to reverse the progress of electrification. In fact, the bill called for the phasing out of EVs by 2035 in favour of internal combustion engines (ICE) models. Reasons cited included EV adoption being deleterious to the state’s oil and gas industry, as well as its lack of charging infrastructure making EVs “impracticable.”

The following month, Tony Wilt, delegate for the Virginia House of Representatives, proposed House Bill 1378. Similarly critical of California’s 2035 zero emissions target, Wilt questioned the infrastructural viability and affordability of switching the state’s total vehicle fleet to EVs. Similar concerns have also been expressed in Europe—in response to Euro 7, the German/European Mechanical Engineering Industry Association (VDMA) stated that ICE is being supplanted faster than practically feasible.

**Economic viability**

Both bills were subsequently defeated, with Anderson admitting afterwards that his own efforts were tantamount to a political stunt aimed against the California Air Resources Board’s push for zero emission vehicles by 2035.

Despite this, McVicar notes that Wyoming’s opposition to electrification arguably has a rational economic basis. It is among the top ten oil producing...
states in the US, therefore, “it isn’t surprising that concern for the economic effects of EVs is being expressed.” Electrification subsequently ties into wider socio-economic concerns surrounding deindustrialisation. However, this doesn’t tell the full story: “Some countries in the Middle East have similar economic ties, yet they embrace EVs more readily and their policies are generally focused on moving beyond oil and gas.” So, what else could be stoking opposition to electrification in the US? The answer could be a simple lack of economic value.

Wyoming has a land mass equivalent to the UK but only around 1% of the population density, making EV infrastructure expensive compared to its likely utilisation. Indeed, the state is second (228 EVs sold in 2022) only to North Dakota (213 sold) in terms of the lowest EV adoption rate in the US, according to Experian. While the Biden Administration has announced a US$5bn package to develop EV charging networks nationwide through to 2027, McVicar states that the total necessary funding will inevitably be a combination of public and private investment. Without an attractive business case for doing so, the latter is unlikely to be forthcoming. In the 2030s, as well as fulfilling “highly ambitious” environmental targets, governments and the automotive industry will need to foster viable economic models for EVs in markets with difficult operating conditions.

**Disparity widens in 2030**

While McVicar thinks broader ideological resistance to electrification on a global level is unlikely to manifest in the 2030s, automotive stakeholders will need to address economic concerns and inequality sooner rather than later. Any resolution will require a business-and consumer-focused dimension.

The high entry cost for current generation EVs is prompting a re-evaluation of ownership models, with some consumers opting for shared mobility as a more valuable mobility proposition. Access and convenience are becoming more important than ownership—a global survey conducted by Statista found that only 33% of US consumers still consider car ownership aspirational. “As of 2023, we’ve not even begun to see the full potential of sharing models,” adds McVicar. “By 2030, customers might be able to purchase an EV on finance and then transfer that arrangement—without owning the car outright—to someone else without an intermediary.” Consumer satisfaction with such arrangements may persist and expand in the proceeding decade, even if the cost of outright ownership eventually drops from highs seen in the early 2020s.

As a result, rather than resistance to electrification, he expects the automotive industry of the 2030s to be characterised by elaboration on the disparity that is already visible today. Each market will have its own particular requirements, and a balance will need to be struck between local population needs and a standardised industry approach. “Working and speaking with people in the industry, I’ve seen first-hand how much change is happening,” concludes McVicar. “The economic arguments for electrification aren’t stressed enough, but they are a crucial consideration for its future.”
Beyond buzzwords: automation requires consumer education

Karla Jakeman argues the need for a bigger focus on language and marketing of automated vehicles
Automated vehicles are a hot topic both inside and outside the connected and autonomous vehicles (CAV) industry. Many vehicle manufacturers are working on bringing automated vehicles to the commercial market, and as such, the wider public is hearing about their capabilities and possible applications for the first time. Although fully autonomous vehicles are not yet within reach of consumers, the invention of autonomous features and their installation in new vehicles brings alongside itself marketing campaigns targeting drivers looking for new vehicles. Buzzwords like “self-driving”, “automated”, “autopilot”, and “hands-free” are popping up everywhere—but when asked about their meaning, most consumers admit they do not understand them.

While the industry becomes increasingly automated, it is essential that CAV consumers understand the capabilities of automated vehicles and how they differ from traditional vehicles. The industry must work to ensure that the public is aware of not only the studied safety and reliability of automated vehicles, but also what different marketing buzzwords mean, what the capabilities of the vehicle truly are, and what to expect when operating one, because, unfortunately, automated cars today are completely misunderstood.

**What are automated cars, really?**

The general public and those not directly involved in the automation industry believe that automated cars are vehicles where they can open the door, sit down, and be driven where they want to go by the vehicle itself, without having to do anything. This is the future players are working towards, but in truth, remain a long way from this dream becoming a reality.

As automation stands today, even in those vehicles advertised as having autopilot capabilities, drivers need to be alert and able to take back control of the vehicle at any point. There are times where a vehicle will encounter a situation it will not know how to tackle, and it will immediately warn the driver to take over, and that needs to be done within a split second. This technology is not a new thing or a faraway sci-fi dream—it’s derived from adaptive cruise control, which alerts the driver to intervene when the vehicle needs help, and most new vehicles are outfitted with this feature, even though their owners would not consider their car to be an autonomous vehicle.

All this is not to say that automated vehicles aren’t worth the hype. Fully autonomous vehicles will offer never-seen-before independence to people with disabilities, the elderly, and those without drivers’ licenses. They will optimise traffic, reduce the numbers of accidents on roads, and contribute towards Net Zero.

It is very important to note how, despite the lack of availability of autonomous commercial vehicles, many people have already formed strong and often negative opinions around them—even though they have never come into contact with one. Researchers and manufacturers know they won’t be able to get the public to form a non-apprehensive opinion of automated vehicles until they are able to experience one, highlighting the need for public education.
Who should take responsibility for driver’s education?

Education around autonomous vehicles can take many different forms. One of the most important ones is to give people the chance to experience automated vehicles for themselves. In Las Vegas, for example, a shuttle trial was recently performed, where people were given the chance to try an automated shuttle for themselves. Although people’s perceptions of connected and autonomous vehicles changed according to their age and income, up to 96% of people agreed that experiencing CAVs for themselves helped them understand the technology, and their opinions had changed positively as a result of the trial. This is great proof that trials are the main tool for public education, and the more trials the public experiences, the more industry players can increase the public’s opinion.

