

ENVIRONMENT

“We need to start decoupling economic growth and natural resource consumption now”

How can today's batteries be used as mines for tomorrow's needs? Mercedes-Benz is addressing this question together with technology partners and scientists in a pilot factory that is currently being built in Kuppenheim in southern Germany. Manuel Michel, Head of Battery Recycling, reports on the most important tasks and explains why high-tech processes contribute to social sustainability.



Manuel Michel
Mercedes-Benz AG

Mr Michel, why is Mercedes-Benz investing a double-digit million sum in order to develop its own battery recycling capability?

The core aspect was to build a sustainable system according to the circular economy. In our pilot factory in Kuppenheim, we want to put our vision into practice. Not only will the energy supply be CO₂-neutral on the balance sheet, additionally we want to recover as many raw materials as possible from batteries without any loss of quality. With this ambition, we are going beyond the legal definition of recycling, which, for example, also includes the incineration of materials as thermal recycling. We will avoid downcycling and

produce recyclates with the highest possible degree of purity instead. In this high-tech facility, which is currently under construction, we will develop important know-how with experts from business and science. Through this facility, we will make an important contribution to the transformation of our Group.

Which challenges are we facing when it comes to battery recycling?

In certain areas, we are still in the early stages, such as the return and transport of batteries. One question we ask ourselves is how and by what means will the



Hydrometallurgical: Innovative mechanical process increases the recycling rate to more than 96 percent

batteries come to us? Then there is also the question of further optimising the recycling process. As an example, we work with a two-stage process that avoids incineration (see info box). This is where our partners come into play, because after all, we are experts in the development and production of vehicles, and less specialists in chemical processes in recycling. Another challenging question for us is how we need to develop and design future batteries in order to achieve optimal recyclability. And last but not least, it is a matter of reintroducing battery-capable secondary raw materials such as cobalt, nickel or lithium back into the supply chain in order to achieve full circularity. This may sound easier than it is, as raw material processing occurs at an early stage in the value chain.

Recycling also consumes resources. How much of an environmental advantage does it provide compared to the use of primary raw materials?

The answer is very complex and depends on many factors. The process itself plays a role, but of course, so does the specific composition of the battery and the origin of the primary raw materials. In various

lifecycle assessments, our colleagues from Corporate Environmental Protection have calculated that the CO₂ footprint of a battery made entirely from recycled materials is significantly smaller compared to a conventionally produced battery.

How do you evaluate battery recycling from a social perspective?

It is part of our social responsibility to conserve scarce resources and keep materials in the loop for as long as possible. Innovative recycling processes help in achieving this goal. They are a third important pillar alongside reprocessing and the longest possible reuse, for example in a stationary energy storage system. At present, we expect the relevance of battery recycling will increase especially from the 2030s onwards, when the vehicle batteries used today will be successively phased out. We must now begin with the development of corresponding processes in order to decouple economic growth and resource consumption more strongly.

How do you build up the expertise at the new location - do you primarily retrain employees for the new job profiles?

Yes, this works very well. As in the existing plants, we need production planners, process engineers and employees who can operate high-tech facilities. Even employees who have worked in transmission assembly for decades can be qualified for new job profiles with the help of targeted learning paths for dealing with battery technologies. The Mercedes-Benz Group offers corresponding opportunities with its Turn-2Learn training programme. In addition, colleagues from cross-functional areas such as human resources, maintenance and controlling also contribute. These jobs will continue to exist.

In the longer term, with battery recycling, you are building up a source of raw materials that will make you less dependent on volatile markets, but also on the mining of critical raw materials. What does this partial withdrawal mean for the people at the beginning of the supply chain?

This important question highlights the complexity of the transformation towards a fully electric future. Finding solutions for such changes can only be achieved through collaboration. A multitude of partners along the entire value chain and beyond must shoulder the responsibility and find ways for the transformation to succeed while ensuring that people along the value chain are included. Innovative concepts and pioneers who take the first steps in their respective areas of influence are very decisive factors in this regard.

The process

The basis of the new recycling factory is an innovative mechanical-hydrometallurgical process that completely avoids energy- and material-intensive combustion processes. Instead, the materials are mechanically disassembled. Subsequently, chemical compounds are broken down to recover especially the valuable components of the battery cell as pure sorted metals. The patented recycling process currently achieves a recovery rate of at least 96 percent to be further increased by 2025 together with technology partners.

Manuel Michel

has worked intensively on the circular economy and recycling of lithium-ion battery systems since 2019. He is responsible for the pilot plant in Kuppenheim within Mercedes-Benz Group AG. As an industrial and mechanical engineer, he was previously responsible for the optimisation of combustion engines in Research & Development at Mercedes-Benz.

“Leaving no one behind sounds like a simple thing. Actually, it's not”

The G20 members, first and foremost China, the USA, and the EU, have an important role to play in achieving global sustainability goals. What contribution are they currently making and what challenges are associated with the transformation to a climate-neutral society? Sustainability expert Changhua Wu talks about refined ESG strategies, approaches to address social inequality and the power of connectivity.



Changhua Wu
Expert for Climate Protection Transformation Processes

After the world economy recovered from the effects of the Corona pandemic in 2021, global CO₂ emissions rose to a new record high. What governmental levers of action do you observe to reverse this trend?

There are a few dimensions to look at. Leading economies use the climate change agenda for competition decoupling. That is unfortunate, as we need to work with each other to achieve the committed climate targets by 2030 and reduce emissions by 43 percent over the 2019 levels. Without a closer collaboration between the largest economies, we will not be able to deliver.

Even though some economies are competing against each other, they share many similarities in how to advance the agendas. One example, the U.S., with the Inflation

Reduction Act, that is quite similar to the industrial policy from China. On the other hand, China has been looking very closely at the EU practice. So, it's an interesting dynamic amongst the major economies, especially.

As a third perspective, I would like to mention China's journey to address climate change during the last three decades. In China, we started from fossil fuels and then moved towards renewable energies in a rather isolated way of thinking, solely focussing on the clean energy transition. Nowadays, China has managed to step into a more systematic way of looking at the sustainability landscape. Of course, we need to address the decarbonisation of the energy systems, but we also need to look at resources, material usage and the industries. I think, that's where the government of China gets it right, they are using those levers of action and deliver the outcomes.



China's rapid economic growth has also highlighted the importance of the goal of a circular economy.

What role does circular economy play in the Chinese automotive and supplier industry?

Due to the rapid economic growth, China has felt the constraints that come with the lack of resources. Therefore, moving towards a circular economy is an important part of the national transition. The government has even set recycling targets in tonnages, not percentages, to be reached by 2025.

For the Chinese automotive supplier industry, the circular economy is not a new concept. Now, as the first generation of battery electric vehicles (BEV) is retiring, their focus is on batteries. So, while cities are moving towards 100 percent BEV, there is already a market and an organic development of demand and supply. Of course, companies continue to use mined materials. However, mainstream players have already recognized that the circular economy is going to play a critical role, particularly around the battery materials. In the future, maybe not yet by the end of this decade, 95 percent of the battery materials could be met by circularity and recycled materials. And this is going to be shifting the dynamics of the resources dramatically.

How can partnerships within the automotive supply chain be used to advance global sustainability goals for a mutual benefit?

If there is a common ground around ESG topics, cooperation becomes a win-win scenario. All those leading companies within the green mobility landscape should join forces to accelerate the progress towards zero

carbon and challenge those market players that are still relying on fossil fuels. Of course, there are obstacles, especially for Chinese companies in the supply chain. On the one hand, they are leading players, for instance in metals processing and in manufacturing battery cells. That's the strength, Chinese industries have already built up. On the other hand, from what I observe, until recently, there was no adequate attention paid to sustainability, both from an environmental and a social perspective. So, for Mercedes-Benz actually, I'm delighted to see the company has its principles and ambitious goals. It shows a systematic approach to electromobility and is proactively working with the companies along the supply chain to overcome those issues, promoting innovative ways and alternatives. So, collaboration sounds wonderful, but it's complex. However, I see the trends unfolding there.

To address the social consequences of the transformation and to leave no one behind, the EU established the "Just Transition Mechanism". Do you see similar efforts in China and the USA?

Politically, that's pretty much a shared vision. However, considering the federal constitution of the U.S. or the EU with its 27 member states, the implementation is complex. In my observation, comparatively speaking, the Chinese political system is facing less barriers in terms of the nationalised endeavour to address a particular challenge in the transition contest.

How do you evaluate the current efforts to make sure, no one is left behind?

It's hard to draw a clear conclusion at this moment. My general impression is that social challenges are increasing, with more and more people expressing their dissatisfaction. Leaving no one behind sounds like a simple thing. Actually, it's not. It's pretty much connected with a lot of things. It's not only about financial compensation and upskilling workers. Basically, we have to deal with some typical mechanisms of industrialisation. On a national level, the industrialisation is driven by cheap labour and low environmental constraints. The emerging economy becomes, globally speaking, the workshop for states that would have to



Battery production at Beijing Benz Automotive Co. Ltd. (BBAC) in Beijing

buy labour more expensively in their own country. But at a certain point in the economic growth process, the industrialisation part gets more sophisticated in terms of technology, value chains, etc. Low-end manufacturing moves away to other parts of the world. Considering the bigger picture of the transition, it leaves a lot of people behind. It's an ongoing transition, and policymakers have so far failed to take enough actions to make sure no one is left behind.

What concrete action do you expect from a global company like Mercedes-Benz in terms of a just transition?

I see that the company is continuously sharpening its activities of sustainability by lifting its goals and targets. It is putting a lot of efforts in the transition from combustion engines to 100 percent electric vehicles, especially regarding their own workforce and in alignment with German policymakers to leave no one behind. In this respect, the company is meeting my expectations. By saying this, I also see some challenges knocking at the door. When it comes down to the value chain, when you go beyond Germany and the EU markets, it's important to keep up the fair transition agenda and try to

collaborate on this with local decision makers and partners along the supply chain. That's where I would like to see even more clarity of the company down the road.

What gives you hope that the global community will overcome the hurdles on the way into a more sustainable future?

First, it's an ongoing effort. All countries need to thrive for a more just and inclusive society. We need people's awareness and behavioural changes as well



In order to be successful as a company in a digital and electric future, employees must be comprehensively qualified.

to overcome these barriers. So, to really get each individual on board, we should use tools that have the power to make everyone act in sync together. The responsible use of social media is a great possibility to be connected and to raise awareness. And there are some good examples, in which companies use this power to raise awareness for sustainability issues, and to organise change. For instance, there are some effective initiatives around plastic collection. It may sound like a tiny thing, but it's a step forward. And once, it reaches enough people, it can become a fashion. I believe that many of these actions aimed at making the world more just and inclusive will end up creating a new reality.

Changhua Wu

is a policy advisor, analyst and climate change transformation strategist specialising in China. She currently holds the position of China Director at TIR Consulting, whose president is the economist Jeremy Rifkin, and is also Chief Strategist at CN Innovation and CEO of The Future Innovation Center Beijing. Changhua Wu is member of the Advisory Board for Integrity and Sustainability at Mercedes-Benz Group. She has master's degrees in journalism, environmental policy and economics from universities in China and the United States.

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This Sustainability Report also includes the content audited in the Non-Financial Declaration. The relevant passages in this Sustainability Report are marked in blue font colour in the continuous text. Audited graphs and tables are also referenced accordingly via footnotes. Unless explicitly noted, this content was audited with reasonable assurance. Unless marked with footnotes, graphs and tables have not undergone external audit, regardless of the colors used.



Climate protection

Materiality and goals

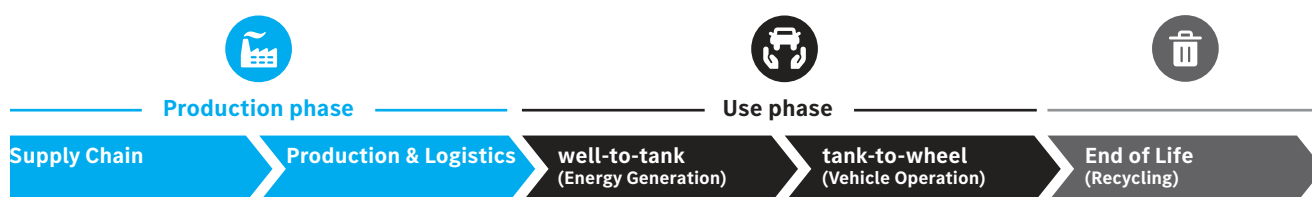
GRI 3-3

Targets	Target horizon	Status as of 2022
Climate protection in vehicles and services		
Mercedes-Benz offers battery-electric vehicles (BEVs) in all segments where the brand is represented	2022	13 models
Increase the share of plug-in hybrids and all-electric vehicles to up to 50% ¹	By mid-decade	Cars 16% Vans 4%
All new vehicle architectures are electric	2025	According to plan
There is an all-electric alternative for every model offered by Mercedes-Benz	2025	According to plan
Mercedes-Benz is all-electric — wherever market conditions allow	By the end of the decade	According to plan
Reduction of the CO ₂ emissions per car in the new vehicle fleet by at least 50% along all stages of the value chain ²	By the end of the decade	According to plan
A fleet of new Mercedes-Benz vehicles that are CO ₂ -neutral on the balance sheet along all stages of the value chain	2039	According to plan
Climate protection in the supply chain		
Mercedes-Benz plans to procure only balance sheet carbon-neutral production materials	2039	86% of suppliers ³
Climate protection in production		
CO ₂ -neutral on the balance sheet production in company-owned Mercedes-Benz production plants worldwide	2022	Achieved
Reduce CO ₂ emissions in the Mercedes-Benz plants (Scope 1 and 2) by 50% ⁴	2030	Achieved
Increase the share of the energy requirement in own Mercedes-Benz production plants which is met through renewable energies: – Cars 70% – Vans 80%	2030	According to plan
¹ When market conditions allow. ² Compared to 2020, based on the entire value chain. ³ Measured on the basis of the annual procurement volume and assured by signature. ⁴ Compared to 2018.		

