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Solutions for your journey

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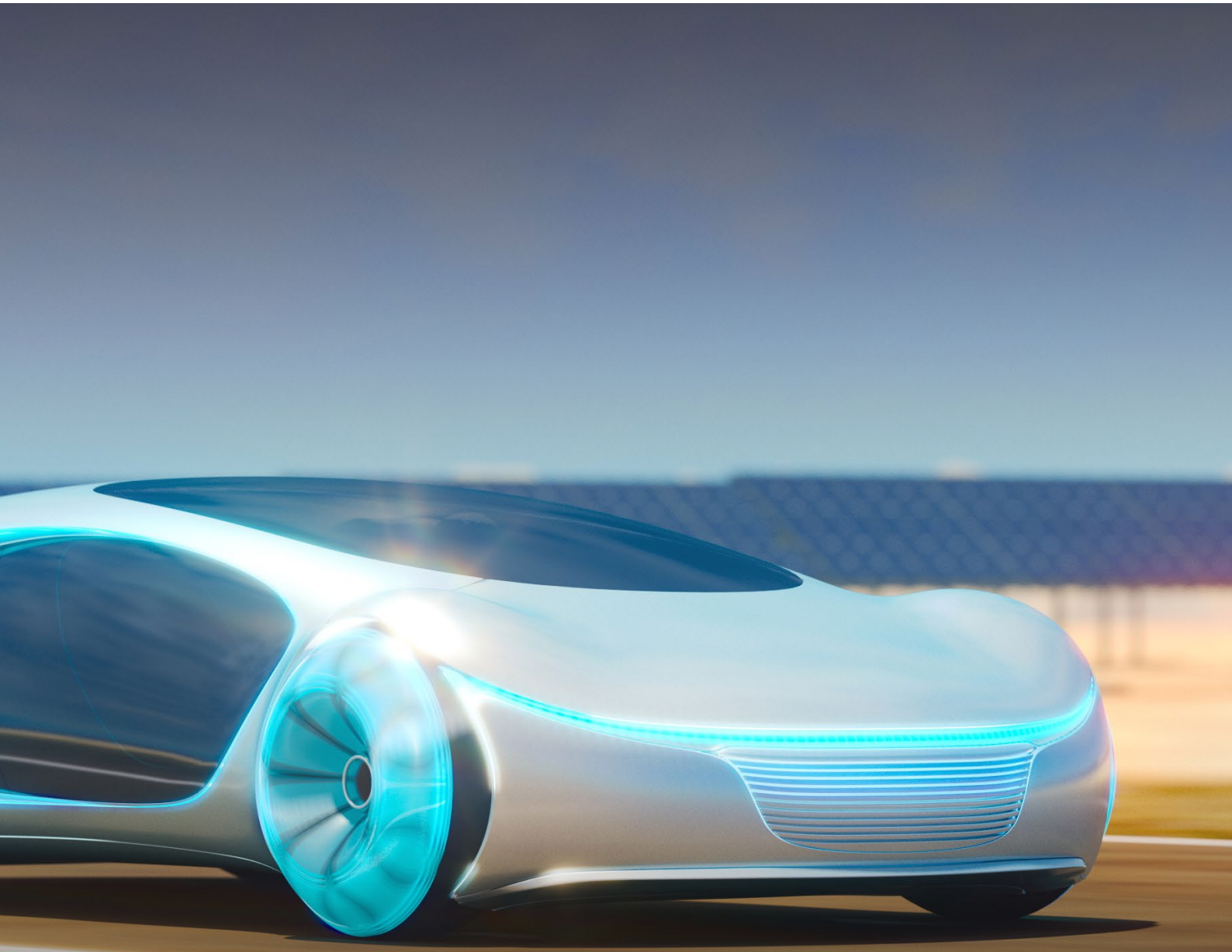


Eco-mobility reimagined

A guide to green vehicle trends beyond the electric powertrain

Introduction

The automotive industry is being forced to innovate.

Government regulations, heightened awareness around the environmental impact of road transport and new business opportunities presented by the green market have led to motor manufacturers and suppliers pursuing eco-friendly technical and design developments with a vengeance.

The following guide explores some of the hottest, green vehicle trends and the differences they may make to your fleet as we look to the future.