The government should also take responsibility and play a part in public education, especially when it comes to autonomous public transport. Bus trials, for example, will teach people what it’s like to use CAVs as a shared form of mobility, how it would feel to ride alone, at night, without the safety factor of a driver. Many people fear that transport without a driver acting as a safety buffer will result in increased crime and less safe and efficient traffic, but who is to say a driverless bus won’t have a security team? For example, safety conductors could be hired instead of drivers to increase safety and responsibility in transport. But without allowing the public to experience these options for themselves, they will never know how they feel, and they will always assume more negative opinions.
One of the options that is mentioned the most in terms of where to place the responsibility for educating drivers is the manufacturers. Although they play an important role, placing the blame on manufacturers is a very complicated area. What happens when a car is sold in the second-hand market? Will the responsibility to educate the new buyer then rely on the seller? The truth is, there needs to be a level of personal responsibility coming from the driver. Most people wouldn’t get behind a wheel without knowing how to drive a car. Automated cars shouldn’t be different. And although this will not be a reality for 100% of people, more effort should be placed on putting the responsibility for education on the drivers’ shoulders, as well as on the manufacturers.

**What will happen in the future?**

Many people outside of the CAV industry have what they believe to be a clear image of what the future will hold. Some hope it will be filled with automated cars; others hope that automation won’t stick. As some will be relieved to hear: the immediate future won’t change much.

Some people with negative opinions of automated cars dislike them because they enjoy driving and are afraid they won’t be able to in the future. Some people with positive opinions of automated cars like them because they want to enjoy the freedom afforded by a car without having to drive one. And herein lies the point of the automation question: people will still have a choice.

Something that will change is that roads will become safer. Automated cars will be able to count on remote operators that can intervene in case of emergency, remotely assisting victims if an incident happens, or taking over the vehicle to avoid a collision if needed. This will provide people with a level of safety and comfort that hasn’t been seen before.

For the foreseeable future, if someone were to get behind the wheel of an automated car, they will continue to require an up-to-date drivers’ license, in case they need to take over the vehicle. It is only when fully automated cars are ready for the mass commercial market that these rules might change.

A future of automated vehicles is coming, but it is not as close as many automation trends would have people think. They are still far enough away that we can take the time to educate the public on the most responsible ways to approach the technology.

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*About the author: Karla Jakeman is Head of Automation at TRL*
Sustainability is shaping multi-modal’s emergence

Mercedes and BMW’s ‘Mobility Super App’ shares its playbook for urban mobility. By Megan Lampinen

Mobility as a Service (MaaS) could reshape the way people move around cities and tackle increasingly urgent environmental concerns. Digital transport service platforms allow consumers to access and pay for various transport options, depending on which suits their particular needs at any specific time. From taxi and private hire vehicles to car-sharing and e-bikes, the idea is to aggregate different mobility brands in one place to improve the efficiency and sustainability of urban transport without introducing new vehicles to the road.

MarketsandMarkets projects that the MaaS market will grow from an estimated US$3.3bn in 2021 to US$40.1bn by 2030, a CAGR of 32.1%. Numerous players are emerging, all keen to ride the coming wave. Free Now is one of them. Formerly myTaxi, the transport app has evolved over the years from an exclusive focus on taxi hailing to a fully integrated multi-modal mobility platform. Following
several acquisitions and rebrandings, it has operated as Free Now under the ownership of BMW and Mercedes-Benz since 2019. With more than 56 million users across 170 cities, the company refers to itself as “the Mobility Super App.”

Free Now boasts the largest vehicle choice for consumers across Europe, including taxis, car-sharing, e-mopeds, e-scooters, e-bikes, and more recently public transport. “In 2022, we became the first mobility platform in Europe to integrate public transport tickets into our app, allowing users to book tickets for buses, trams and underground trains directly through the platform,” notes Mariusz Zabrocki, General Manager of Free Now UK. “We’ve made it our mission to complete the urban mobility offering and through these partnerships, we believe we’ve achieved that.”

Megatrends driving multimodal

A number of different trends are currently shaping urban mobility and spurring interest in apps like Free Now. Among them, Zabrocki highlights the 15-minute city: the concept that everything citizens need can be accessed within 15 minutes by walking, biking, public transport and shared micro-mobility. “This trend is a response to the climate crisis and reinforces the importance of reducing personal car usage in the city centre, making public spaces more liveable and vibrant,” he tells Automotive World.

He also notes how green mobility is gaining importance. Free Now’s MaaS report for 2023 found that 91% of Europeans consider sustainable transport options as important, if not more, than before the energy crisis. “In 2023, the key to offering high quality multi-mobility options is prioritising green transport solutions,” Zabrocki asserts. “Especially when we consider the 15-minute city, localities should be looking to collaborate with mobility platforms like Free Now to make urban mobility more efficient and sustainable while avoiding adding more cars on the streets.”

He also points to the trend towards ‘flexible mobility spending’, which is particularly important given the rise of hybrid working. Free Now’s Corporate Mobility Survey 2022 found that the use of company cars is poised for a massive decline in the coming years. At the moment, 90% of respondents have integrated a company car as a mobility solution into their overall transport strategy, but this will fall to 37% in the next three years. “That’s a reflection of the new workforce that is much more concerned about sustainability,” says Zabrocki. On the other hand, mobility budgets are poised to become the most popular company benefit within the next three years. “What we’re seeing now is companies leaning towards a monthly allowance for employees to make use of multi-mobility options such as taxis, car-sharing, e-scooters, e-bikes and public transport for commuting,” he explains. In response, Free Now has introduced a Mobility Benefits Card for business clients—a prepaid card that employees can use for expenses, however they chose to travel.

Overall, these trends have been driving growth in the urban mobility industry. Zabrocki points out that across Europe, multi-mobility trips grew by over 200% in 2022, while the number of multi-mobility users grew by 27%.
User feedback

Free Now’s consumer research shows that more than half of its users take more than one type of transport. To offer the sort of diversity demanded, the company collaborates with 14 mobility providers. “User experience and freedom of choice are truly our biggest strengths,” states Zabrocki. “The ability to utilise multiple forms of transport on the app is the most liked part of our offering.”