As a player in the transport sector, the Mercedes-Benz Group supports the Paris Climate Agreement: It is convinced of the objectives of the agreement. About one fifth of all greenhouse gas emissions in Europe are produced as a result of the transport of people and goods on streets and roads. The Mercedes-Benz Group is taking deliberate measures to counteract this trend and has made climate change mitigation a core element of its business strategy. The Group's ambition is to make the entire Mercedes-Benz new vehicle fleet CO₂-neutral on the balance sheet across all stages of the value chain by 2039.

In order to achieve this goal, the Mercedes-Benz Group is transforming the products and services that are at the heart of its business activities. The company also takes into account climate change mitigation in all of the life cycle phases of its automobiles — from the supply chain and its own manufacturing operations to the use and disposal of the vehicles. The Mercedes-Benz Group sets itself ambitious targets for CO₂ reduction in the individual phases and systematically analyses the resulting CO₂ emissions and other environmental impacts along its entire value chain.

CO₂ neutrality on the balance sheet along the value chain



The company's goal is to cut by at least half the CO₂ emissions per passenger car along the entire value chain by the end of this decade, compared to 2020. The goal of reducing the CO₂ emissions of the Mercedes-Benz new car fleet by 40% compared to 2018 in relation to the use phase (🔗 [well-to-wheel](#)) has been confirmed by the 🔗 [Science Based Targets initiative \(SBTi\)](#).

The most important levers for this are electrification of the vehicle fleet, charging with green electricity, improving the battery technology, the 🔗 [decarbonisation](#) of the supply chain and extensive use of renewable energies in production.

The Mercedes-Benz Group confirmed its corporate goal of improving the framework conditions for decarbonising the economy and society worldwide by joining the initiatives 🔗 [“The Climate Pledge”](#) and 🔗 [“Transform to Net Zero”](#) in 2020.

The Mercedes-Benz Group uses various future scenarios to assess the robustness of its climate-related activities and the associated risks and opportunities. In doing so, it distinguishes between different types of risks when identifying climate-related risks within the scope of a

scenario analysis: transitory climate risks are related to the transition to a low-carbon economy and result from changes in political parameters, technological developments and changing markets. To obtain a well-founded basis for its analyses, the Mercedes-Benz Group examines generally recognised scenarios such as the 🔗 [“Net Zero Emissions by 2050 Scenario” \(NZE\)](#) and the “Sustainable Development Scenario” (SDS) of the 🔗 [International Energy Agency \(IEA\)](#). The scenarios are analysed, broken down and used as a reference for comparison with company-specific reduction paths, among other things.

Moreover, it is important for the Mercedes-Benz Group to know the long-term physical climate risks to its business operations. This refers to the impact of risks associated with the increasing intensity of extreme weather events as well as changes in climatic conditions – for example storms, floods, heavy precipitation and temperature rises. As a global company, the Mercedes-Benz Group has locations all over the world. In addition to assessing current threats from extreme weather events, long-term developments are also analysed and prioritised on the basis of different scenarios, including the 🔗 [IPCC SSP5-8.5 scenario](#).

Climate protection in vehicles and services

Strategy and concepts

All-electric future

GRI 2-23

The Mercedes-Benz Group believes that the complete electrification of its product range is the most important lever for making its entire new vehicle fleet CO₂-neutral on the balance sheet across all stages of the value chain by 2039. By the end of this decade, the Mercedes-Benz Group wants to be all-electric wherever market conditions allow. The strategic step to “Electric only” will accelerate the transformation of Mercedes-Benz to an all-electric and software-driven future.

However, CO₂ emissions are not only produced during the manufacture of components for purely battery-electric vehicles, but also during the generation of the charging current. Against this background, the “Green Charging” initiative is a further step on the road to CO₂-neutral on the balance sheet mobility: with this, the Mercedes-Benz Group enables its customers to charge their vehicles with green electricity. Through the use of certificates of origin, it is ensured that an equivalent amount of electricity from renewable sources is fed into the power grid for the charging processes.

➤ [Green charging with Mercedes me Charge](#)

As early as November 2021, the Mercedes-Benz Group underscored its commitment to this transformation during the COP26 UN Climate Change Conference.

In the 🌐 “[COP26 declaration on accelerating the transition to 100% zero-emission cars and vans](#)”, the Mercedes-Benz Group undertakes to work together with other companies, cities and governments to achieve CO₂-neutral transport for the future. The company is convinced that the electrification of vehicles will be instrumental in accelerating the transformation.

With “Ambition 2039”, the Mercedes-Benz Group not only wants to contribute to an on the balance sheet climate-neutral world – the group also wants to inspire

its customers to welcome this on the balance sheet climate-neutral future. For many of them, it is important that products they use do not cause any damage to the environment and that to achieve this they do not have to make any compromises in their everyday lives. With its product range, the company aims to meet both customer demands.

Regulatory framework for CO₂-neutral road traffic

GRI 3-3

For Mercedes-Benz Cars and Mercedes-Benz Vans, there are legal regulations covering binding targets for the average fleet consumption and CO₂ emissions for new vehicle fleets. The high-volume markets in China, Europe and the USA are particularly regulated. However, such fleet regulations should not be seen as stand-alone solutions. Instead, they are an important part of a broader regulatory environment, because of the following general rule: effective and ambitious fleet regulations must be complemented by coherent policy measures such as promoting the development of the charging infrastructure and the expansion of renewable energies. In addition, other framework conditions such as fiscal and non-fiscal incentives are needed in order to ensure that mobility remains affordable. The Mercedes-Benz Group therefore strongly favours a political and regulatory framework that accelerates the transition to CO₂-neutral mobility. This also includes gradually integrating the transport sector into the emissions trading.

Environmental aspects in product development

GRI 3-3

The Mercedes-Benz Group has set itself the goal of developing products that are especially environmentally friendly and energy-efficient in their respective market segments. The company’s own environmental and energy guidelines define how it intends to achieve this goal. The Mercedes-Benz Group sets itself clear targets and has defined corresponding metrics which

indicate how successful it is in achieving them. This applies to every series and to every individual product. Product development plays a key role in this regard: the impact of a vehicle on the environment – and thus what CO₂ emissions it causes – is largely determined in the early stages of development. The earlier the company takes environmental aspects into account, the more efficiently it can reduce the ecological impact of its vehicles.

Responsibilities and data transparency

GRI 2-24

An interdisciplinary team of environmental experts and specialists in procurement, development, logistics, production, strategy and sales is working at the Mercedes-Benz Group to make the company's fleet of new cars CO₂-neutral on the balance sheet by 2039. It monitors CO₂ emissions and controls reduction measures.

First, this concerns the CO₂ emissions when driving – the so-called [🔗 tank-to-wheel](#) emissions. Since 2008, the Product Strategy CO₂ unit has ensured that ambitious consumption and portfolio measures are implemented in good time and to best economic effect. One of the major milestones for this was electrification of the passenger car fleet in order to achieve the demanding EU fleet targets in 2020.

The Board of Management of the Mercedes-Benz Group AG is responsible for setting strategic goals, including targets for reducing the CO₂ emissions, and for monitoring the progress made in achieving these goals. The Product Steering Board (PSB) is responsible for the car fleet. This body monitors the development of the CO₂ emissions of the car fleet in markets in which such emissions are regulated. It is also responsible for providing forecasts. In its evaluations, the PSB takes into account a variety of factors, including the increasing degree of vehicle electrification and the changes that have been made to legal requirements, for example those related to the introduction of the [🔗 WLTP](#) certification procedure. The PSB is assigned to the Committee for Model Policy and Product Planning (AMP). The Product Strategy unit ensures compliance with the CO₂ fleet emission limits for vans and reports on this regularly to the Van Executive Committee. The Committee for Model Policy and Product Planning and the Van Executive Committee both inform the Board of Management of Mercedes-Benz Group AG. The Board

of Management then decides which measures need to be implemented. On the market side of the equation, price and volume control measures can also affect our ability to achieve our CO₂ targets over the short term. For this reason, such measures are also discussed with the Board of Management within the framework of regular reporting on the current state of [🔗 CO₂ fleet compliance](#).

The responsibility for ensuring that the climate protection targets are implemented is distributed across several corporate units and Board of Management members: the development units of the vehicle divisions are responsible at the vehicle level. For cars and vans, these are the “Drive Systems Product Group” development unit, the product groups of the vehicles and Mercedes-Benz Vans Development. In each current year, the sales unit manages the achievement of the CO₂ target. At the level of the production plants and the company's own-retail outlets, the respective Board of Management member for Mercedes-Benz Cars and Mercedes-Benz Vans is responsible. Mercedes-Benz Group AG monitors the implementation at Group management level.

“Ambition 2039” also relates to all other CO₂ emissions that occur in the life cycle of a vehicle. For example, the Environmental Protection unit calculates the CO₂ emissions of all model series and drive systems at Mercedes-Benz Cars and Mercedes-Benz Vans. To obtain an overview of the emissions, the company produces environmental and ecological balance sheets for the entire life cycle of vehicles. The company's procurement departments work with around 2000 direct suppliers to make the supply chain CO₂-neutral on the balance sheet as well. The logistics experts address emissions from the supply of goods, distribution and delivery to distribution centres. Their goal is to avoid shipments as much as possible and to optimise routes and transport systems. The teams also apply additional measures for achieving CO₂ neutrality on the balance sheet in areas like production and customer-specific charging concepts.

To enable comprehensive recording and control of the CO₂ contribution of the individual units, data transparency over the entire life cycle is the key factor: for this purpose, the Mercedes-Benz Group has developed an internal monitoring tool for CO₂ calculation. This makes it possible to track the

progress with regard to CO₂ targets down to model series level and, for the first time, to present climate-relevant emissions down to the last nut and bolt. At the same time, the fleet level can also be analysed. The CO₂ monitoring tool maps two central perspectives on the company's climate protection activities: firstly, the strategic view of management and investors; this looks at the annual development of CO₂ emissions of all vehicles sold and shows whether the company is on target. Secondly, the detailed view of the design engineers and procurement personnel within the model series support function; with the help of this tool, they can ascertain what emissions are currently attributable to the battery of an EQS, and by what percentage this value must be reduced with regard to the company's own CO₂ targets.

CO₂ emissions along the entire value chain

GRI 305-1/-2/-3

To evaluate how environmentally compatible a vehicle is, the Mercedes-Benz Group conducts ecological assessments: the company systematically analyses the generated CO₂ emissions and other environmental impacts along the entire value chain of a vehicle – from raw material extraction through production and use to recycling. Among other things, these analyses have shown that as more and more vehicles are electrified, the focus is shifting towards other factors such as production of the high-voltage battery and generation of the electricity for charging the battery. Since the launch of the EQS, battery cells have been produced with electricity that is CO₂-neutral on the balance sheet, while the Group continues to drive forward efforts to promote battery charging with electricity from sustainable sources.

[➤ Life cycle assessment of the EQE 350+](#)

The Mercedes-Benz Group collates and publishes the key figures for the CO₂ emissions on corporate level based on the [Greenhouse Gas \(GHG\) Protocol](#) framework.

The Mercedes-Benz Group differentiates its greenhouse gas emissions according to three categories – the so-called Greenhouse Gas Scopes. Scope 1 includes all emissions that the company itself produces when it burns energy media at its production sites – for example, when it generates electricity and heat in the company's own power plants. Scope 2 includes all

emissions caused by external providers from whom energy is purchased in forms such as electricity and district heating. Scope 3 includes all the emissions that are generated before (upstream of) or after (downstream of) business operations. For example, Scope 3 includes the CO₂ emissions that arise in the supply chain (purchased goods and services), through the vehicles' operation in customers' hands (the use phase, including the production of fuel and electricity), and in the recycling phase of the vehicles.

The GHG Protocol specifies a total of 15 categories of Scope 3 emissions. The emissions are determined on the basis of comprehensive methodological considerations and complex calculations. The reported Scope 3 categories are selected after a review of relevance and data availability. At 78%, the majority of the Scope 3 emissions reported for the Mercedes-Benz Group occur in the utilisation phase, in other words during fuel and electricity production ([well-to-tank](#)) and the operation of its products (tank-to-wheel). Around 17% of indirect Scope 3 emissions are attributable to the supply chains that provide the company with goods and services.

The company determines the CO₂ emissions in the utilisation phase of Mercedes-Benz vehicles on the basis of its worldwide sales figures and the average, standardised CO₂ fleet value. An annual mileage of 20,000 km is assumed for each vehicle, for an assumed usage period of ten years. In total, the mileage therefore amounts to 200,000 km per vehicle.

[➤ Scope 1, 2 and selected Scope 3 CO₂ emissions in t per vehicle Mercedes-Benz Cars 2022](#)

[➤ Scope 1, 2 and 3 emissions worldwide Mercedes-Benz Cars](#)

Measures

An all-electric product range

The Mercedes-Benz Group's goal is to accelerate the pace of expansion of its range of electric vehicles. Its commitment to research and development work is correspondingly great. Altogether, the Mercedes-Benz Group wants to invest more than €60 billion between 2022 and 2026 for the transformation towards an all-electric and software-driven future.