Harnessing the power of the sun

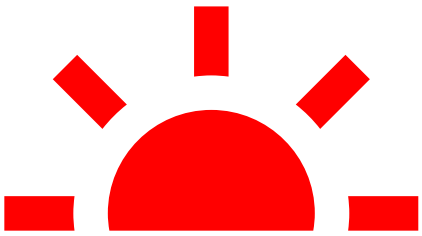
Solar-powered cars are no longer a flight of fancy, pioneering auto engineers are making them a reality.

These electric vehicles use photovoltaic cells to convert sunlight energy into electricity and their batteries can store solar energy, enabling them to run when there's a lack of direct sunlight. Bidirectional charging, meanwhile, opens up opportunities to transfer energy back to the grid, home or other vehicles.

And when it's too cloudy to charge them, there's no need to panic, they can be plugged-in like a conventional EV.

Innovative start-up Lightyear Motors has made particularly impressive strides in solar transport innovation.

Lightyear 0 (formerly the Lightyear One) – which can charge 32 kilometres of range per hour – was unveiled this year as the world's first production-ready solar car.



Solar-powered cars are no longer a flight of fancy

Bridgestone developed custom-engineered Turanza Eco tyres for the vehicle, combining its revolutionary lightweight ENLITEN and ologic technologies to help deliver a drag coefficient of just 0.19.

The tyres reduce weight by using fewer raw materials throughout the manufacturing process and cut rolling resistance through innovative treads, larger diameters, high inflation pressures and slim design.

Lightyear co-founder and CEO Lex Hoefsloot believes conventional electric cars ultimately "have a scaling problem".

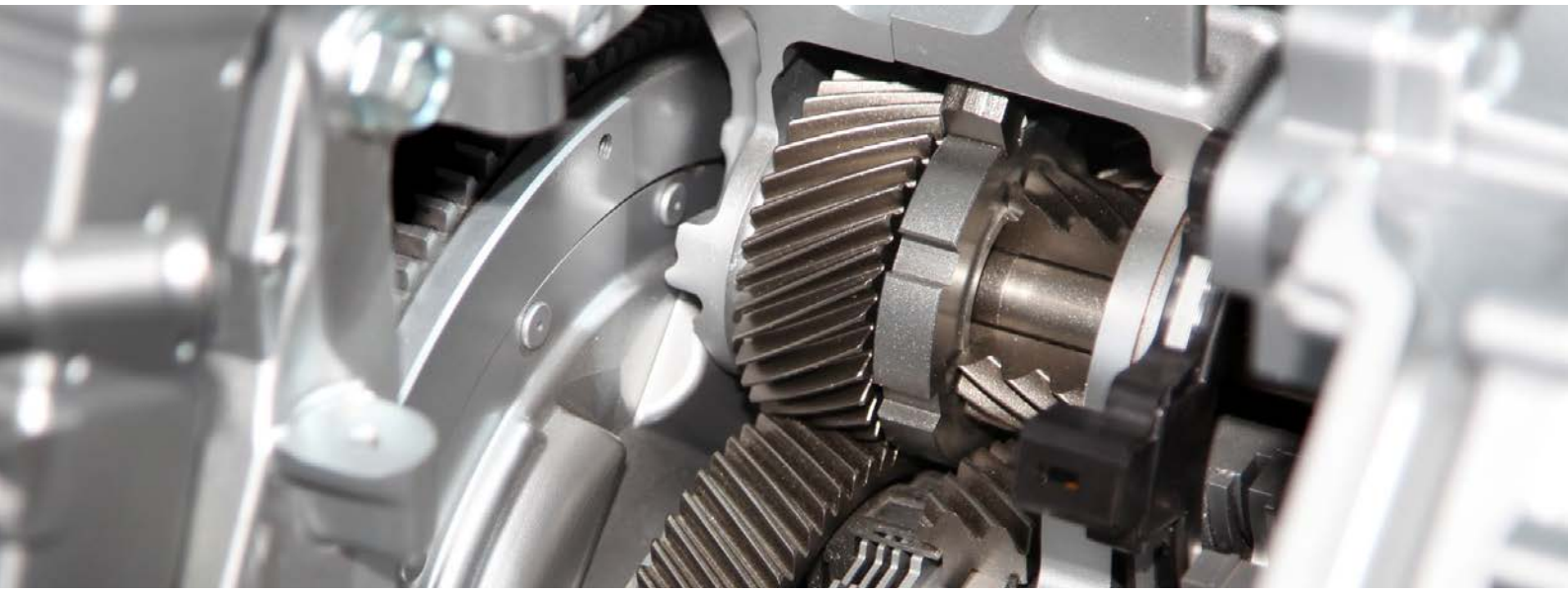
"There's no hiding from it, access to charging stations will not keep up with the demand for electric cars," he said. "To minimise plug-charging and maximise range, the industry's strategy, so far, has been to add batteries. This increases the carbon footprint of production and, in turn, boosts weight and the need for high-power charging stations.