Looking ahead, Zabrocki concedes that Free Now and the wider urban mobility industry as a whole needs to place more focus on sustainability. Under its Move To Net-Zero carbon emissions programme, Free Now wants 50% of all its vehicle rides to be in fully electric vehicles (EVs) by 2025. That rises to 100% by 2030. The company partners with numerous EV suppliers including Citroen, Marshall, Mobilize, Otto Car, Peugeot, Bonnet, BP Aral, BP Pulse, EDP, Electra, Ohme, Shell and Wallbox Charging to support the transition. In addition, as of 2020, it has committed to offset all remaining CO2 emissions. This made it the first mobility platform in Europe to target net zero in all key European markets.

The goal of more efficient and sustainable transport is a laudable one, but not without challenges.

When it comes to micro-mobility, the biggest concern at the moment is around regulatory uncertainty and how that impacts adoption and growth. For the taxi and minicab segments, the focus is on tailpipe emissions, and most EVs still carry a price premium. Zabrocki also flags access to chargers and the cost of charging as key challenges. In the UK, the company offers drivers financial support and other benefits through third-party offers if they switch to EVs. In Ireland, it is encouraging drivers to apply for the Electric Small Public Service Vehicle (SPSV) Grant Scheme.

Government support

Aside from these incentives, Zabrocki is generally critical of what he perceives as a lack of government support: “This is a huge barrier. In the UK, calls for the VAT levied at on-street EV charge points to be equal to that of domestic charging have gone ignored, while the overwhelming lack of charging points across the country continues to impact its accessibility. We need greater public and private sector collaboration to ensure that investments can be made across sustainability.”

He would like to see the UK extend its plug-in taxi grant and an equivalent grant targeted at minicab
drivers. Free Now’s recent driver survey found that half of those with EVs believed support from the government was a key factor in helping them to switch to e-mobility. He also hopes to see changes in VAT policy: “As mentioned, this is a huge challenge facing our drivers, especially as we focus on sustainable travel. It not only impacts them as they struggle to access EVs, but it also has a knock-on effect on urban mobility, hindering cities and mobility platforms from working towards a sustainable EV future. Yet disappointingly, governments have so far ignored these calls.”

France is singled out as a country actively encouraging citizens to improve their sustainability through government schemes. Paris has created over 900 miles of bike lanes to encourage cycling. The ‘Forfait Mobilités Durables’ scheme allows employers to cover the full cost of travel between home and work on the condition that employees use a ‘soft mobility’ transport option. These options include cycling, shared cars, public transport and electric transport modes. The grant is tax-free for the employee and an estimated 20% of French businesses have implemented the scheme.

**Where next for urban mobility?**

Looking ahead, Zabrocki expects urban mobility to continue to evolve as innovation and collaboration accelerate. That includes more partnerships among mobility operators and working with the private sector to increase mobility options, as well as public sector collaboration. “More can be done in terms of reducing bureaucracy and creating more agile processes that facilitate innovation and development that fosters mobility and sustainable urban development at a national and local level,” he declares. “In order to encourage the growth of the MaaS industry, there needs to be a symbiotic relationship in which we are supported by our cities and governments through local regulations and infrastructure investment to offer sustainable urban mobility options.”
Electric vehicles (EVs) offer zero emissions at the tailpipe level, but their true carbon footprint stretches far beyond that. These vehicles—and notably their batteries—can produce significant emissions during their manufacturing, and end-of-life recycling of the lithium-ion batteries is complex. The source of the electricity used to charge EVs in daily operation also can have a big impact depending on how it is produced. And what if their batteries are later put into second-life applications—how does this affect the accounting? The trouble is that the industry currently lacks harmonised standards to help the assessment of that overall footprint in a consistent way.

A new European Union-funded initiative has begun work on setting out a baseline for a European-wide single life cycle assessment (LCA) approach for zero emission vehicles (ZEV) and batteries, but which should also be applicable for vehicles with internal combustion engines (ICE).

“LCA is really just about providing a more holistic end-to-end assessment of the impacts of a product or service,” explains Nikolas Hill, Head of Vehicle Technologies and Fuels in Ricardo’s Sustainable Transport team. Ricardo Plc is part of the core team of the collaborative TranSensus LCA project consortium, coordinated by Fraunhofer LBF & IST, and whose members from industry consist of BMW, EDF, Northvolt, Renault, Ricardo, Scania, Sphera, ST Microelectronics, Umicore, Valeo and Volkswagen as well as nine different research associations, and 24 associated partner organisations.

“In the past, the industry was only addressing ICE vehicles and the main focus there was on direct emissions from the vehicle and vehicle efficiency,” adds Hill. “We are now moving...
to different types of fuels and powertrains, and they impact different parts of that life cycle.” An EV may have a much bigger emissions footprint during manufacture, while more conventional powertrain vehicles have higher emission impacts in the use stage. An objective comparison of one vehicle model to another requires a broader look across the whole of the life cycle.

**Many players, many approaches**

In 2020, Polestar became one of the first mainstream brands to publish a detailed report on a LCA of one of its EVs, the Polestar 2, along with its underlying methodology. At the time, Chief Executive Thomas Ingenlath explained to *Automotive World* that this was part of a push to encourage the wider mobility industry to be clearer with consumers about the environmental impact of their products. It was a good start, but it soon became apparent that a company-by-company approach had limited use.

The practice of assessing life cycle emissions has always been an open one, consisting more of a framework than a

“If you can’t monitor something objectively and consistently you can’t set targets or improve it.”

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strict set of stipulations. That left considerable flexibility in how companies make decisions about data, how they characterise the use of the vehicle, and their choice of various methodological options. While Polestar outlined its methodology along with its LCA, other brands may take another approach. Essentially, every player could do things slightly differently, resulting in different results that cannot be accurately compared to each other.

There are many potential points of divergence. For instance, all assessments make an assumption about the type of energy that will be used to charge EVs during their years of operation. Views on the likely electricity mix and if or how that will change over the vehicle’s lifetime vary considerably. There are also different methodological options for dealing with use of recycled content in production and end of life recycling. Here, options range from only counting the recycled material at the front through to options where all incoming material at the front is treated as virgin material and credits are received for all recycled materials at the end.