The Mercedes-Benz Group is convinced that the transformation of road transport will lead to the complete electrification of vehicles. However, there are still obstacles to be overcome that require efforts on the part of the business community: for example, the charging infrastructure must not be allowed to lag behind the demand. The growth rate of renewable energies may also be too slow. Moreover, the workforce must be trained in new software and drive technologies. Although all newly introduced vehicle architectures will be purely electric from 2025, [plug-in hybrids](#) and low-emission combustion engines still play an essential role and remain indispensable as a bridging technology.

EQ models: Future-oriented and battery-electric

Since 2018, Mercedes-Benz AG has been offering battery electric vehicles under the Mercedes-EQ brand. It is continuously expanding this brand's portfolio through the addition of more models. During the reporting year, Mercedes-Benz reached an important strategic milestone and now offers an all-electric alternative for every segment in which Mercedes-Benz is active — i.e. the EQA and EQB for the compact segment, the EQC for the midrange segment and the EQE and EQS for the premium segment. In August 2022, the all-electric model range was expanded to include the EQS SUV. This was followed in mid-2022 by the staggered global market launch of the EQE business saloon. The EQE 350 (WLTP: combined electrical consumption: 18.8–16.0 kWh/100 km; combined CO₂ emissions: 0 g/km) has an output of up to 300 kW and a range¹ of up to 645 km (according to WLTP).

In addition, the company also reached another milestone with the market launch of the EQE SUV in October 2022: the modular drive concept enables the EQE SUV to offer a wide range of maximum total outputs from 215 to 300 kW. Depending on the vehicle equipment and configuration, the European vehicles achieve [WLTP](#) ranges¹ of up to 590 km.

Plug-in hybrids

[Plug-in hybrids are an important transitional technology on the road to an all-electric future.](#) Mercedes-Benz Cars offers an efficient drive-system package for this purpose: since 2021, customers have been able to choose between more than 20 model variants. This combination of an electric drive system and a combustion engine enables locally emission-free driving. The drive system, which consists of an electric motor and a high-voltage battery, can make all-electric operating ranges possible that are sufficient for most daily trips. In the compact segment, ranges of over 70 km ([WLTP-TML](#)), in the luxury segment sometimes over 100 km (WLTP-TML) are possible. Mercedes-Benz offers this technology for the entire vehicle portfolio – from the A- to the S-Class, from the GLA to the GLE.

Efficient vehicle concept

Efficient driving and charging reduces the life-cycle CO₂ footprint – and is therefore a key lever for achieving the climate protection targets of the Mercedes-Benz Group. For this reason, the company focuses right from the early development phase on making all its vehicle concepts energy-efficient and takes all relevant areas into account: aerodynamics, powertrain, rolling resistance, weight, thermal management and onboard power network.

It strives to achieve what is technically possible in the premium segment and consistently takes actual customer operation as a benchmark. With the VISION EQXX concept car, Mercedes-Benz provides a preview of what will be possible in the future in terms of efficiency and electric range. On its first journey in April 2022, the vehicle covered over 1000 km in real everyday traffic on a single battery charge. The drive took place with a sealed charging socket and was accompanied by an independent expert from TÜV SÜD. The technical findings are being incorporated into the series development. The EQS also enables energy-efficient driving with a [C_d value](#) of 0.20 – especially at higher speeds.

¹ Electric energy consumption and range were determined on the basis of Regulation (EU) 2017/1151

Mercedes-Benz Vans

Mercedes-Benz Vans is also setting the course for an all-electric future: Mercedes-Benz Vans is developing a fundamentally new, modular and purely electric vehicle architecture for this purpose, under the name VAN.EA. This means that from 2025, all newly developed vans will be exclusively electric.

Mercedes-Benz is convinced of the ecological and economic advantages of all-electric vans and has firmly anchored its claim to leadership in electric mobility in its strategy. As a result, all of its model series are to be systematically electrified. Even today, body manufacturers and customers can already choose from a number of battery electric vans for both commercial and private use. These include the eVito panel van and eVito Tourer, the eSprinter and the EQV. From 2023, it is planned that they will be joined by the eCitan and EQT (WLTP: combined electrical consumption: 18.99 kWh/100 km; combined CO₂ emissions: 0 g/km).²

The new eSprinter

Mercedes-Benz Vans is also consistently implementing its strategy with the new eSprinter, underlining its claim to “Lead in Electric Drive”. The features of this model series were defined in close collaboration with the customers: three battery and several body variants – from panel vans to chassis for box bodies – will enable the new eSprinter to penetrate into new customer segments and markets, including the USA and Canada. Depending on the configuration, the range can be extended to more than twice that of the current eSprinter. Production is scheduled to ramp up in stages in Charleston (South Carolina/USA), Düsseldorf and Ludwigsfelde (Germany), beginning in the second half of 2023. Mercedes-Benz AG has invested around €350 million in the new eSprinter, which is to be produced in a CO₂-neutral on the balance sheet manner.

Sustainability and climate protection in urban delivery transport

Just how ecological a van can be is demonstrated by the Mercedes-Benz Vans business unit with its SUSTAINEEER technology platform: based on a Mercedes-Benz eSprinter, SUSTAINEEER combines many innovations that improve the quality of life in cities, protect the climate and the environment and enhance the safety and health of drivers and other road users. Among other things, the all-electric van has a roof-mounted solar panel that generates green electricity for the vehicle. The SUSTAINEEER is equipped with intelligent software and communication solutions that allow efficient route planning in real time. This reduces not only the distances driven, but also the energy consumption.


➤ Resource conservation

Charging infrastructure and digital charging services

GRI 203-1


The Mercedes-Benz Group has set itself the goal of contributing to the electrification of individual mobility worldwide. In the Mercedes-Benz Cars and Mercedes-Benz Vans divisions, the company is therefore continuously working on private and commercial charging solutions for the home, the workplace and public spaces. The ultimate goal is to offer customers the best charging experience in the industry in terms of reliability, convenience, sustainability and value retention.

Green charging with Mercedes me Charge

To offer its customers convenient and green charging, the Mercedes-Benz Group relies on a strong  digital ecosystem including vehicle integration and innovative partnerships.

The Mercedes me Charge digital charging service offers the company's customers access to one of the largest charging networks in the world. Mercedes me Charge is growing. At the end of 2022, more than 1,000,000 AC and DC charging points had been integrated around the world, including more than 350,000 in Europe. In Europe alone, there are over 850 different operators of public charging stations to whose charging points Mercedes me Charge customers have access.

² Electric energy consumption and range were determined on the basis of Regulation (EU) 2017/1151

In addition to making charging as easy and convenient as possible for customers, Mercedes me Charge also enables green electricity to be charged at public charging points in Europe, the USA and Canada. Energy Attribute Certificates (EACs) ensure that the corresponding amount of green energy is fed into the grid after each charging process. This green electricity bears the  **EKOenergie** eco-label and is provided by certified energy generation plants.

Green electricity, in other words electricity from renewable energy sources, is a significant factor in the life cycle of an electric car in order to avoid CO₂ emissions. This is because around 50% of the CO₂ footprint of a battery electric vehicle – given the current EU electricity mix – is generated in the use phase, in charging processes that generate CO₂. But whether a public charging point draws green power or power from non-renewable sources is often not known. The supply of the charging current is the responsibility of the charging point's operator. To counteract this lack of transparency and promote the use of electricity from renewable sources, the Mercedes-Benz Group has made green charging an integral part of Mercedes me Charge.

In addition, green charging creates incentives for investments in further renewable energy plants. Moreover, the system shows how the respective charging behaviour affects the personal CO₂ footprint. The Mercedes-Benz Group was the first automobile manufacturer to offer this service. The public response to green charging is positive. Since the market launch in Europe in March 2021, the monthly green charging volume has increased steadily.

Creation of own global high-power charging network

The Mercedes-Benz Group has announced far-reaching plans for the creation of a global high-power charging network in North America, Europe, China and other key markets. Construction of the first charging park will begin in 2023. The aim is to have put in place the complete network of more than 2000 charging hubs, with more than 10,000 charging points, by 2027. In the USA, the company is planning more than 400 charging hubs with more than 2500 charging points. The network is explicitly designed to be available to compatible vehicles of any brand, with the ambition of encouraging the rapid expansion of electric mobility on a global basis.

In accordance with its sustainable corporate strategy “Ambition 2039”, the Mercedes-Benz Group wants to make it possible for its customers to charge their vehicles using green electricity. This will be achieved primarily by means of green energy supply contracts or through the use of Energy Attribute Certificates (EACs) from accredited issuers. Certain Mercedes-Benz charging stations will also include photovoltaic systems designed to meet the electricity requirements for lighting, video monitoring and suchlike.

Expansion of the IONITY fast-charging network

Within the scope of the IONITY joint venture, Mercedes-Benz AG is working to create a high-performance fast-charging network for electric vehicles in Europe. IONITY aims to safeguard private electric mobility by means of a standardised charging network along the most important pan-European motorways with the intention of speeding up the adoption of electric mobility within the market.

At the end of 2022, over 450 IONITY fast-charging locations or “charging parks” were in operation. Each charging park has several charging points, all of which are powered entirely by green electricity. The high charging power of up to 350 kW per charging point enables correspondingly designed vehicles to charge their batteries quickly. The more than 2,000 charging points of IONITY are integrated into Mercedes me Charge and can be conveniently used via Plug & Charge.

The number of IONITY fast-charging stations is expected to more than quadruple across Europe and grow to around 7000 charging points at more than 1000 locations by 2025. These will in future also be found along major roads and near urban centres. Some locations will also have innovative flagship concepts for making travel more convenient and improving the charging experience. To realise this growth strategy, the existing shareholders and BlackRock as a new shareholder are investing €700 million.

Flexible charging system for EQ models and plug-in hybrids

The Mercedes-Benz Group offers a flexible charging system for private and public charging. Charging at up to 22 kW is possible via various adapters. The system is also compatible with all battery-electric vehicles (BEVs) and plug-in hybrids that have a type 2 connection.

Intelligent charging with the networked Mercedes-Benz Wallbox

The new Mercedes-Benz Wallbox charges electric cars and plug-in hybrids quickly, intelligently and conveniently. It is designed for up to 22 kW.³ As it is technically preconfigured for remote functions, customers are for the first time optionally able to start and stop charging processes via the Mercedes me App⁴, monitor the present state of charge and view the charging history. In addition, the Mercedes-Benz Wallbox now has an integrated energy meter. Furthermore, it is technically possible to receive software updates “over-the-air” via the customer’s own internet connection in the future.⁵ This makes the Wallbox particularly future-proof.

Charging infrastructure expanded at own locations

Mercedes-Benz AG is also continuously driving forward the expansion of the charging infrastructure at its own locations: since 2013, it has put more than 6,000 charging points into operation. At the end of 2022, comprehensive charging solutions were available to employees. The company also plans to install more charging points in 2023. In addition, over 2,500 of the Mercedes-Benz charging points at the company’s own locations will also be available to the public from the end of 2022.

With the “charge@Mercedes-Benz” project, since 2013, the company has been bundling its activities for the development of an intelligent charging infrastructure for all company-owned properties in Germany.

Mercedes-Benz AG not only equips car parks, multi-storey car parks and customer centres, but also its internal development test facilities and test sites. The charging points of Mercedes-Benz AG are supplied with 100% certified green electricity.

Services

A large proportion of the CO₂ emissions from cars with combustion engines is generated during driving. The Mercedes-Benz Group would therefore like to support the users of its vehicles in adopting a climate-friendly driving style and in making purchasing decisions in favour of locally emission-free vehicles. To this end, it offers a wide range of service solutions.

Facilitating the switch to battery-electric vehicles

Mercedes-Benz Mobility supports the transformation towards electric mobility with the Green Mapping concept: since the end of 2020, customers who have leased or financed their Mercedes through Mercedes-Benz Mobility AG can switch from a combustion engine to a hybrid or electric vehicle for the same monthly instalment.

App facilitates decision for e-mobility

Is an electric vehicle or a plug-in hybrid right for my day-to-day life? The Mercedes-Benz “Electric Ready App” supports drivers in determining whether a switch would be practicable by analysing individual driving behaviour. To do this, it uses the principle of gamification: the users receive a lot of useful information relating to electric mobility presented in an entertaining manner as part of a seven-day challenge. In addition to data about their potential energy requirements, users can simulate the duration of different charging solutions in real time and view the various regional charging infrastructures. The app has been available in around 29 countries worldwide since 2020. So far, it has evaluated just under 2.5 million trips for its users, which is an average of 24 trips per week.

3 Depending on the manufacturer and vehicle, 22 kW charging may require the “Alternating current charging system (AC charging 22 kW)” as optional equipment. If this is not the case, the vehicle is automatically charged with the optimum output at the Wallbox. The maximum charging capacity of the charging station must suit the physical installation (cable diameter and overload protection)

4 To use the remote functions of the Mercedes-Benz Wallbox and receive over-the-air updates, the Mercedes me App, a personal Mercedes me ID and consent to the Terms of Use for the Mercedes me connect services are necessary.

5 To receive the “over-the-air” updates, customers must agree to the respective update in the Mercedes me App or give general consent in the Mercedes me App to receive all future updates

The Mercedes-Benz “Electric Ready App” offers corresponding additional functions specifically for commercial users: among other things, they can be used to check whether the routes driven could also be covered with an electric Mercedes-Benz van; the app also takes various loads and the resulting vehicle weight into account. The “eCost Calculator” calculates whether an electric Mercedes-Benz van would be a good option from a financial standpoint. It provides information that makes it possible to compare the annual operating costs of a van with a combustion engine with those of an electrically powered Mercedes-Benz van. With regard to the charging infrastructure, Mercedes-Benz Vans also analyses the local conditions together with the interested parties with the help of the “eCharging Planner”. This shows what measures are necessary for the efficient operation of individual vehicles, or of smaller or larger fleets.