"Lightyear 0 delivers more range with less battery, reducing weight and CO_2 emissions."

"There's no hiding from it, access to charging stations will not keep up with the demand for electric cars."

Lex Hoefsloot
Lightyear co-founder and CEO

Turanza Eco tyre



Tripping the light fantastic

The pressure on motor manufacturers to reduce emissions has seen their lightweighting ambitions intensify.

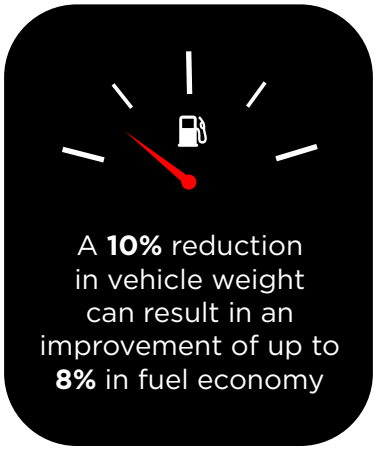
For a conventional vehicle, a 10 per cent reduction in vehicle weight can result in an improvement of up to eight per cent in fuel economy[1].

For the electric vehicle market, meanwhile, the use of lightweight materials can be critical to offsetting the weight of batteries and electric motors, improving efficiency and increasing range.

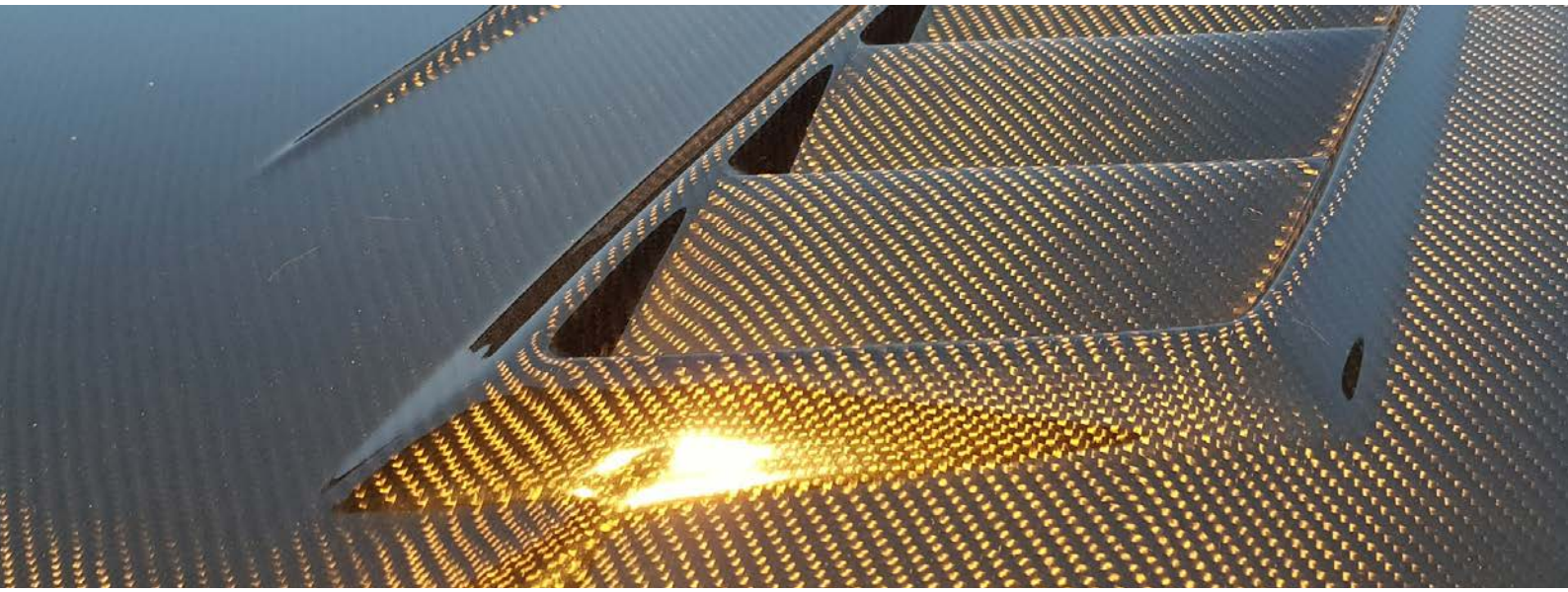
Consequently, more lightweight materials are being deployed than ever before – for body, chassis, powertrain and interior applications.