“The choices between the different LCA end-of-life methodologies and where they balance out can mean the net results come out quite different,” Hill drives home. But it’s not necessarily due to a difference in the products, just the methodology. An agreed standard would change that. “With harmonisation, everybody broadly does things in a similar way,” Hill tells Automotive World. “If two different companies produce a LCA of their products, you can directly compare them and say—within the range of uncertainty—that they are comparable.”
Supply chain complications

The LCA consortium face a significant challenge in laying down standards for a complex supply chain. The focus is on not only manufacturers but also their suppliers. “Everybody has to consistently abide by the same rules, and it has to be manageable and not unduly burdensome,” he emphasises. “It can get very complicated.”

That includes the question of how to treat the fact that an EV battery might have a second life. BMW has said batteries in its iX2 will be used as stationary power packs, while Mitsubishi has been using batteries from the plug-in hybrid Outlander to power manufacturing at its Okazaki plant in Japan. On the whole, McKinsey estimates that second-life lithium-ion battery supply could surpass 200GWh per year by 2030, up from 1GWh in 2020. Such a sizeable market ideally needs to be taken into consideration within LCA.

“But how do we account for that and allocate emissions impacts between the vehicle and the second life application?” asks Hill. “There are numerous aspects that become complicated when you dive into the details. We need to find a balance between practicality and realism, what can be done now and also what might be done in the future perhaps. That’s part of why this is such a big project.”

A standard approach to LCA could provide benefit for many applications, including product reports and disclosures, new product development and policy analysis. “What we develop will probably need to address all of those, but it may mean that, whilst there are commonalities in a lot of areas, certain data or certain aspects may have different flexibilities or different approaches that are more suitable for those different purposes,” he cautions.

Every player could do things slightly differently, resulting in different results that cannot be accurately compared to each other.

Hill expects the end product will be a matrix, with most of it standardised, but with freedom of choice on certain types of applications. Ultimately, the aim is to enable greater transparency and help focus efforts in the areas for greatest benefits. “Hopefully it will reduce these conflicting stories creating confusion over what is best. It will help OEMs communicate to their customers and help target areas for improvement,” he states. “If you can’t monitor something objectively and consistently you can’t set targets or improve it.”

The project started in January 2023 and is intended to run for 30 months. A draft methodology should be ready in the next 12 to 18 months with a final version expected in mid 2025.
Gasoline and diesel internal combustion engine (ICE) technology has improved dramatically over the years. Combined with the growing adoption of electric vehicles (EVs), tailpipe emissions are on the decline and scrutiny is shifting towards non-exhaust emissions, such as those from braking systems. Tiny metal particles released into the air have been linked to lung damage and respiratory problems, and regulators are cracking down.

Measuring brake emissions

Euro 7, which is set to take effect in 2025, will mark the first emission standard to limit particle emissions from brakes. Pivotal to that will be establishing an official procedure to measure brake particle emissions under standardised conditions. This is exactly what the United Nations Economic Commission for Europe’s Working Party on Pollution and Energy has been developing, as have various braking experts. For brake suppliers, these coming standards are reshaping current R&D and guiding future product strategies.

Tenneco’s Ferodo OE Braking business is a case in point. It is arguably one of the oldest players on the market, recently celebrating 125 years of operation. Today it is a leading supplier of friction materials, accounting for 40% of the global high-value front brake disc friction market, and boasts the broadest range of friction materials in the world. Over its long history, it has learned the importance of innovation. The Ferodo Engineering team’s efforts are backed by 230 engineers devoted to the global OE market.

Holger Schaus, Vice President, Engineering, tells Automotive World that the company is actively collaborating “with various partners and relevant groups” to get on top of the emissions focus. Regarding new Euro 7 solutions under development, Schaus hesitates to share details publicly but confirms the team is “working with discs and developing new friction material to drastically reduce friction.” He concedes that “automakers will need a solution for this. We have been collaborating with some OEMs for more than three years, focussing on product development and finetuning to improve friction performance. Each OEM has its own philosophy and its own approach.” The company’s
current customer list spans most of the major vehicle manufacturers, including Volkswagen, Ford, BMW and Mercedes-Benz, along with new entrants like Tesla and BYD.

Tenneco has also developed a dyno to simulate and measure brake emissions. Validation testing on this state-of-the-art measurement test rig is underway and should accelerate the development of new friction materials that meet Euro 7 requirements. The aim is to receive certification by Q4 2023.

**Targeting copper**

Sustainability within braking goes beyond Euro 7 and emission testing. At Ferodo, it has been a hot topic for years, with considerable effort poured into its low-copper and copper-free offerings. Ferodo introduced its low-copper and copper-free brake pad range for the aftermarket in 2012, followed in 2019 by the technical release of its advanced copper-free hybrid friction material composites for OE vehicle applications.

“California kick-started the move towards low and then zero copper in the product,” explains Neville Rudd, Group Vice President and General Manager of Tenneco’s Global OE Braking business. Research in the US linked brake dust to water contamination and damage to aquatic life, prompting tighter restrictions. “Having that particular issue in one state meant it rolled out across the US, and now it is pretty standard globally to produce friction material products without copper,” he adds. “That’s the basic change we made to make sure no water source becomes potentially contaminated.”

**Towards electric and autonomous**

Low-carbon mobility is also characterised by growing use of EVs and automated driving. These trends are making themselves felt on the braking front. “Vehicles that use much more regenerative braking [like EVs] mean the value proposition of our product will change,” notes Schaus. “With less braking you will have more corrosion, and you still need to ensure top performance for emergency situations.”

There is also the weight issue: EVs are generally about 19% heavier than their equivalent ICE models due to the addition of the battery pack. “That could mean a shift to a high performance brake,” says Rudd. “Even though the brake would only be used in emergency situations, it’s needed to retard the vehicle speed very quickly.” He also points out that heavier vehicles will need bigger brake pads. Coatings could be another area for further development in the wake of e-mobility. “Automakers are starting to apply various coatings to discs, and that will develop further, particularly with the particle emission reduction targets we are seeing to ensure discs remain clean and there is less wear on discs themselves,” says Rudd.