Furthermore, a range simulator, a charging time calculator and an e-route planner can be used via the Mercedes-Benz Group website.

App collects data about individual fuel consumption

The Mercedes-Benz Group offers transparent information and comparison options on the fuel consumption of its vehicles in Europe: since 2020, customers can voluntarily share their individual fuel consumption anonymously and compare it with users of similar vehicles via the free Mercedes me app for almost all model series. This information is also available on the [company's website](#). Since 2022, visitors to the website can select a vehicle themselves and view the consumption curve of all journeys.

Data show that individual fuel consumption can be both below and above the WLTP certification value. Deviations compared to the WLTP cycle can be caused by numerous factors such as road conditions, load, weather conditions, but especially by the individual driving style.

Saving energy with the Eco Coach

Since the end of 2020, the Mercedes-Benz Group has offered customers of plug-in hybrid and electric vehicles an app with individual energy-saving tips: the Mercedes me Eco Coach analyses personal driving and charging behaviour and provides personalised

tips on how to reduce the CO₂ footprint and increase the longevity of the vehicle battery. The app is now available in ten European markets.

For each activity and participation in various challenges, points are awarded that can be redeemed for CO₂ compensation or converted into Mercedes me Charge charging vouchers.

More environmentally friendly batteries

Range, performance, charging time: the battery is the centrepiece of an electric vehicle. As part of its holistic battery strategy, the Mercedes-Benz Group is pursuing the goal of bringing ever more economical, powerful and environmentally compatible battery systems to market. To this end, the Mercedes-Benz Group together with its partners is focusing on battery cells and modules produced on a CO₂-neutral on the balance sheet basis.

To promote local battery production and reduce transport distances, Mercedes-Benz AG has acquired shares in the European battery cell manufacturer Automotive Cells Company (ACC). From 2025, this will supply Mercedes-Benz with high-performance battery cells and modules. ACC plans to more than double the capacity of its European plants as part of its cooperation with Mercedes-Benz.

In addition, Mercedes-Benz and Contemporary Amperex Technology Co, Limited (CATL) announced in August 2022 that they would expand the existing battery cell partnership: the new CATL plant in Debrecen, Hungary operates on a CO₂-neutral basis and supplies battery cells for European production locations in Germany and Hungary.

At the same time, the company also relies on other strong cooperations with the aim of jointly developing advanced battery technologies – from cells and modules to integration into the vehicle battery. Among other things, it is working with partners to increase the energy density of lithium-ion batteries by using high-silicon anodes or lithium anodes in combination with solid-state technology.

The Mercedes-Benz Group is stepping up its research and development activities in order to bring new technologies into series production as early as possible:

among other things, it is setting up a competence centre for cell technology in Untertürkheim – materials and cells can be technologically evaluated there in the future. The “Mercedes-Benz eCampus” will gradually take up operation from 2023. This also means that a near-series plant for the small-scale production of battery cells will be available at the start.

Effectiveness and results

Effectiveness of the management approach

The Mercedes-Benz Group’s management approach to climate protection is based on the “Ambition 2039” targets. The company has also defined the measures it will use to achieve these goals. The Mercedes-Benz Group evaluates their effectiveness on the basis of internal and external performance assessments: internally, the company conducts audits at the departmental level several times a year for this purpose. Externally, it has selected goals and measures audited by an auditing company.

The Mercedes-Benz Group also engages in dialogues on the topic of climate protection and uses the insights gained to review and, if necessary, adapt its management approach. For example, the company maintains an intensive exchange with environmental institutes and non-governmental organisations at its annual [“Sustainability Dialogue”](#). In addition, the topic of climate protection is an integral part of regular Board of Management meetings; current developments are discussed with the Advisory Board for Integrity and Sustainability. Politicians, the general public and other stakeholders of the Mercedes-Benz Group also provide the company with regular feedback on how the company’s own sustainability goals are perceived and assessed.

Results

Alternative drive systems

[Electrified vehicles \(xEV\) at Mercedes-Benz Cars accounted for 16% of the Group’s worldwide unit sales in the year under review. Battery electric models accounted for 4% of unit sales at Mercedes-Benz Vans.](#)

Alternative drive systems Mercedes-Benz Cars

		2022
Worldwide	Alternative drive systems (total)	333,490
	Plug-in hybrid	184,263
	Electric drive	149,227
	MBC unit sales (total)¹	2,040,719
Europe ²	Alternative drive systems (total)	236,678
	Plug-in hybrid	142,022
	Electric drive	94,656
	MBC unit sales (total)¹	618,904

¹ Group sales Mercedes-Benz Cars (incl. smart)

² Europe: European Union, United Kingdom, Switzerland and Norway

Alternative drive systems at Mercedes-Benz Vans

		2022
Worldwide	Electric drive	15,003
	MBV unit sales (total)¹	415,344
Europe ²	Electric drive	14,847
	MBV unit sales (total)¹	259,436

¹ Group Sales Mercedes-Benz Vans (commercial)

² Europe: European Union, United Kingdom, Switzerland and Norway

Calculation of CO₂ emissions

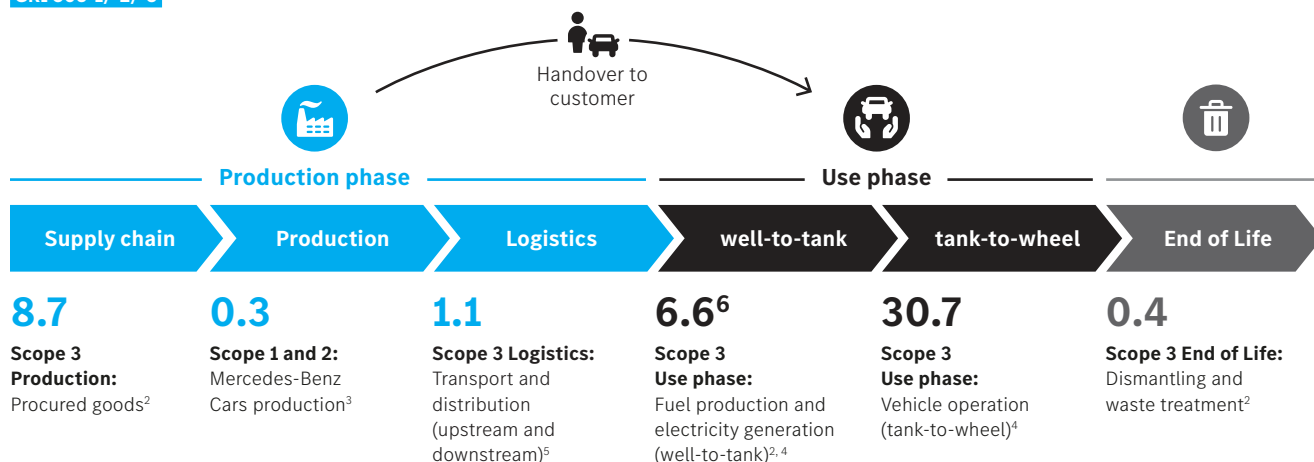
GRI 302-1/2 GRI 305-1/-2/-3

For the entire life cycle of the Mercedes-Benz Cars fleet and the Mercedes-Benz Vans fleet worldwide, Mercedes-Benz has calculated emissions in accordance with the requirements of the Corporate Accounting and Reporting Standard 2004 of the Greenhouse Gas Protocol Initiative.

This resulted in an average CO₂ value of 47.9 t per vehicle for Mercedes-Benz Cars for the year 2022, and an average CO₂ value of 62.7 t per vehicle for Mercedes-Benz Vans. 52.2 t is accounted for by the use phase, which is dominated by commercial goods transport with vans in the 3.5 t-5 t segment.

Scope 1, 2 and selected Scope 3 CO₂ emissions in t per vehicle, Mercedes-Benz Cars 2022^{1,7}

GRI 305-1/-2/-3



1 For calculation basis see appendix 7 Calculation and documentation of CO₂ emissions and chapter 7 CO₂ emissions along the entire value chain

2 See 6 Life cycle assessments of vehicles and internal life cycle assessment studies

3 See 7 key figures environment. Since early 2022, all CO₂ emissions (Scope 1 and Scope 2) at production facilities operated by the Mercedes-Benz Group that have been as yet unavoidable have been offset by means of carbon offsets from qualified climate change mitigation projects.

4 Driving emissions of Mercedes-Benz Cars fleet (EU, China, USA and RoW) standardised, mileage: 200,000 km, for data basis see chapter 7 Development of CO₂ emissions

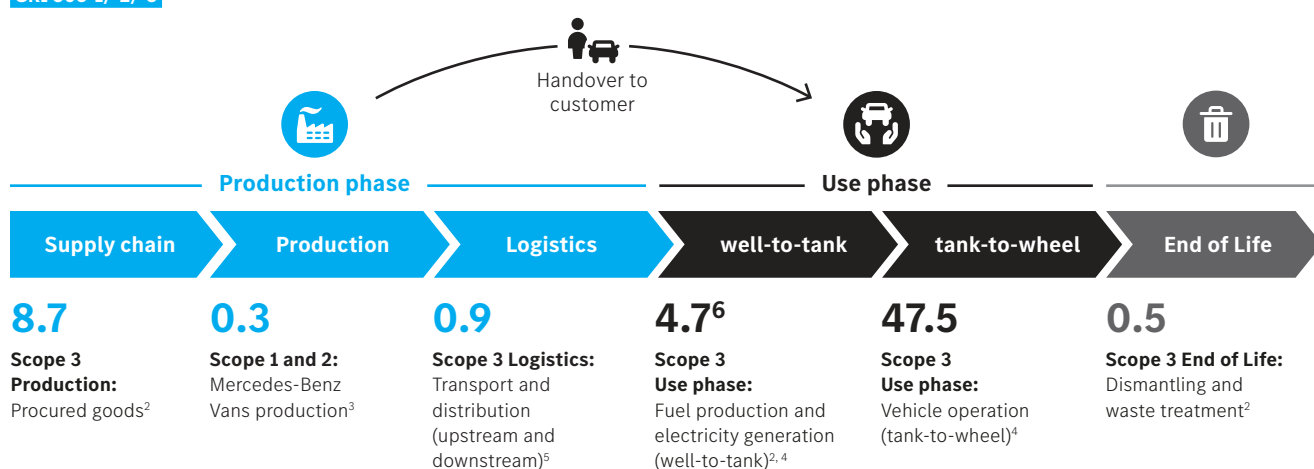
5 Forecast value

6 Incl. Green Charging: Contribution per vehicle -0.08 t CO₂

7 The key figures were audited in order to obtain limited assurance

Scope 1, 2 and selected Scope 3 CO₂ emissions in t per vehicle, Mercedes-Benz Vans 2022^{1,7}

GRI 305-1/-2/-3



1 For calculation basis see appendix 7 Calculation and documentation of CO₂ emissions and chapter 7 CO₂ emissions along the entire value chain

2 Internal life cycle assessment studies

3 See 7 key figures environment. Since early 2022, all CO₂ emissions (Scope 1 and Scope 2) at production facilities operated by the Mercedes-Benz Group that have been as yet unavoidable have been offset by means of carbon offsets from qualified climate change mitigation projects.

4 Driving emissions of Mercedes-Benz Cars fleet (EU, China, USA and RoW) standardised, mileage: 200,000 km, for data basis see chapter 7 Development of CO₂ emissions

5 Forecast value

6 Incl. Green Charging: Contribution per vehicle -0.03 t CO₂

7 The key figures were audited in order to obtain limited assurance.

Scope 1, 2 and 3 emissions, Mercedes-Benz Cars worldwide^{1, 5, 8}

	2020		2021		2022	
Scope 3	Specific CO ₂ in t/car	Absolute CO ₂ in million t ⁴	Specific CO ₂ in t/car	Absolute CO ₂ in million t ⁴	Specific CO ₂ in t/car	Absolute CO ₂ in million t ⁴
Procured goods ⁶	8.1	17.0	8.4	17.0	8.7	17.7
Logistics	1.0 ²	2.1 ²	1.1 ²	2.2 ²	1.1 ²	2.2 ²
Business travel	0.006	0.012	0.009	0.019	0.028 ⁷	0.057 ⁷
Employee traffic	0.060	0.125	0.053	0.107	0.052	0.107
Use phase of our products (well-to-tank)	5.6	11.8	6.3 ³	12.7 ³	6.6 ³	13.6 ³
Use phase of our products (tank-to-wheel)	33.7	70.4	32.2	65.5	30.7	62.7
Dismantling and waste treatment ⁶	0.4	0.8	0.4	0.8	0.4	0.8
Scope 1 and 2						
Manufacture	0.8	0.9 ⁴	0.7	0.7 ⁴	0.3	0.4 ⁴
Total	49.7	103.2	49.1	99.2	47.9	97.8

1 Values are rounded

2 Forecast value

3 Incl. Green Charging: Contribution per vehicle -0.08 t CO₂

4 Absolute Scope 3 emissions relate to retail sales (2020: 2,087,200; 2021: 2,032,663; 2022: 2,041,705; unaudited). Absolute Scope 1 and 2 emissions relate to vehicles produced from fully consolidated locations, excluding third-party products (2020: 1,230,733; 2021: 1,132,213; 2022: 1,261,106; unaudited)