Notably, aluminium, which weighs around a third of steel per cubic foot, has become the metal of choice for a raft of EV auto parts. And building on knowledge and experience from the aerospace industry, composites – combinations of two or more materials with different physical and chemical properties – are also being explored.

Polymer composites have long been touted as a replacement for heavier metal components, and carbon fibre is already being used in premium cars from the likes of BMW and Porsche.



1 Lightweight Materials for Cars and Trucks, US Department of Energy



The high cost of manufacturing carbon fibre may have proved an obstacle to its widespread use, but scientists and engineers are now discovering innovative ways to overcome this problem. Researchers from Massachusetts Institute of Technology (MIT), and elsewhere, for example, have recently devised a process for making lightweight fibres from petroleum residue.

Where carbon fibre is enhanced with graphene – the smallest, strongest substance known to man, and 200 times stronger than steel – the performance improvements become even more exciting. Indeed, this material has already been deployed in the body panels of the Mono R supercar from BAC, contributing to a kerb weight of just 555kg.

Not only is graphene extremely light and strong, it offers high electrical conductivity, meaning exciting opportunities for future battery developments.

Also gaining traction are materials based on natural fibres.

Porsche, for example, has been using natural fibres for the doors and the rear wing of its 718 Cayman GT4 Clubsport MR, while Volvo is exploring natural fibre composites for its next generation of EVs.

Calculations have revealed that those used in the Volvo Cars Concept Recharge – **shown here** – are up to 50 per cent lighter than regular plastic parts.

Carbon fibre enhanced with graphene has already been deployed in the body panels of the Mono R supercar from BAC:

WATCH

The circular vehicle

The quality standards needed for automotive parts and materials has made recycling – key to lowering supply chain emission and end of life waste – a challenging task.

McKinsey estimates that by 2040, 60 per cent of auto industry emissions will come from the materials used in production[2].

But things are starting to change and the Circular Cars Initiative (CCI) was recently established by the World Economic Forum, the automotive industry and other stakeholders to put circularity and sustainability at the core of future car manufacturing.

When today's Audi A3 drivers get behind the wheel, little will they know their seat covers are made from recycled plastic bottles. Ford Bronco Sport drivers are unlikely to be aware that the SUV's wiring harness clips are made from discarded nylon fishing nets, while BMW i3 drivers may be surprised to learn that the car's door panel trims are made with Kenaf fibres, a renewable raw material harvested from malva plants.

Look down when you're sat in the new Range Rover and the floor mats you'll see are made with Econyl yarns, which use recycled industrial plastic, fabric offcuts and reclaimed ocean plastics.

All the while, Volkswagen has revealed its vision of the future with the ID. LIFE concept.

By 2040, 60% of auto industry emissions will come from the materials used in production

2 The zero-carbon car: Abating material emissions is next on the agenda, September 2020

The vehicle's bodywork uses wood chips as a natural colouring agent, along with a bio-based hardener. The air chamber textile for the roof and front cover is made from recycled PET (polyethylene terephthalate) bottles, while the microfleece upholstery used for the seats and door trims also comprise recycled materials.

The BMW i Vision Circular concept goes so far as to demonstrate how a car be made with 100 per cent recycled and recyclable materials.

As EV sales continue their upward trajectory, so will volumes of spent batteries. With the IEA forecasting that recycling could meet up to 12 per cent of the EV industry's demand for lithium, nickel, copper and cobalt[3] by 2040, plans are being unveiled for dedicated battery recycling facilities across the country.