As for the move to autonomous driving, this could result in more fleet vehicles putting in much higher mileage. “Instead of sitting parked for most of the day, vehicles could be almost constantly in operation. That leads to faster wear of the components,” Schaus explains. For a brake supplier, durability will need to be considered under these harsher conditions.

The good news is that none of these innovations should entail a hefty price increase. “While friction material changes involve significant R&D investment on our part, the pricing impact is relatively small,” Rudd confirms. “Each individual customer is pursuing its own slightly different approach to resolving particle emissions through changes in braking technology. Over the next couple of years, as the most cost-effective solution becomes known, the price impact will depend on each customer’s volumes and how successful their platforms are.”
Audi imagines four-dimensional virtual cabin designs

Audi’s activesphere concept car makes the case for mixed reality combined with minimalistic designs as the future of vehicle interiors. By Will Girling
Since November 2022, Audi has been including virtual reality (VR) add-ons for select models, such as the e-tron. The company’s ‘Motorverse’, developed in partnership with extended reality entertainment firm holoride, features both passive and active content that reacts in real-time to the vehicle’s motion.

In January 2023, the German automaker provided an insight into its vision for the future of VR-inflected cabin designs with the ‘activesphere’ concept car. The electric vehicle (EV) integrates a new operating concept—Audi Dimension—that emphasises mixed reality (MR) through an optical headset.

Siddarth Odedra, Head of UI/UX Design at Audi, is careful to make the distinction between full VR and augmented reality (AR), which he views as two ends of a scale. The former represents a break from the real world, such as use cases in the video game sector, while the latter simply overlays information on the real world. MR effectively sits in the middle of both concepts. Using this technology, the activesphere’s minimalistic cabin is overlaid with digital control panels and virtual displays within system-identified, touch-sensitive zones. This allows occupants to control the vehicle in an almost button and screen free manner.

“Obviously, the activesphere is an extreme case—a vision of how MR could reshape cabin designs,” he tells Automotive World. Nonetheless, he explains that what this concept exemplifies today could become a reality in tomorrow’s commercially available production models.

Entertainment, then safety

Odedra states that the primary benefit of MR is that it allows for cleaner interior designs that grant “both physical and digital freedom.” The challenge for Audi is to develop a roadmap that unlocks these next-gen features iteratively. “We’re not saying that we want to remove everything physical. Part of developing activesphere was to determine what makes sense as physical, digital, or mixed.” As such, he states that the company will be prioritising entertainment in the first instance. The significant regulatory and homologation considerations of incorporating MR into safety-critical systems naturally places them outside immediate realisation.

Ironically, focusing on entertainment could actually yield safety improvements. Current generation infotainment systems must grapple with human-machine interfaces that could dangerously distract drivers if configured without care. “Today, for example, drivers have to look away from the road to change tracks on a playlist,” says Odedra. In the
activesphere, these controls would be brought into the driver’s direct field of vision, enabling them to keep their eyes on the road while making the desired adjustments. The headset system would also be sensitive enough to detect when this information was needed based on where the wearer’s attention was focused.

“Unbound by a screen, we could present information almost anywhere, although that’s not necessarily desirable,” he continues. “Just because we can, doesn’t mean we should.” This presented another design challenge for Audi: curating content to prevent the sensation of information overload. The company calls this “the right information in the right place at the right time,” and has been focusing particularly on navigation applications. Odedra states that information can be “contracted” to sit subtly in the background of the driver’s perception until it is required, at which point interactive 3D data is “expanded” in real time throughout the cabin. “It’s almost four-dimensional—this is why we call it Audi Dimension.”

Minimalism

Some automakers, such as Italian start-up Aehra, are prioritising minimalistic vehicle design for aesthetic and sustainability purposes. For Audi, the purpose of simplified interiors is to create “freedom of space” for occupants, both in the physical and mental sense. In German this is called ‘freidenk’—literally ‘free thinking’—and serves as the automaker’s guiding philosophy. “We’re not pursuing spaciousness for its own sake,” asserts Odedra. “As autonomous vehicles (AVs) become more sophisticated, we want drivers and passengers to do what they want when they’re not driving.”

In the activesphere, which is envisioned with SAE Level 4 capabilities, the cabin transforms when the driver activates the automated driving mode. The dashboard, steering wheel and pedals retract into ‘invisible’ locations, unlocking even more space for the front occupants. This is indicative of a broader automotive trend that emphasises the ability of AVs to transform cars into a third living space, an area equivalent to a mobile living room or office. Multinational chemical company Asahi Kasei debuted a concept car—the AKXY2—at CES 2023 that took this idea to its logical conclusion: the interior contained almost no controls at all, giving priority to seating and comfort instead.

“The activesphere’s minimalist interior helps to create ‘freedom of space’—the driver controls retract when the vehicle is in autonomous driving mode.
perceive that less is more. This is where MR creates value by unlocking more features virtually than would have ever been possible physically. For those who might be reluctant to abandon the organic haptics of a traditional cabin, he adds, trust in the digital experience must be nurtured. “It’s important to display the right information to reassure people in those initial stages. At the onset of full AVs, that might mean detailing each decision to the driver in advance.” However, once familiarity has been built, this can be dialled back.

Supporting the real world

Audi has already explored both ‘extremes’ of VR/AR—holoride for VR and AR features in the heads-up display of its Q4 e-tron—and now views an equal blend of the two (MR) as the best long-term solution. “The activesphere demonstrates that we’re ready for that future,” states Odedra.

“Audi is dedicated to unlocking the value of MR in the cabin.”

Pointedly, he adds that the virtual world’s potential should not be limited simply to gamification. While some players and commentators are excited about the metaverse’s ability to provide enhanced multisensory entertainment experiences, Odedra would rather focus on the enhancement of customers’ everyday tasks. Envisioning a world in which 3D headsets become more refined and easily portable—similar to the evolution of the smartphone—he concludes that now is the time for automotive to define how this technology will shape car design. “Why escape from the real world? Gamification might be easier to realise, but it’s not necessarily the most valuable use of the virtual space.”

By keeping the emphasis on the core driving experience, Audi has made its stance in the debate clear.
What happens to IoT connectivity if there is an outage?