5 For calculation basis see appendix [7 Calculation and documentation of CO₂ emissions](#) and chapter [7 CO₂ emissions along the entire value chain](#)

6 See [Life cycle assessments of vehicles](#) and internal life cycle assessment studies

7 Business trips by air plane, rental car and domestic train services

8 The key figures were audited in order to obtain limited assurance

Scope 1, 2 and 3 emissions, Mercedes-Benz Vans worldwide^{1, 5, 8}

	2021		2022	
Scope 3	Specific CO ₂ in t/van	Absolute CO ₂ in million t ⁴	Specific CO ₂ in t/van	Absolute CO ₂ in million t ⁴
Procured goods ⁶	8.6	3.4	8.7	3.6
Logistics	0.9 ²	0.4 ²	0.9 ²	0.4 ²
Business travel	0.007	0.003	0.008 ⁷	0.003 ⁷
Employee traffic	0.039	0.015	0.038	0.016
Use phase of our products (well-to-tank)	4.9	1.9	4.7 ³	2.0 ³
Use phase of our products (tank-to-wheel)	47.8	18.9	47.5	19.7
Dismantling und waste treatment ⁶	0.5	0.2	0.5	0.2
Scope 1 and 2				
Manufacture	0.5	0.2	0.3 ⁴	0.1 ⁴
Total	63.3	25.0	62.7	26.0

1 Values are rounded

2 Forecast value

3 Incl. Green charging: contribution per vehicle -0.03 t CO₂

4 Absolute Scope 3 emissions relate to retail sales (2021: 394,978; 2022: 415,335; unaudited). Absolute Scope 1 and 2 emissions relate to vehicles produced from fully consolidated locations, excluding third-party products (2021: 336,847; 2022: 360,874; unaudited)

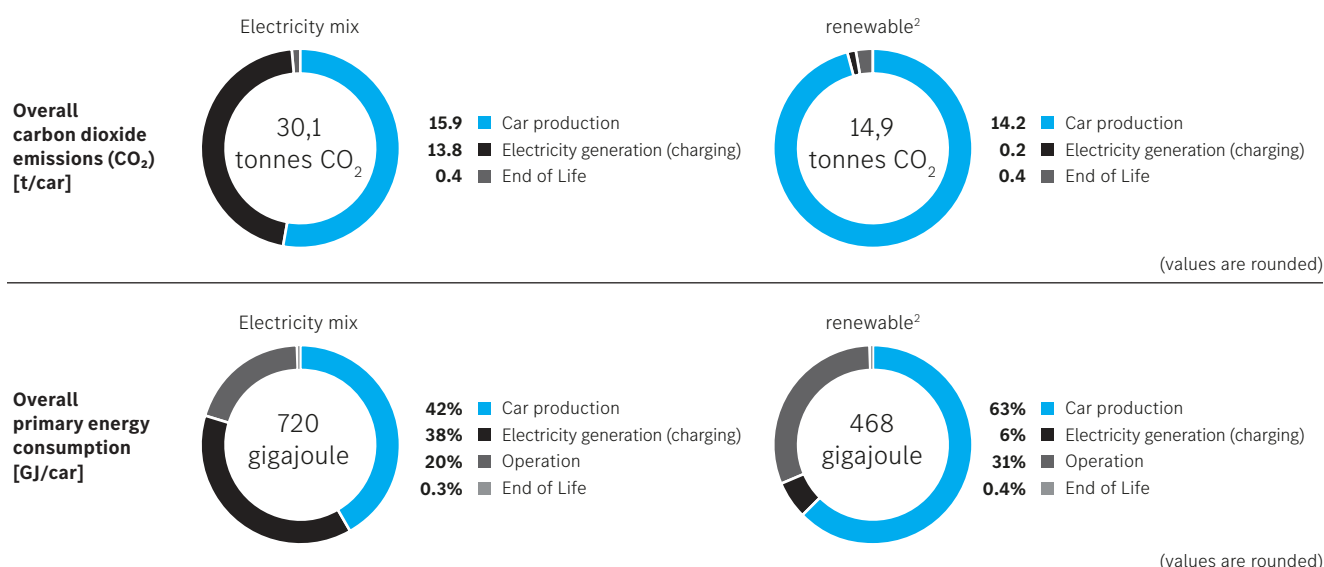
5 For calculation basis see appendix [7 Calculation and documentation of CO₂ emissions](#) and chapter [7 CO₂ emissions along the entire value chain](#)

6 Internal life cycle assessment studies

7 Business trips by air plane, rental car and domestic train services

8 The key figures were audited in order to obtain limited assurance.

Life cycle assessment of the EQE 350+¹



1 EQE 350+ (WLTP: combined electrical consumption: 18.7 – 15.9 kWh/100 km; combined CO₂ emissions: 0 g/km)
 2 Renewably generated energy for cell production and charging current

Development of CO₂ emissions in Europe

GRI 305-5

The Mercedes-Benz Group has defined the CO₂ emissions of its total new passenger car fleet in Europe as one of its significant non-financial performance indicators. For more information on how it expects the CO₂ emissions of its car fleet in Europe to develop in 2023, see the Outlook chapter in the annual report.

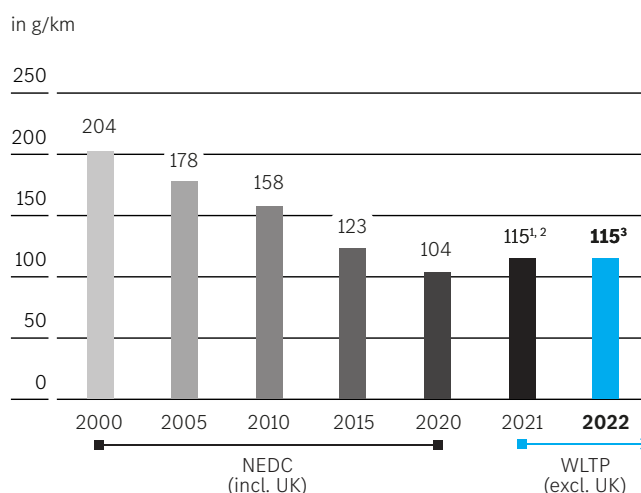
🌐 **Forecast, AR 2022**

In the reporting year, the average CO₂ emissions of the Mercedes-Benz passenger new car fleet in Europe (European Union, Norway and Iceland), applying the statutory regulations, are expected to amount to 115 g/km (including vans registered as passenger cars) and were thus at the same level as in the previous year. This means that the figures for Mercedes-Benz achieved the CO₂ targets in Europe in 2022.

For 2023, the company expects that the Mercedes-Benz fleet average in Europe (European Union, Norway and Iceland) will continue to fall. This development is particularly favoured by the continuing increase in sales of all-electric and plug-in vehicles as a proportion of total passenger car sales.

Development of the average CO₂ emissions of the Mercedes-Benz passenger car fleet in Europe

GRI 302-5

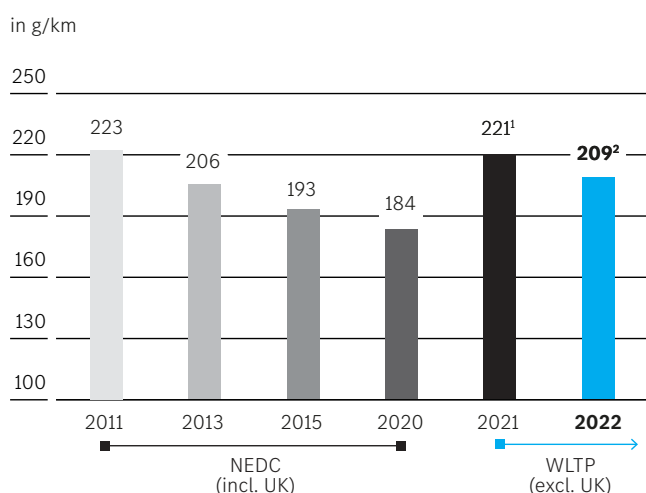


1 Including vans registered as M1 vehicles — all other years without vans.
 2 Preliminary EU data.
 3 Projection.

In the reporting year, the average CO₂ emissions of **vehicle category N1 light trucks** in Europe (European Union, Norway and Iceland) as measured on the basis of the legal regulations are expected to amount to 209 g/km. This means that the figures for Mercedes-Benz will be below the CO₂ target.

For 2023 the company expects a further reduction in CO₂ emissions due to rising sales of battery-electric vehicles.

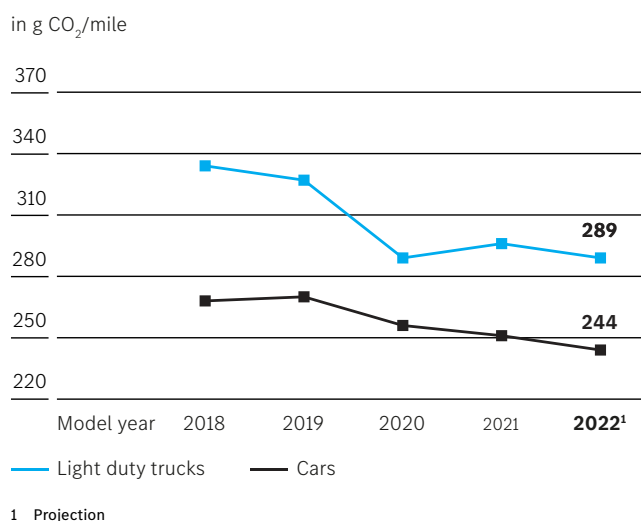
Development of the average CO₂ emissions of the Mercedes-Benz van fleet in Europe



Development of CO₂ emissions in the USA

In the United States, fleet values are regulated by two separate federal standards for limiting greenhouse gases and fuel consumption in vehicle fleets: the **Greenhouse Gas Protocol (GHG)** and the **Corporate Average Fuel Economy (CAFE)** standard. For the 2022 model year, the GHG fleet figure is 244 g CO₂/mi for the car fleet and 289 g CO₂/mi for the fleet of vans and SUVs registered as light trucks (on the basis of the most recent forecast). Because the portfolio of electrified vehicles (xEV) in the United States is still in an early stage of development, the Mercedes-Benz Group was not able to achieve its average fleet targets of 195 g CO₂/mi for the car fleet and 256 g CO₂/mi for the fleet of vans and SUVs registered as light trucks. However, the Mercedes-Benz Group was able to offset the remaining difference through the purchase of external credits.

Mercedes-Benz GHG values for passenger cars and light duty trucks in the USA



The models of the Mercedes-Benz Sprinter are subject to the GHG regulation for Classes 2b/3. The CO₂ targets in these classes depend on the payload, the towing capacity and the drive type of the vehicles. Data on CO₂ emissions from Mercedes-Benz vehicles were not yet available at the time of publication of this report.

Development of CO₂ emissions in China

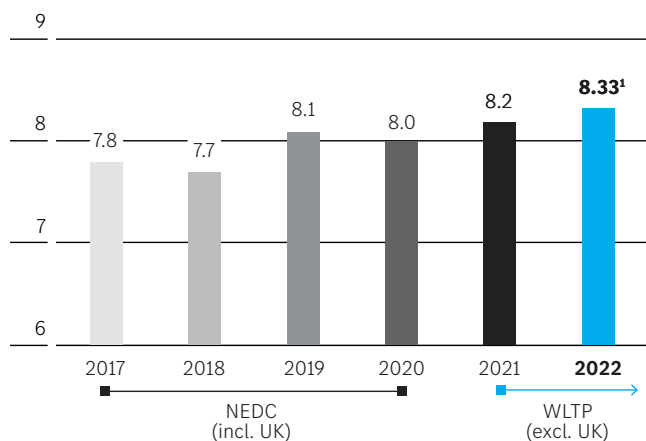
In China, domestic and imported cars are reported separately and according to fleet consumption values, unlike in Europe and the United States. This means the figures for the imported fleet are the relevant figures for our wholly owned subsidiary Mercedes-Benz China (MBCL). The target was 7.01 l/100 km; the figure that was actually achieved was 8,33 l/100 km (8.17 l/100 km including **off-cycle technologies**). MBCL plans to purchase external credits in order to close consumption gaps in the fleet's target achievement at short notice.

The aim of the Mercedes-Benz Group with regard to the portfolio expansion for all-electric vehicles and plug-in hybrids is to achieve the emission targets in China in the medium term, together with the joint-venture partner Beijing Benz Automotive (BBAC).

Mercedes-Benz fleet consumption passenger cars in China

GRI 302-5

in l/100 km



1 Preliminary value without off-cycle technologies

The V-Class and Vito models are produced by the joint venture Fujian Benz Automotive Co., Ltd. (FBAC) and constitute a local fleet (domestic). A value of 9.29 l/100 km was achieved (without off-cycle technology); the target value is 7.9 l/100 km. At present, the fleet balance can be offset by means of a credit transfer. This situation is not likely to change until 2026, because the fleet consists of only a single vehicle model.

Legal limits on the fuel consumption and/or CO₂ emissions of car fleets and light truck fleets also exist in many other markets, although the target values differ from market to market. This concerns major sales markets for Mercedes-Benz products such as Switzerland, Canada, Japan, South Korea, Brazil, India and Saudi Arabia. The Mercedes-Benz Group also takes these target values into account in the further development of its portfolio.

Climate protection in the supply chain

Strategy and concepts

Climate-protection goal: CO₂ neutrality on the balance sheet


GRI 2-23 GRI 3-3

With its “Ambition 2039”, the Mercedes-Benz Group aims to have a CO₂-neutral on the balance sheet new vehicle fleet along the entire value chain in less than 20 years. The supplier network plays a decisive role in achieving the climate targets: for example, the production of an all-electric vehicle is about twice as CO₂-intensive as for a conventional combustion engine model, mainly owing to the lithium-ion batteries.