At Bridgestone, we're contributing to the circular economy by targeting 100 per cent sustainable material usage by 2050.

Tyre retreading – a powerful example of automotive recycling and the circular economy – sits at the heart of Bridgestone's environmental commitment. Tyre retreading results in an 80 per cent reduction of CO_2 and other carbon emissions[4] and Bridgestone truck tyres feature retreading technology built into their original design.

Discover more about Bridgestone Bandag retread tyres **here**.

The company's investment in innovative recycling technologies has now seen it launch a joint R&D program aimed at developing chemical recycling technologies that utilise used tyres for high-yield production of isoprene, a raw material for synthetic rubber.

Synthetic rubber, typically manufactured from petroleum by-products, is currently one of the primary materials used for tyre production.

Discover more about the i Vision Circular:

WATCH

3 The Role of Critical World Energy Outlook Special Report Minerals in Clean Energy Transitions, March 2022 update

4 Source: Bipaver

Sustainability by design: from aerodynamics to rolling resistance

The science of aerodynamics is nothing new for the automotive industry.

Wind tunnels and flow simulation software to help calculate drag coefficients have become integral to modern vehicle design.

Combatting air resistance, however, has never been more important, with driving range on a single charge a core area of focus for today's EV market.

The design flexibility of EVs – with electric drivetrains comprising of electric motors that are smaller than internal combustion engines (ICE) and batteries that can be housed under rear seats or boot floors – has opened the door to new, exciting aerodynamic possibilities.

Although batteries still require airflow cooling, the conventional engine grille is also no longer needed.

Faced with a blank canvas, unconstrained designers have been rethinking their approach.

The sleek grille-less shape of Tesla Model 3, for example, enables airflow to be directed under the body, giving it a drag coefficient of just 0.23 and making it one of the most aerodynamic cars ever made.

Wind tunnels and flow simulation software to help calculate drag coefficients have become integral to modern vehicle design

Car headlights, such as those used for the likes of the Hyundai Ioniq 5 and Honda e, are becoming smaller, yet increasingly distinctive – the former made up of 256 small cubic pixel clusters, the latter an 'eye-like' design.

Thierry Metroz, DS Automobile's Design Director can foresee the day when lights are completely reimagined.

"Today, all cars are built in the same way, with a bonnet, a bumper and wings, and headlights positioned at the junction of these elements," he said. "In the future, we believe lights will be dematerialised and that the surface of the body itself will instead serve as the light source."

The DS X E-TENSE concept car comprises adjustable 'light curtains' which are built into the body and can change shape, colour and brightness.

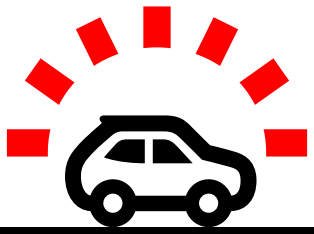
Vehicle tyres are also being engineered with ever greater precision to maximise efficiency and to reduce rolling and aerodynamic resistance.

Bridgestone's Ecopia H002 tyres, for example – employing the innovative NanoPro-Tech compound to reduce energy loss, alongside design details such as slim beads and buttresses – can help dramatically cut fuel consumption. For an average long-haul fleet, this equates to more than £180,000 a year[5].

Bridgestone's recently designed bespoke Turanza Eco tyres for the Mercedes-Benz VISION EQXX, meanwhile, have contributed to increasing the vehicle's efficiency and driving range to a real-world 1,000km – from Sindelfingen, Germany to Cassis, France – on a single charge.

As with the tyres engineered for Lightyear 0, they have been designed to enhance battery range, with a large diameter helping reduce rolling resistance, and a narrow tyre width reducing aerodynamic resistance.