As mobility businesses come to rely on the Internet to function, how should the industry at large think about system downtime? By Neil Miller
In today’s digital-first world, glitchy experiences can be bad in so many ways. If your food ordering app delays, or the conference call stalls, it’s certainly detrimental to the user experience, but there are broader implications to the vendor brand and bottom line as well. In the case of the transportation industry, glitchy connectivity can have even broader implications when it comes to the upkeep and performance of critical functionality.

IoT (Internet of Things) has changed the way we think about getting from point A to point B. User experience, planning, and logistics all stand to benefit thanks to increased digitisation and connectivity. IoT in transportation incorporates a wide network of embedded sensors, actuators, smart objects and other intelligent devices. This network collects data about the real-world scenario and transmits it over specialised software to transform that data into useful information.

At its core, IoT runs on Internet connectivity. But the Internet wasn’t built to sustain a global transportation industry and outages are not a matter of if but when. In an industry where safety and mission-critical performance are non-negotiable, outages and other disruptions can have far reaching consequences.

So, as transportation businesses come to rely on the Internet to function, how should the industry at large think about system downtime, and the level of unpredictability this new reliance brings with it? It starts with visibility, and with proactive management. New software technologies are enabling extended monitoring into the digital environments that sit beyond today’s IT perimeters, into the Internet networks that have become core to the tech stack. And by knowing how outages can occur and where, businesses in the transport sector can better arm themselves, reduce resolution times and improve customer communication.

Creating reliable travel experiences through visibility

IoT is at the heart of reshaping transportation to provide greater safety, more efficient travel, improved vehicle and aircraft maintenance, and more strategic traffic management. According to recent research from McKinsey, the total value created by connected-car use cases could reach more than US$550bn by 2030, much higher than the roughly US$64bn in 2020.

But one of the key challenges with increasing and expanding connectivity is tracking the performance of transportation endpoints. An endpoint is a device that connects to the computer network, so in the connected car example it is the vehicles themselves—the ships, aeroplanes, trains and more. Dealing with these moving assets means that tracking the endpoints can be tricky to monitor.

A fleet of trucks, for example, travelling to different locations where drivers cannot check in with the central office because it is out of range or otherwise unavailable, causes complications for the operation teams monitoring the journeys. The unpredictable nature of the Internet also adds noise to the data these companies collect. So, the reliability and accuracy of asset location and status need to be closely examined, especially during times of high network latency or packet loss.
This need for visibility into connectivity and performance grows with each new device, or endpoint, added. In addition to internal systems working together, transportation companies are reliant on the Internet and the cloud to power IoT devices, adding a further layer of complexity to the digital supply chain. With all these factors at play, it’s imperative to ensure high quality networking across multiple networks, including the Internet.

Wider digital supply chain issues can also be very time-consuming and costly. For example, when Google Maps went down on 9 August 2022 it took out several apps that rely on its API (Application Programming Interfaces) to deliver directions. For example, apps like Uber and Lyft rely on Google Maps data to provide real-time information about traffic conditions and other factors impacting drivers’ ability to pick up riders.

Without the right technology in place, these issues can result in outages for transportation companies. Downtime in certain areas of the transportation sector can be a safety issue and expensive, resulting in steep regulatory fees and labour costs. 2022 saw multiple IT outages for airlines all over the world, including Southwest Airlines putting the pressure on to avoid another summer of travel chaos this year.

Businesses that rely on connected communications systems are at risk of becoming vulnerable when connectivity worsens.

Innovation is the way forward

Businesses that rely on connected communications systems are at risk of becoming vulnerable when connectivity worsens. To receive reliable, real-time data from sensors in vehicles and to support connections to moving assets, end-to-end visibility of the networks relaying this information is required. Tools such as software agents can provide this visibility into potential impacts through insights and provide in-depth analysis to operation teams on how much downtime it is experiencing and where exactly the issue is occurring. With this data, transportation organisations can make better decisions about where to invest in upgrades like sensors, readers, software, and other IoT tools, to improve reliability and performance management.

This telemetry data can go a step further to support proactive maintenance, helping businesses track and understand patterns to reduce time of or prevent outages altogether. This is already being done with applications throughout the industry, but it’s particularly useful for fleet managers.

A team can use telemetry scanners to track such parameters at fuel level or engine temperature and thus receive information about the fleet’s health in real time. This way, organisations can decrease the need for routine mechanical inspections and examine only those vehicles that have already demonstrated some technical issues. Fleet management telemetry can also include other variables, of course. Directly tracking speed and driver behaviour can provide important information.

Telemetry can also help operators understand the conditions in which the fleet travels to produce better estimates for needs and expectations. Not to mention
that the future of connected technology will help companies save money on shipping by enabling drivers to access information about weather conditions, rest stops, and parking lots. This level of contextual telemetry forecasts fuel consumption based on driving distance and road conditions to find better lanes and modes.

But for these maintenance systems to work and be reliable, end-to-end visibility is required of the networks relaying that information. Businesses are coming to the undeniable realisation that as connectivity becomes borderless, so too do they need to adopt new infrastructure strategies that can manage these borderless environments. Reliable visibility is one of these strategies. Reliability means ensuring you have access to real-time data from sensors in vehicles and readers on tracks and roads, so you can monitor performance and act if problems arise.

Overall, this capability helps improve uptime while reducing expenses stemming from unplanned repair work and hauling costs.

Utilising visibility for future developments

The Internet is a critical component of transportation and logistics. As transportation companies are seeing more and more services connected, the quality of the network is becoming more essential than ever. With the vast amount of data available, it is easy to see how it can help companies in the transportation sector do better capacity planning for fleets and solve problems proactively with support from alerts and fault codes.

The level of innovation that is coming out of the automotive industry is undeniable. Hybrid work, online shopping, and telehealth are all examples of major transformational shifts in recent years where connectivity is critical, making cloud and Internet networks crucial to the new technology stack, powering functionality and user experience. While digitisation is happening in all facets of life, its manifestation in transportation is perhaps one of the more visceral ones. Electric vehicles, autonomous driving, and the ever-growing volume of dashboard apps, make the driving and passenger experience one that more and more resembles that of the mobile office or living room—it’s both exciting and impressive.