The Mercedes-Benz Group has various levers at its disposal to avoid and reduce CO₂ emissions – for example in the make-up of the electric vehicle portfolio or at the company’s own production locations. But it is also clear that there are some areas which the company can influence only in part. This includes for example the energy mix used in the use phase of the vehicles, or for production of procured components in the country of origin.

Sustainable transformation at the suppliers

GRI 2-23/-24

The Mercedes-Benz Group aspires to prevent, minimise or as far as possible eliminate (potentially) negative environmental impacts along its supply chain. To achieve this, it observes the practice of sustainable supply chain management. Its  “Responsible Sourcing Standards” provide the guidelines for this: they include minimum requirements for CO₂ savings, requirements for the introduction of an environmental and energy management system and compliance with legal requirements. Suppliers must agree to the Responsible Sourcing Standards in order to participate in the award process for any new contracts with the company. In addition, Mercedes-Benz Cars and Mercedes-Benz Vans set further sustainability requirements for suppliers. These requirements define measures that will be applicable for future vehicles – for example specific CO₂ targets for focus materials.

[➤ Requirements for suppliers](#)

In order to reduce CO₂ emissions in the supply chain, Mercedes-Benz Cars and Mercedes-Benz Vans are actively promoting the transformation of their suppliers. For this, they use three levers: through the “Ambition Letter”, which applies in the case of the award of any new contract, suppliers pledge to the segments that only CO₂-neutral on the balance sheet products will be procured from 2039 on.

[➤ Declaration of intent on CO₂ neutrality on the balance sheet](#)

In addition, they have integrated target values for CO₂ emissions into their criteria for award processes – the focus is on components that are produced in a CO₂-intensive manner. These targets not only concern the direct supplier, but are also valid for the upstream production of raw materials and components.

[➤ More climate-friendly production materials](#)

As a third lever, both segments work together with selected partners. The aim is to reduce CO₂ emissions in the supply chain – especially in the production of important components such as battery cells or body-in-white components – through innovative technologies.

[➤ Future technologies for reducing CO₂ emissions](#)

Measures

Declaration of intent on CO₂ neutrality on the balance sheet

GRI 3-3 GRI 308-1

The Mercedes-Benz Group implements various projects and measures in order to avoid and reduce CO₂ emissions in its supply chains for services as well as for production and non-production materials. In future, the company wants to work only with partners who share its understanding of sustainability in terms of climate, environment and human rights.

For this reason, in 2020, Mercedes-Benz Cars and Mercedes-Benz Vans already sent out to suppliers of production materials the ambition letter, a declaration

of intent on balance sheet carbon-neutral products and established approval as a prerequisite for awarding contracts. By signing this document, they commit themselves to supply Mercedes-Benz AG only with products that are CO₂-neutral on the balance sheet by 2039 at the latest – and thus to the Mercedes-Benz Group's "Ambition 2039".

➤ Effectiveness and results

More climate-friendly production materials

Moreover, Mercedes-Benz Cars and Mercedes-Benz Vans are setting selected priorities for production materials on the road to achieving CO₂ neutrality on the balance sheet. To this end, quantitative interim targets for CO₂ emissions in the supply chains have been defined – these were derived from the results of the supplier discussions and determined with the support of external experts. Mercedes-Benz Cars and Mercedes-Benz Vans have placed the focus on materials and components that have high CO₂ emissions in production. These include steel, aluminium, certain plastics and batteries. Finally, they have integrated the target values into their criteria for contract award processes – and consistently apply CO₂ and recycled content requirements as key criteria when awarding contracts for the "Electric first" vehicle platform "Mercedes-Benz Modular Architecture" (MMA), as well as the "Mercedes-Benz Electric Architecture" platform (MB.EA).

Future technologies to reduce CO₂ emissions

The Mercedes-Benz Group is working together with suppliers to develop measures for reducing the CO₂ emissions of the procured production and non-production materials as well as those involved in delivering goods to the plants (inbound logistics). For Mercedes-Benz Cars and Mercedes-Benz Vans, the goal is to source only CO₂-neutral on the balance sheet production materials from 2039 on – with the focus on batteries, steel and aluminium.

Battery

The battery is the component in the vehicle with the greatest CO₂ contribution. To counteract this, Mercedes-Benz Cars and Mercedes-Benz Vans stipulate from their strategic battery cell partners that only battery cells produced on a CO₂-neutral on the balance sheet basis should be procured. In this way the emissions of a cell can be reduced by around 30%. Since 2021, external experts and testing organisations

have been verifying and confirming CO₂-neutral on the balance sheet cell production at the suppliers.

In addition, both segments are engaged in ongoing negotiations with other players in the supply chain – including electrode producers, refineries and mines. In addition to respecting human rights, a central requirement is to rely more on renewable energy sources, in particular for electricity. They have also agreed with strategic partners to establish a sustainable supply of lithium.

➤ More environmentally friendly batteries

Since 2018, the audit and consulting company RCS Global has been creating transparency about the complex supply chains for battery cells for Mercedes-Benz. In the reporting year, these audits were extended to include further battery raw materials. Along with the human rights due diligence, the audit now also covers specific environmental topics – including environmental due diligence, CO₂ emissions and the use of electricity from renewable sources.

➤ Production materials

➤ More environmentally friendly batteries

Steel

The company also works with strategic partners in other areas of the supply chain: in 2021, for example, Mercedes-Benz AG was the first car manufacturer to invest in the Swedish start-up H2 Green Steel (H2GS) as a means of introducing CO₂-free steel into series production going forward. H2GS produces CO₂-free steel by using hydrogen and electricity from exclusively renewable sources. In addition, Mercedes-Benz AG has been purchasing more environmentally friendly flat steel products from Salzgitter Flachstahl GmbH since 2021. In the same year, Mercedes-Benz AG also launched a partnership covering CO₂-free steel with the Swedish steel manufacturer SSAB.

Aluminium

In the reporting year, Mercedes-Benz AG furthermore signed a letter of intent with an aluminium producer with the aim of working together to develop and introduce, by 2030, aluminium for automotive applications that is practically CO₂-free. Innovative technologies for primary material production as well as the increased use of scrap will play an important part in this project.

➤ Resource conservation along the supply chain

New minimum requirement for suppliers

In the reporting year, the Mercedes-Benz Group introduced the “Responsible Sourcing Standards” (RSS). These are the company’s new central contractual document covering sustainability requirements for suppliers. The standards include its minimum requirements for a responsible supply chain – including environmental protection. They aim to conserve natural resources and prevent and repair environmental damage caused by economic activities when it occurs. If the environmental damage is unavoidable or irreparable, it must be compensated. In this way, the company is tightening its sustainability requirements, particularly in the areas of environmental due diligence, climate protection and resource conservation, as well as biodiversity, deforestation and water. In addition, the standards define minimum requirements with regard to human rights due diligence.

➤ Requirements for suppliers

With the newly developed RSS, the Mercedes-Benz Group not only goes beyond its own previous sustainability requirements; it also sets stricter requirements for suppliers than those required by the German Supply Chain Sourcing Obligations Act (LkSG). In this way, the company seeks to sensitise its suppliers beyond the legal requirements and motivate them to greater efforts with respect to sustainability. In order to act in compliance with the LkSG, the Mercedes-Benz Group has applied the RSS to all contract award processes since 2023.

➤ Supply chain law

Environmental and energy management systems


GRI 2-23/24 **GRI 3-3**


Suppliers of production materials to Mercedes-Benz Cars and Mercedes-Benz Vans are expected to operate with an environmental management system that is certified according to ISO 14001 or EMAS. Depending on the specific risks, this also applies to suppliers of non-production materials and services. If a supplier does not have a certified environmental management system, the supplier is given two years to set up such a system and have it certified. If this is not done, the supplier may be excluded from receiving new orders.

Moreover, suppliers of services and of non-production materials for CO₂-intensive commodities will also be requested to sign the “Ambition Letter” that requires them to make their production CO₂-neutral on the balance sheet or to provide their services in a CO₂-neutral on the balance sheet fashion by no later than 2039. In addition, project-related CO₂ reduction measures are agreed with non-production material suppliers and service providers in the contract award process, for example through the use of electricity from renewable energy sources as part of the commissioning process.

Transparency through data

GRI 308-2

Mercedes-Benz Cars and Mercedes-Benz Vans are also cooperating with organizations such as  CDP (formerly Carbon Disclosure Project) so that it can depict the environmental impact of its supply chains even more transparently. The suppliers have been reporting on their environmental impact and climate change mitigation efforts within the framework of the CDP Supply Chain Programme since 2019. CDP provides the corresponding tools for recording, assessing and publishing environmental and climate data. To this end, the company contacted its main suppliers once again in 2022. These suppliers represent around 84% of the annual procurement volume of Mercedes-Benz Cars and Mercedes-Benz Vans. Around 91% of them participated in the survey.

To ensure that the sustainability requirements are met, Mercedes-Benz AG is involved in the cooperation project  “Catena-X”. This project networks companies across industries and allows for a secure exchange of data between all participants in the automotive value chain: from the mining of raw materials to recycling, the data chain is supplemented by each company with product-specific CO₂ data so as to allow the sharing of a product-specific CO₂ footprint that should include as high a proportion of primary data as possible. In the “Catena-X” project group “Sustainability and CO₂”, the Mercedes-Benz AG is working together with other partners to develop a standard that will make the CO₂ data more comparable and reliable.

Award for suppliers

The Mercedes-Benz Group considers climate protection and resource conservation in the supply chain to be an element of its cooperative partnership with suppliers. Public recognition for good performance is also important to the company. For this reason, the company also gave awards to suppliers for outstanding sustainability performance in 2022 – for the third successive time and for the first time under the name of 🌐 “Mercedes-Benz Supplier Circle”.

Effectiveness and results

GRI 3-3 GRI 308-2

Progress on climate change mitigation in the supply chain is reported at regular intervals in the Group Sustainability Board (GSB). The Mercedes-Benz Group continuously reviews the progress it is making towards its 2039 ambition for passenger cars: since 2020, the “Mercedes-Benz Cars Purchasing and Supplier Quality” procurement unit has been measuring, among other things, the number of suppliers who agree to the “Ambition 2039” statement of intent. By signing, the suppliers agree that, by 2039 at the latest, they will only supply products to the company that are CO₂-neutral on the balance sheet. The results show that the supplier network of Mercedes-Benz Cars and Mercedes-Benz Vans has largely agreed to the climate targets of the Mercedes-Benz Group, which are formulated in “Ambition 2039”.

Approximately 86%¹ of all suppliers of production material for Mercedes-Benz Cars and Mercedes-Benz Vans registered in the system (as measured on the basis of annual planning procurement volume that, in turn, is based on target figures updated bi-weekly) have signed the ambition letter. CO₂ neutrality on the balance sheet is incorporated into the terms of contract, and the ambition letter is a key criterion for the awarding of contracts. This means that a supplier who does not sign the “Ambition Letter” will not be considered in any new contract tendering process.

In addition, Mercedes-Benz Cars and Mercedes-Benz Vans have developed requirements in the form of interim CO₂ targets for components whose production generates a large amount of CO₂ emissions. These targets are included as criteria during the contract award process and affect a major share of the supply chain emissions of future vehicles. The CO₂-intensive materials and components include steel, aluminium, certain plastics and also the battery.

In the reporting year, the suppliers of Mercedes-Benz Cars and Mercedes-Benz Vans gave assurances that they would meet the company’s targets for the components across all model series. This means that they will continuously reduce CO₂ emissions, especially for materials and components with high CO₂ emissions, and increase the share of secondary materials.

The goal of the Mercedes-Benz Group is to bring more climate-friendly materials and products into its vehicles as quickly as possible. It is already setting the course for this today and relying among other things on CO₂-free steel. Compared to conventional steel production, the use of almost 100% scrap saves more than 60% of CO₂ emissions.

¹ The key figure was audited in order to obtain limited assurance.

Climate protection in production

Strategy and concepts

CO₂-neutral on the balance sheet production

GRI 2-23

The Mercedes-Benz Group formulates the holistic goal of making the mobility of the future more sustainable in its sustainable business strategy. One of the most important targets is the reduction of greenhouse gas emissions. This applies not only to mobility solutions but also to the Group's own production plants. By pursuing its goal of making its own production processes CO₂-neutral on the balance sheet, the Mercedes-Benz Group intends to act in accordance with the Paris Climate Agreement.

Thus the CO₂ emissions arising from Mercedes-Benz' production operations and the energy supply of the brand's plants will be consistently reduced or, wherever possible, completely eliminated. In order to accomplish this, Mercedes-Benz is relying on the purchase of green electricity, the expansion of other renewable energy sources at its locations and the implementation of a sustainable heating supply system.

The expansion of electric mobility is the key to more sustainable mobility in the future: this is why the Mercedes-Benz Group has designed its worldwide production network with a flexibility that allows the manufacture of fully electric vehicles. Since 2022, eight Mercedes-EQ models have been rolling off the production lines at seven locations. [Production at all manufacturing locations operated by the Mercedes-Benz Group has been CO₂-neutral regarding Scope 1 und Scope 2 since the reporting year.¹](#) Since early 2022, all CO₂ emissions (Scope 1 and Scope 2) at production facilities operated by the Mercedes-Benz Group that have been as yet unavoidable have been offset by means of carbon offsets from qualified climate change mitigation projects.¹

Responsibilities and organisation

GRI 2-24

GRI 3-3

The Mercedes Benz Group has 30 production locations worldwide, each of which is subject to different regional and national laws. Environmental and climate protection

in production is managed and coordinated across the business units by three regional committees – Germany/Europe, North/South America and Africa/Asia. Through the committees, experts can network across companies and plants and exchange information on legislation, procedures and innovations. In addition, these committees draw up globally valid internal standards and procedures.