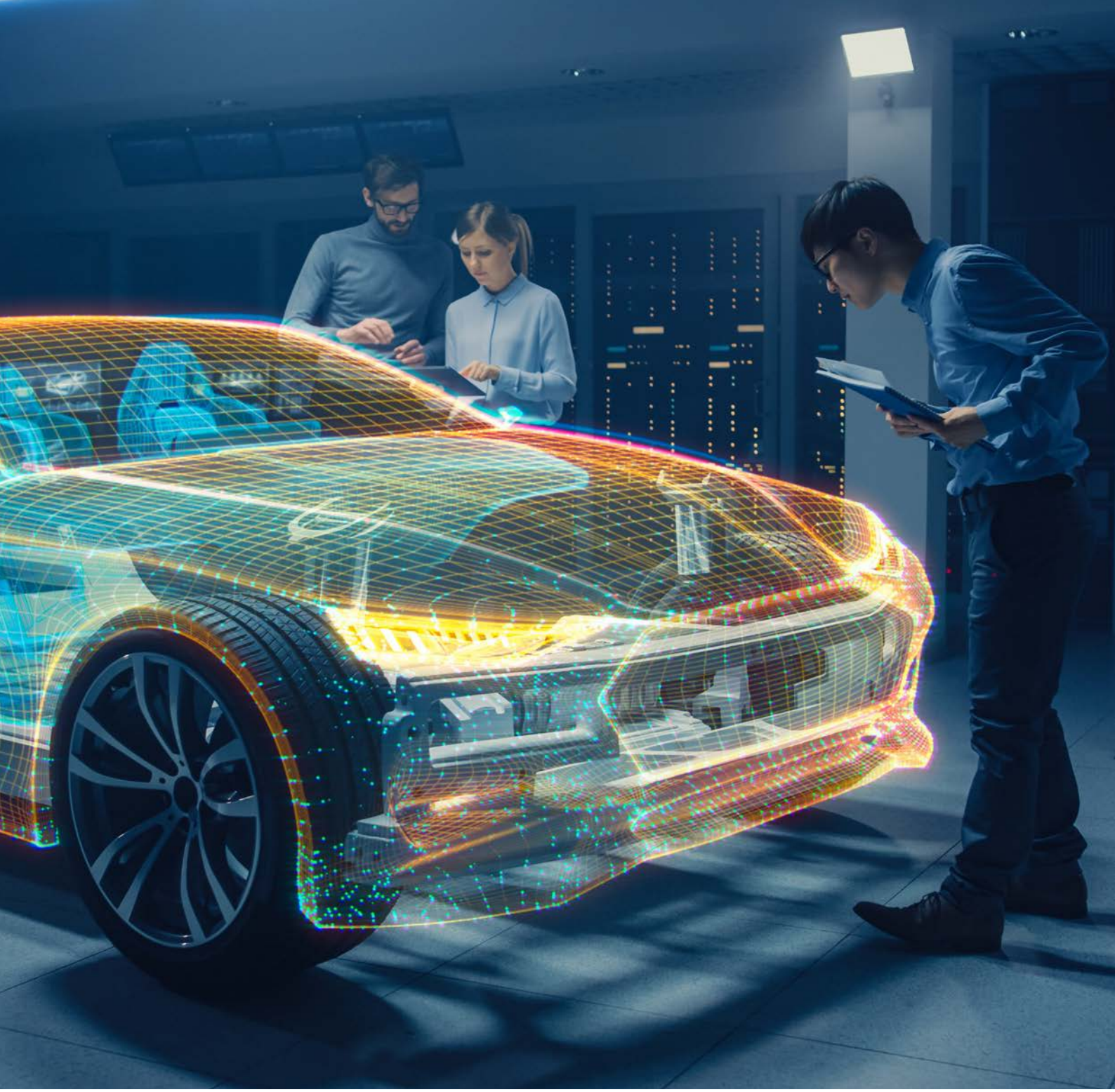
In collaboration with Mercedes-Benz, the tyre also comes with optimised sidewalls and a bead area design that match the covers mounted on the 20-inch wheels, further improving aerodynamics.



"In the future, we believe lights will be dematerialised and that the surface of the body itself will instead serve as the light source."

Thierry Metroz
DS Automobile's
Design Director

5 Based on calculations with the VECTO tool for a 4x2 tractor and trailer combination with ECOPIA H002 315/70R22.5 steer and drive and 385/55R22.5 trailer tyres compared with the same unit and under same conditions with previous generation ECOPIA H001 tyres. Financial savings and CO_2 reduction projected for an entire fleet based on following assumptions: fleet size of 150 tractors and 150 trailers, 130.000 km annual mileage per truck, diesel price €1.2/l. Please note that actual savings may vary as they depend heavily on other factors.



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Discover more about Bridgestone's sustainability journey **here**.

For information about how Webfleet can help your business decarbonise,

call **0208 822 3605** or visit **www.webfleet.com**