So, as the innovation continues and new opportunities abound, so too are the software technologies that optimise the digital experience becoming ubiquitous. End-to-end visibility across cloud and Internet networks, using tools via telemetry and software agents, can uncover blind spots in the transportation industry. In turn, IoT connectivity will perform with full availability.

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The Internet wasn’t built to sustain a global transportation industry and outages are not a matter of if but when

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Where does Europe stand in the global battery race?

The demand for batteries, particularly in the automotive industry, is skyrocketing, and Europe cannot afford to fall behind. By Lars Carlstrom

China has emerged as a dominant player in the global battery and electric vehicle (EV) market in the last two decades. It is no secret that the Chinese Government has implemented a range of policies and incentives to encourage the adoption of EVs, including subsidies, tax breaks, and favourable regulations.

European Commission President Ursula von der Leyen recently noted that Beijing has embarked on a decades’ long strategy of “hidden subsidies” on strategically important industries including semiconductors, batteries, and EVs. As a result, CATL, BYD, and BAIC have emerged as ‘national champions’, leveraging China’s abundant supply of raw materials, low-cost labour, and government support to gain a competitive edge over their international rivals.

The US has now woken up to the threat of China’s stranglehold on strategic industries. Landmark legislation in the form of the CHIPS Act and the Inflation Reduction Act (IRA) are powerful steps towards reducing Chinese dominance in strategically important industries.

For batteries specifically, the IRA will transform and redirect the supply chain in a truly holistic sense, and as NGO Transport & Environment put it, “has changed the rules of the industrial game”. Under the IRA, US$45 per kilowatt-hour of a battery’s production costs will be covered, creating a strong incentive for companies developing these highly technical and cost-intensive products. The battery industry is constantly evolving, so more financial support for battery production will allow companies to invest more in R&D and enhance competitiveness.
Beyond intra-industry competition, the future success of the transition to e-mobility will rest upon the ability of battery producers to innovate and deliver more efficient cells which utilise more recycled materials and lower percentages of finite, critical metals. In fact, 40% of the materials contained in an EV battery must be extracted, processed, or recycled in the US, or a country with which the US has a free trade agreement. This figure increases to 80% after 2026, a move which will transform the global battery industry by ‘nearshoring’ the industry and its processes into the US’ sphere of influence.

**What about Europe?**

Opportunities for leading European firms in the space will be limited if they cannot compete with the US’ largesse. Leading European companies have already highlighted the need for Europe to respond. In early March, Volkswagen warned the EU that it would put a planned battery plant in Eastern Europe on hold and prioritise a similar facility in the US after estimating it could receive €10bn (US$10.8bn) in relevant incentives since the passage of the IRA.

The Eurozone is a shrewd political and economic force which can match the ambition and scale of the US, but the regulatory environment has often been slow to adapt to innovation. This has created a challenging environment for developers of cutting-edge technologies which need the
support of the EU to build continental champions. This is especially true in an industry like advanced battery development, where smaller and independent cell developers risk being shut out by existing large automotive firms able to redirect billions into their gigafactory development plans. A lack of support for nimble and technologically advanced battery cell developers will lead to further delays in innovation and investment.

The EU’s new Green Industrial Plan, announced in February, is a statement of intent, but may not go far enough to meet the scale of the challenge from the US and China. Funding pathways for clean industry are largely drawn from existing sources such as the EU Recovery Fund, which could lead to imperfect economic competition within the bloc as larger economies absorb funding at the expense of smaller economies. The EU Recovery Fund was a significant step towards supporting the revival of the European economy in the wake of the COVID-19 pandemic and could assist the ongoing integration of the EU. However, it is important to understand the scale of the challenge posed by competition from the US and China.

New funding lines will need to be extended, focusing exclusively on the opportunity for economic growth and development in clean technologies such as advanced battery development. Under the Green Industrial Plan, the EU Commission is turning to unspent funds from its €800bn recovery package and will offer tax breaks for green firms under the REPowerEU fund. Many regard this as an overly cautious approach that does not instil confidence in a long-term solution for the EU’s clean energy ambitions.

**What’s at stake**

Failure to recognise and swiftly adapt to the changing macroeconomic environment could have dire consequences for the EU. Europe’s dependence on imported batteries will undermine its energy security and strategic autonomy. Europe’s automotive and energy sectors will struggle to remain competitive if they are unable to access the latest battery technologies. The battery industry is expected to be a major contributor to the European Union’s (EU)
economy in the coming years. According to a report by the European Battery Alliance, by 2025, the EU’s battery market could be worth €250bn, creating up to four million jobs in the process.

The demand for batteries, particularly in the automotive industry, is skyrocketing, and Europe cannot afford to fall behind. Failure to establish a competitive battery industry could result in the loss of millions of jobs across the continent. This would be compounded by a deeper economic decline as Europe would lose its edge in all other adjacent industries, such as manufacturing and technology, where advanced batteries will be used. This could have a knock-on effect on jobs, investment, and innovation in these sectors, as well as on the wider European economy, potentially endangering the EU’s plan for a Just Transition.

**Fostering the right environment**

Calls are growing for the EU to allow for each country to foster an environment where highly specialised clean tech industries can be developed in line with each country’s strengths and potential for growth. Europe is home to a well-educated and highly skilled population; many European countries also have a long history of manufacturing and engineering excellence which is vital for the development of clean tech industries, which will require significant economic and scientific resources.

For example, Italy is a prime candidate for advanced industrial development in clean technologies, as a result of its historically strong industrial base. The country is home to a number of companies that specialise in advanced materials, electronics, and engineering. With adequate and targeted support from the EU, this expertise can be leveraged to develop and manufacture advanced batteries for a range of applications, from EVs to grid-scale energy storage.

Italy is also home to a number of world-class research institutions and universities, such as Politecnico di Milano, which are at the forefront of research in areas such as battery chemistry and materials science. These institutions can help partner with key industries to provide knowledge and expertise required to develop new, more efficient battery technologies.

Such initiatives will not only accelerate the development of advanced battery technologies and e-mobility solutions, but they will also create jobs and stimulate economic growth while delivering a clean and sustainable future.