European Union Emissions Trading System

Industrial plants in which CO₂ emissions are caused by the combustion of fossil fuels, and whose licensed [rated thermal input](#) exceeds 20 MW, must by law participate in the [European Emissions Trading Scheme \(EU ETS\)](#). The operators of such facilities are required to calculate on an annual basis the CO₂ emissions they generate, report the figures to the responsible authorities, and then submit to the same authorities CO₂ emission certificates in the amount of the reported CO₂ emissions. A major proportion of the CO₂ emission certificates needed must be acquired at a cost via EUA auctions, the commodity exchange or direct trading. At the Mercedes-Benz Group, an in-house committee of experts from various departments defines the procurement strategy and the risk management for the EUA certificates needed by the Group.

Currently, more than 60% of the CO₂ emissions generated at the European production locations of the Mercedes-Benz Group are covered by the EU emissions trading scheme. Through various measures, the Mercedes-Benz Group is attempting to further reduce CO₂ emissions – these also include projects to increase energy efficiency or to expand capacities for regenerative power and heat generation.

¹ This information was audited in order to obtain limited assurance

German National Emissions Trading System

The new Fuel Emissions Trading Act (BEHG) has introduced CO₂ pricing by means of a national emissions trading process for amounts that are not subject to the EU Emissions Trading System (EU ETS). This law applies to the heating and transport sectors in particular. Accordingly, the Mercedes-Benz Group must ensure the acquisition of certificates for the fossil fuels it uses that are not subject to the EU ETS.

Measures

Procuring green electricity

The goal of the Mercedes-Benz Group is to consistently reduce – and, where possible, completely avoid – the CO₂ emissions generated in vehicle production and in the energy supply to the plants. The procurement of green electricity plays a key role in these efforts. Since 2022, all the Mercedes-Benz Group's own production plants worldwide have obtained 100% of their external electricity from renewable sources.

For the procurement of green electricity, the Mercedes-Benz Group in Germany currently relies on a mix of solar, wind and hydroelectric power for external electricity purchases. The electricity is generated in a solar park near Ingolstadt as well as by more than 160 wind turbine systems throughout Germany, plus hydroelectric power plants. This green electricity is generated at the same rate as it is consumed. This ensures that the company's exact electricity needs are met with quarter-hour accuracy using green electricity from the grid.

Expansion of renewable energies

GRI 3-3 GRI 302-1

Another important pillar of CO₂-neutral on the balance sheet production for the Mercedes-Benz Group is the expansion of renewable energies at its locations. The aim is to cover more than 70% (cars) and 80% (vans) of the energy requirement in production with renewable energy sources by 2030. In order to continue to cover the energy requirements in production with renewable energies, the Mercedes-Benz Group is, among other things, planning to expand solar and wind energy at its own locations, and to conclude corresponding power purchase agreements.

Up to 2025, the Mercedes-Benz Group will make further investments to continue the expansion and installation of photovoltaic systems (PV systems) at more than 50 locations around the world.

The installation of PV systems is already in progress at the German locations in Rastatt, Bremen, Hamburg, Köllda and Sindelfingen; other sites in the company's global production network will follow, including Kecskemét (Hungary) and Tuscaloosa (USA).

In September 2022, the Mercedes-Benz Group began its planning for the installation of a wind farm on its test site in Papenburg, northern Germany. By 2025, the plan is to construct several wind turbine systems there, generating more than 100 MW and covering over 15% of the annual power requirement of Mercedes-Benz Group AG in Germany. To this end, the company is planning a long-term cooperation with a partner in the form of a [power purchase agreement \(PPA\)](#) to the value of hundreds of millions of euros. Furthermore, internal studies are ongoing to determine whether the large-scale installation of photovoltaic systems is feasible on the test site. When planning project implementation and ecologically sustainable use of the site, Mercedes-Benz Group AG collaborates closely with the relevant local authorities and interest groups.

In addition, Mercedes-Benz Group is in the final phase of concluding a long-term power supply contract with a major energy provider. The power will be generated by a newly constructed offshore wind farm in Germany, which is due to go into operation by 2027. The supply contract covers more than 25% of the company's entire power requirement in Germany.

The production of the EQS at Factory 56 in Sindelfingen since May 2021 is a great example of the sustainable and CO₂-neutral on the balance sheet vehicle production of the future at Mercedes-Benz. A PV system supplies the production shop with around 30% of self-generated, green electricity each year – but also feeds a stationary battery bank operated by Mercedes-Benz Energy. It has a capacity of 1400 kWh and serves as a buffer on days when there is little sun, for example.


More sustainable heat supply

The Mercedes-Benz Group is also reducing CO₂ emissions arising from the plants' heat supply. Among other things, biomethane and geothermal energy are to be used, and heat pumps powered by green electricity are to be put into operation.

In 2022, Mercedes-Benz Cars gradually increased its purchases of biomethane for production processes at German locations. Several Mercedes-Benz production locations use district heating, including the Mercedes-Benz Vans plant in Ludwigsfelde (Germany). This is generated from over 60% renewable energy sources and thus reduces the CO₂ emissions of the company's own Sprinter production at the site. Other Mercedes-Benz locations are supplied by biomass heating plants.

Offsetting CO₂ emissions

Since early 2022, all CO₂ emissions (Scope 1 and Scope 2) at production facilities operated by the Mercedes-Benz Group that have been as yet unavoidable have been offset by means of carbon offsets from qualified climate change mitigation projects.²

Remaining emissions are produced mainly in the combined heat and power plants which generate electricity and heat with natural gas. All offsetting projects comply with international accounting requirements and the high quality demands of the  Gold Standard. In this way, the Mercedes-Benz Group supports projects that meet very high quality criteria, are subject to a reliable calculation methodology and avoid double counting. The climate-protection projects not only avoid CO₂ emissions but also promote sustainable, socially beneficial and environmentally friendly development in many ways in the countries where the projects take place. The portfolio includes offset projects such as small-scale biogas plants in Nepal and CO₂-reduced drinking water treatment in Nigeria and Kenya.

The focus of the Mercedes-Benz Group's climate policy is to reduce and avoid CO₂ emissions. According to the Intergovernmental Panel on Climate Change (IPCC),

the global climate targets cannot be achieved through reduction measures alone. In addition, CO₂ would also have to be removed from the atmosphere. The Mercedes-Benz Group therefore also intends to include CO₂ removal projects in its portfolio in the future.

Global battery production network

Mercedes-Benz aims to be fully electric by 2030 – wherever market conditions permit. In this process, the local production of batteries is a crucial element for flexibly and efficiently meeting the global demand for electric vehicles. To this end, Mercedes-Benz relies on a global battery production network, which is an important component of the worldwide production network.

The network consists of factories on three continents: battery systems are manufactured in Kamenz (Saxony), in the Hedelfingen part of the Untertürkheim plant in Stuttgart, as well as in Bangkok (Thailand), Beijing (China) and Jawor (Poland). The battery plant in Esslingen-Brühl near Stuttgart started production of plug-in hybrid batteries in mid-2022; the battery factory in Tuscaloosa, USA, began operations in the reporting year. The Mercedes-Benz battery production network will also be supplemented by a further battery factory at the Sindelfingen location. To further reinforce its capacities in the global battery production network, the company is cooperating with GROB in Mindelheim – a specialist in the field of battery plant technology. The goal is to jointly develop and set up assembly systems for upcoming battery modules and systems. The plants are to produce batteries for the Mercedes-Benz EQ models that will leave the production lines from 2025.

More sustainable transport logistics

On the way towards CO₂-neutral on the balance sheet transport logistics, Mercedes-Benz AG is committed to the prevention and reduction of CO₂ emissions in the global transport network. In 2022 around 2 million Mercedes-Benz vehicles were transported around the world. In addition, the European production networks of Mercedes-Benz AG received nearly 6.6 million t of production materials. Mercedes-Benz AG is continually optimising its logistics in order to reduce the associated CO₂ emissions.

² This information was audited in order to obtain limited assurance

Among other things, in the reporting year, the company improved the transport network for the supply to the Asian markets: thanks to shorter transport routes, around 20,000 t of CO₂ were avoided, compared with the previous year. The company also wants to shift more transport from road to rail, and is focusing on an expansion of rail transport: in August 2022, work began on a new rail siding with logistics centre at the Mercedes-Benz plant in Jawor (Poland). This expansion is to facilitate the delivery of batteries from Jawor to Mercedes-Benz plants around the world from 2024.

Together with DB Cargo, the company opened the logistics centre for the Mercedes-Benz plant in Bremen in 2021. The Centre for Battery Logistics is the hub of the CO₂-neutral on the balance sheet logistics concept for the battery systems of the new Mercedes EQ model, the EQE. Since 2022, DB Cargo has been transporting the systems on a CO₂-neutral on the balance sheet basis from the Mercedes-Benz Hedelfingen plant in Stuttgart to Bremen by using green electricity. For marine transport of components from Bremerhaven to India, Mercedes-Benz AG relies on biofuels and was able to reduce CO₂ emissions by around 9,000 t in the reporting year compared with the previous year. Furthermore, in close cooperation with its transport service providers, Mercedes-Benz AG is examining innovative transport concepts and new means of transport such as freight sailing ships to further avoid and reduce emissions in its logistics. Until these climate-friendly transport alternatives and technologies become available, Mercedes-Benz AG continues to support qualified climate protection projects.

More sustainable sales operations

The Mercedes-Benz Group has set itself the goal of making its sales more climate-friendly – but this can only be achieved with the support of its sales partners.

By 2030, all sales partners worldwide are expected to achieve the goal of CO₂-neutral on the balance sheet operation. The focus here is on identifying and implementing measures that help to avoid and reduce CO₂ emissions. This includes switching to green electricity contracts, the energy-efficient refurbishment of existing buildings and the construction of highly energy-efficient new buildings. This is based on the global CO₂ emissions of the Mercedes-Benz Sales

Organisation, which the company determined for the first time in the reporting year, as well on continuous reporting for subsequent years. This enables the Mercedes-Benz Group to check the effectiveness of the implemented measures and to measure the realised CO₂ reduction. In addition, it plans to develop an interactive platform in 2023 which includes all concepts, tools and measures relevant to CO₂ reduction. At the same time, the platform is intended to provide the strategic framework for the sustainability efforts of the Mercedes-Benz Sales Organisation.

The own-retail outlets of Mercedes-Benz AG in Germany, like the Mercedes-Benz plants, have been operated on a CO₂-neutral on the balance sheet basis with effect from 2022. In addition to the nationwide switch to green electricity, the focus in the reporting year was on avoiding or reducing energy consumption in the own-retail outlets and sales buildings – for example, by switching to LED lighting and taking modernisation measures. Increasing energy efficiency remains the focus of the dealerships.

Effectiveness and results

Effectiveness of the management approach

GRI 3-3

The Mercedes-Benz Group uses internal and external tools to determine how much progress its plants are making in achieving the climate-protection targets. The Mercedes-Benz Group has defined the parameters for in-house reviews, and it regularly monitors these parameters. An external auditing company annually audits a selection of corporate goals and their implementation. The company uses the results to adapt and further develop its climate protection measures.

Results

GRI 302-1 GRI 305-5

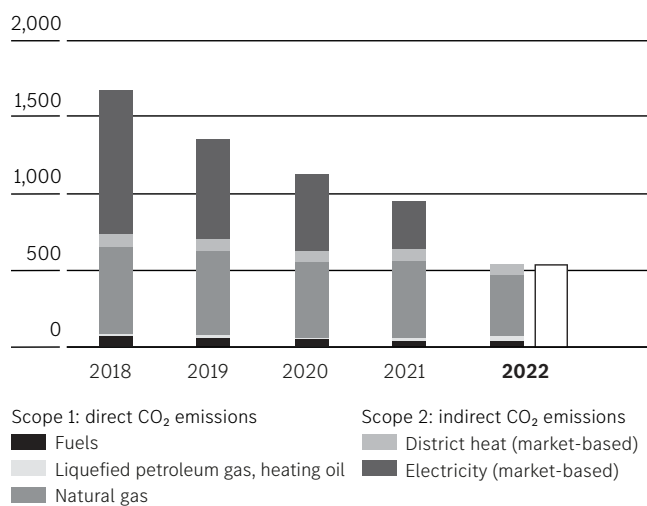
The Mercedes-Benz Group has been systematically recording climate protection measures in a database for many years. Using the data, it can efficiently monitor its self-designated targets, as the respective measures can be stored and tracked in the database with the corresponding calculations for CO₂ reduction.