Europe can start by providing fresh funds on par with the IRA delivered on a long-term basis. Providing funding and grants to research institutions and private companies working on battery and EV technology will deliver confidence to the European clean tech industry and set a tone for European ambition. Europe can capitalise on its place in the global battery race, but it must be ambitious, laser-focused and act now.

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*About the author: Lars Carlstrom is Chief Executive of Italvolt*
The pressure on businesses to decarbonise is mounting. In 2022 the UK Government unveiled a £200m (US$247m) programme to build the country’s zero-emission heavy-goods vehicle (HGV) fleet over three years. Alongside this, regulation is needed to drive further investment in public charging infrastructure across the UK to complement the private charging points which businesses will need to install at their depots. Data from Shell’s “Decarbonising Road Freight: Getting Into Gear” shows eight out of ten commercial road transport leaders believe there needs to be more well-designed regulatory incentives to achieve cost parity between conventional fuels and electrification solutions.

“It’s a challenging landscape, with businesses facing a range of barriers as they move to decarbonise their fleets,” says Chris Thornton, Commercial Road Transport Manager at Shell UK. “For example, it will take some time to change the way they operate, especially if fleets aren’t confident that they can access the infrastructure they need to refuel and recharge.” This is the case for 80% of sector leaders, who see insufficient access to fast battery charging and hydrogen refuelling stations as a limiting factor for their decarbonisation ambitions. Putting that infrastructure in place will take time, and Thornton suggests “businesses need to get moving.”

There is no one-size-fits-all solution for decarbonising the heavy-duty sector. Fleets are actively exploring a range of technologies, including battery electric, hydrogen fuel cells and hydrogen internal combustion engines (ICE). “Ultimately, the individual needs of each business will determine the alternative fuel solutions they move towards. Elements like fleet size, makeup and routing will all play a role in driving the decarbonisation decisions that fleet operators make,” notes Thornton. This is where data-driven solutions like telematics can help businesses to analyse their operations and identify the best route to reducing emissions while improving fleet efficiency.

He is also keen to point out that businesses will generally gravitate towards solutions they can rely on, and infrastructure is critical to that. “For fleets looking to electrify their vehicles, depot charging is an effective solution because businesses can be confident it meets their specific operational needs,” he says. That said, many will still need an expansive on-the-go network of...
EV charging points that enable drivers to refuel while out on the road. Thornton adds that “using fuel cards like the Shell Card, to access a robust on-the-go refuelling and EV charging network will also be vital in giving drivers easy, reliable access to a variety of mobility solutions.”

**Tailwinds**

Regardless of their decarbonisation path, zero-emission trucks must be commercially viable and must enter the fleet at scale by the late 2020s if the sector is to contribute to meeting the goals of the Paris Agreement. “There’s no waiting for tomorrow to get started,” Thornton tells *Automotive World*. “However, the changes we’re talking about will require major investment from businesses, so subsidies on infrastructure—even for private depots—will be vital. The timeframe for change also means we need to develop infrastructure in the smartest way possible. In the future, sharing charging facilities available at private depots between local transportation businesses will ensure charging solutions are available at scale for everyone. This could even help unlock new revenue streams for operators.”

Thornton also suggests that operators need to change their mindset around fully refuelling or charging trucks every time they plug in: “If they’re able to shift their focus on balancing capacity with their operational needs, they’ll find it easier to access
the EV charging infrastructure at their depots and on-the-go that’s right for them.”

New vehicle trials are an essential step at this point as well. Research by Imperial College London shows that fleet operators should be running new vehicle trials by 2025 with a view to driving low-carbon options and replacing their remaining heavy-duty fleet by 2035. “The sector will need to step up its research and development efforts to meet these timelines,” Thornton warns.

First-movers

While the HGV industry has historically proven a technology laggard, that could be changing. There is an opportunity for fleet operators to become first movers on electrification, provided they act quickly. “Real change will take time,” he emphasises. “When it comes to making that start though, fleet operators can only become first movers if there’s the ambition to do so in the wider business. The company must have an overarching ambition for fleet electrification with senior stakeholder buy-in and alignment. Otherwise, fleet operators will struggle to get the support and investment they’ll need for a successful EV transition.”

An important way for them to gain stakeholder support is to overcome some of the misconceptions around electric trucks. For example, concern around range anxiety can be alleviated through a process of analysing fleet operations. “Fleet managers need to consider how much battery power their EV trucks really need in a day based on their data - it’s often less than they expect,” Thornton observes. Fleet operators will also need to convince
the wider business that the numbers add up. This is where support with financing for hardware can be effective—something that a partner like Shell can provide—not to mention the wealth of operational data that can be gathered on fleet efficiency and decarbonisation using telematics.

For now, the sector remains in a ‘chicken and egg’ scenario. Someone needs to move so the others can follow, and OEMs need to meet the demand for EV trucks. “It’s easy to get hung up on what comes first between building infrastructure and improving alternative powertrain technologies,” Thornton says. Also, many businesses are reluctant to move first when there’s no guarantee it’ll give them a competitive advantage. UK government figures show that seven out of ten sector leaders describe the lack of demand for decarbonisation from the market and from customers as a major barrier to them.

The long-term view

At the end of the day, the benefits for cleaner fleets could be substantial. “By achieving their emission-reduction goals, operators can also attract ambitious customers that have committed to their own net-zero goals,” says Thornton.

Ultimately, no single organisation can deliver this transition alone. “We all need to work closely with strong partners that have the same goals—including government organisations, automakers and energy providers,” Thornton asserts. Working with experienced industry partners to realise the benefits of decarbonisation can help fleets tap into existing infrastructure and find tailored solutions for their specific business needs. He points to Shell’s acquisition of SBRS, geared at helping it grow in new segments, including the European e-truck charging market. The acquisition will enable Shell to offer more end-to-end charging solutions to business customers to electrify and decarbonise their fleets, from depot charging equipment, to charge point management and supplying cleaner energy.

Seven out of ten sector leaders describe the lack of demand for decarbonisation from the market and from customers as a major barrier to them.

For all fleets, Thornton drives home the importance of moving quickly. “Starting now means buying yourself enough time to move without rushing, learning and making improvements as you go, and building up confidence among your stakeholders including senior executives and drivers,” he adds. “The long-term view is also the way to look at spreading investments and reducing the total cost of ownership.”