During the reporting year, Mercedes-Benz Cars and Mercedes-Benz Vans employed a bundle of measures that enabled them to reduce CO₂ emissions in production (Scope 1³ and Scope 2⁴) from 946,038 t in 2021 to 537,821 t in the year under review, and thus by 43% compared to the previous year. In the reporting year, the Mercedes-Benz Group already achieved its target of reducing CO₂ emissions at its own plants (Scope 1³ and Scope 2⁴) by 50% by 2030 compared to 2018. This target was confirmed by SBTi (in 2018, Scope 1 emissions comprised 650,000 t CO₂ and Scope 2 emissions 1,040,000 t CO₂) and is also being pursued beyond the production sites for the central functions considered. Since early 2022, all CO₂ emissions (Scope 1 and Scope 2) at production facilities operated by the Mercedes-Benz Group that have been as yet unavoidable have been offset by means of carbon offsets from qualified climate change mitigation projects.⁵

Scope 1 (direct) and Scope 2 (indirect) CO₂ emissions in production

GRI 302-1/-5

in 1,000 t



□ CO₂ compensation for unavoidable emissions¹

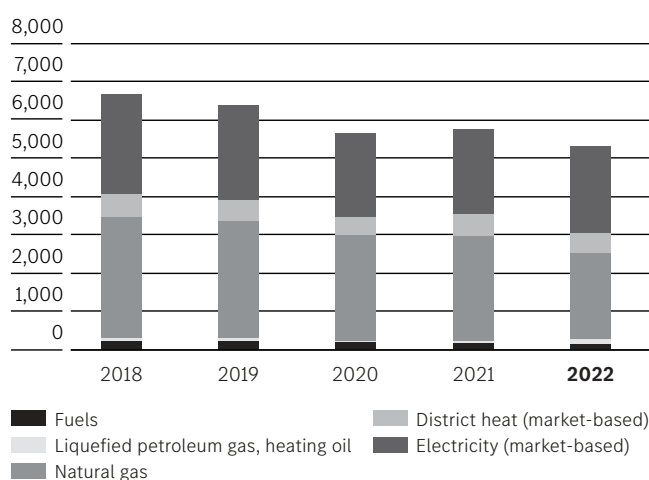
¹ Compensation amounts up to 2021 are not shown. These are small quantities.

In the production of Mercedes-Benz Cars, renewable energies accounted for 100% (1,956 GWh) of total electricity consumption and 48% (2,044 GWh) of total energy consumption in the reporting year. At Mercedes-Benz Vans, renewable energy accounted for 100% (326 GWh) of total electricity consumption and 38% (341 GWh) of total energy consumption.

Energy consumption in production

GRI 302-1/-5

in GWh



³ Scope 1 emissions are direct greenhouse gas emissions from sources that are the direct responsibility of or controlled by the company

⁴ Scope 2 emissions are indirect greenhouse emissions from bought-in energy, such as electricity, or district heating that are externally generated but used by the company

⁵ This information was audited in order to obtain limited assurance

Key figures

CO₂ emissions from energy consumption (in 1,000 t)³

GRI 305-1/-2

	2021 ²	2022
CO ₂ direct (Scope 1)	681	569
CO ₂ indirect (Scope 2) — Market-based	466	94
CO ₂ indirect (Scope 2) — Location-based	1,123	1,121
Total — Market-based¹	1,148	663
Total — Location-based¹	1,805	1,690

1 Since 2016, the "Market-based" and "Location-based" accounting approaches have been implemented in accordance with GHG Protocol Scope 2 Guidance.

Since then, the Market-based-approach has been the standard accounting method.

2 These data have been adjusted due to the spin-off and hive-down of the Daimler commercial vehicle business as an independent company, nonetheless, they still contain minor uncertainties as adjustments for combined locations and units can first be made in financial year 2022.

3 The key figures were audited in order to obtain limited assurance.

Specific CO₂ emissions (in kg/vehicle)¹

GRI 305-1/-2

		2017	2018	2019	2020	2021	2022
Cars	CO ₂ direct (Scope 1)	250	267	279	326	349	258
	CO ₂ indirect (Scope 2) — Market-based ²	565	562	431	426	306	57
	Total — scope 1 & 2	815	829	711	752	655	316
Vans	CO ₂ direct (Scope 1)	340	355	346	333	353	269
	CO ₂ indirect (Scope 2) — Market-based ²	157	196	160	147	141	9
	Total — scope 1 & 2	497	551	506	479	493	279

1 Excluding CO₂ from liquid fuels

2 Since 2016, the "Market-based" and "Location-based" accounting approaches have been implemented in accordance with GHG Protocol Scope 2 Guidance.

Since then, the Market-based-approach has been the standard accounting method.



Air quality

Materiality and goals

GRI 3-3

Target	Target horizon	Status as of 2022
The entire new car fleet of the Mercedes-Benz Group is no longer to have any relevant effect on nitrogen dioxide pollution in urban areas.	2025	Achieved

The corporate responsibility of the Mercedes-Benz Group as an automotive manufacturer includes bringing individual mobility, climate protection and air quality into harmony. Inner-city air quality is an important environmental aspect for the Group.

The EU Commission is actively imposing stricter limits for air pollutants: its proposed revision of the European Air Quality Directives includes standards envisaged for the period from 2030, which are more closely aligned with the guidelines of the World Health Organization (WHO). The proposed legislation is being negotiated between the European Parliament and the Member States.

In addition, the EU Commission presented its proposal for the new Euro 7 emission standard on 10 November 2022: the successor to the Euro 6 emission standard tightens the limits for pollutant emissions of vehicles. In addition to new exhaust emission regulations, the proposed legislation also envisages particulate matter limits for brake and tyre abrasion for the first time. In this context, the EU Commission announced that it would develop a measurement method for tyre abrasion by the end of 2024.

To comply with future regulatory requirements, the Mercedes-Benz Group is constantly advancing its technologies.

Improving air quality in urban areas

Strategy and concepts

Fewer air pollutants – in vehicles and production

GRI 3-3

In order to reduce the pollutant emissions of its vehicles, the Mercedes-Benz Group specifies certain properties and necessary measures in the concept and/or performance specifications for the engines. These concept and performance specifications are approved by the Committee for Model Policy and Product Planning. This is the highest body at Mercedes-Benz Cars, and it determines all product-related topics.

However, it is not only the vehicles of the Mercedes-Benz Group that produce air pollutant emissions, its production locations also play a part: reducing them is a constant task and challenge – for the plant and equipment planning as well as for daily operations.

Depending on their type and size, the plants in Germany are legally obliged to appoint immission control officers. Depending on the air pollutant, the maximum values and requirements for emissions and immissions are regulated by law – these apply as the benchmark for the production plants and for product development at the Mercedes-Benz Group.

Of particular importance are so-called volatile organic compounds (VOCs). In addition, the heat and power generation plants release nitrogen and sulphur oxides as well as fine particles. The latter also occur in the extraction of welding smoke from the body shop areas. All three are also significant air pollutants that must be reduced.

Measures

In order to further reduce the pollutant emissions of its vehicles and production locations, the Mercedes-Benz Group intends to continue developing measures.

Measures in the development and production processes

Product design is a central starting point for the Mercedes-Benz Group for improving its performance in the area of air pollutant emissions from the ground up. The Group is continuously working on suitable solutions and is investing in appropriate technologies and measures to ensure that the air quality continues to improve.

Diesel engines cause less nitrogen oxide emissions

The Mercedes-Benz Group has further reduced the NO_x emissions of its diesel engines through technologically innovative approaches. This was made possible by a complete package of engine and exhaust gas aftertreatment.

Vehicles with diesel engines of the latest generation have low NO_x emissions in real driving – on many journeys they actually record values according to the RDE measuring process that are significantly lower than the current laboratory threshold limit of 80 mg/km. In continuous operation covering many thousands of kilometres under RDE conditions, they achieve average emissions of around 20 to 30 mg NO_x/km.

Technical Compliance Management System

GRI 416-2

The work in the development departments requires precise knowledge of the processes and framework conditions – this is the only way to ensure that technical/regulatory requirements, standards and laws are systematically complied with. That is why Mercedes-Benz Cars and Mercedes-Benz Vans support their employees with a “technical Compliance

Management System” (tCMS). This is to ensure that all legal and regulatory requirements are met throughout the product development and certification process.

[➤ Compliance with technical and regulatory requirements](#)

Reduced solvent emissions in production

The Mercedes-Benz Group seeks to be a leader in dealing with the production-related emissions of VOCs in the automotive sector. VOC refers to a group of highly volatile organic hydrocarbon compounds. These substances can easily pass from the liquid to the gaseous phase and are frequently harmful to human health. In automobile production, VOCs are primarily released in the vehicle painting process. Different countries use a variety of methods to define and record VOCs; as a result, it is difficult to achieve uniform worldwide documentation. Moreover, the documentation of these emissions must be in conformity with various legislative limit value specifications.

In order to reduce VOC emissions at its own production locations, the Mercedes-Benz Group plans to modernise and optimise old paint systems or build new ones in the coming years. In addition, Mercedes-Benz AG has concluded a public-law agreement with the City of Sindelfingen: It stipulates that the Mercedes-Benz Group may not release more than 20 g of VOC per square metre of painted vehicle surface at the Mercedes-Benz Sindelfingen plant. Measurements show that the actual emissions achieved at the Sindelfingen plant are lower.

Measures in the use phase

Intelligent utilisation concepts allow a further reduction in pollutant emissions. The Mercedes-Benz Group has also developed comprehensive concepts for air quality in the vehicle cabin for the protection of drivers and passengers.

Hardware retrofit promoted

Mercedes-Benz Group AG is participating in a voluntary hardware retrofit programme for diesel vehicles initiated by the German federal government. Specifically, the parent company subsidises hardware retrofitting with up to €3000 incl. VAT per vehicle – provided certain conditions are met. The hardware retrofit must be developed and offered by a third-party supplier and approved by Germany’s Federal Motor Transport

Authority (KBA). The offer is aimed at private owners of affected Mercedes-Benz models who have their primary residence in a priority region. These regions were defined by the Federal Ministry of Transport and Digital Infrastructure in 2017.

The air quality in the 15 priority regions has improved demonstrably since 2017. Even though the demand for hardware retrofit has decreased significantly, the programme will continue until further notice.

Brake abrasion as a source of particulate matter

When a vehicle is braked, the abrasion of the brake linings and brake discs produces what is known as brake dust. In order to be able to investigate the type and volume of particulate matter contained in this dust, a reliable measurement method is needed. Against this background, the Mercedes-Benz Group is an active member of the “Particle Measurement Programme” Working Group of the United Nations Economic Commission for Europe (UNECE). The aim is to develop a reliable measurement method.

In addition, the Mercedes-Benz Group is involved in other working groups dealing with the issue of particle emissions during braking – including those of the German Association of the Automotive Industry (VDA), the European Automobile Manufacturers’ Association (ACEA) and the International Automobile Manufacturers’ Association (OICA).


At the same time, the Mercedes-Benz Group examines actual values of the volume of particulate matter produced and the effect of potential measures in order to reduce the brake abrasion of its own vehicles.

As a consequence of the increasing share of hybrid and battery-electric vehicles, brake dust emissions are falling significantly, since a considerable proportion of the deceleration in these vehicles takes place through the process of recuperation by the electric motors and thus almost or completely without any brake dust emissions.

Nevertheless, the Mercedes-Benz Group continues to cooperate with scientific institutes and conducts research into braking, also with respect to tyre abrasion. Current research on tyre abrasion involves the development of a measurement method that

characterises the tyre abrasion with regard to microplastics. The Group is constantly advancing its technologies with a view to staying below the recommendations of the EU Commission and future limits today and in the future.

Actively improving air quality

The “ technology platform SUSTAINER” based on the eSprinter from Mercedes-Benz Vans integrates a variety of innovative solutions for more sustainable delivery operations – and has the potential to contribute to better air quality in cities in the future: In addition to battery-electric drive, the “SUSTAINER” has fine particulate matter filters on board that compensate particulate emissions in the immediate vicinity of the vehicle. A filter is integrated into the front module and – together with the suction fan that is already in the vehicle – filters particulate matter from the air. This enables it to also filter the surrounding air at low driving speeds and during the charging process. In addition, low-emission and low-wear brake discs and tyres optimised for low rolling resistance with less wear reduce the technology platform’s own particulate emissions.

In order to gain comprehensive knowledge about this technology in terms of effectiveness, weather influences and service life in real operation, Mercedes-Benz Vans, the Austrian Postal Service and MANN+HUMMEL launched a pilot project in the reporting year. For this purpose, two eSprinters were equipped with optimised particulate filters in the front module. These vehicles have been on the streets in the Graz city centre since August 2022. In addition, built-in sensors determine values for the concentration of particulate matter. The project is supported by the Institute for Energy and Environmental Technology in Duisburg.

Local concepts for air quality

Intelligent mobility and logistics concepts can also help to improve air quality in cities. In the reporting year 2022, the Mercedes-Benz Group initiated measures for environmentally friendly employee mobility at the Sindelfingen location under the leadership of the Corporate Mobility Working Group. Measures include buses for commuters and a concept for providing bicycles.

As part of the local “Mobility Pact Rastatt”, for example, Mercedes-Benz AG has continued to push ahead with

the establishment of a cross-border bus service for employee transport between Rastatt and Alsace. The line is to be tied into the local public transport system and enable employees from Alsace to commute more sustainably between the plant and their homes. The concept also contributes to reducing the regional traffic volume. The bus line to Alsace started operation in December 2022.

On the initiative of the management and the General Works Council of the Mercedes-Benz Group, the Group has been offering employees of Mercedes-Benz Group AG, Mercedes-Benz AG and Mercedes-Benz Intellectual Property GmbH & Co. KG the opportunity to order up to two bicycles since April 2022. These are financed through deferred compensation from collectively agreed benefits, among other things. For this purpose, the three companies have concluded a general works agreement on the provision of bicycles with the employee representatives.

Since 2021, the Mercedes-Benz Group has also been using the car sharing app “FreeFloating” at the Sindelfingen location for short trips with a company car: As part of the pilot project, employees can borrow and return the vehicles at the plant exclusively via the app. In view of the positive feedback, the car sharing app was also introduced in Stuttgart in October 2022 – the plants in Bremen and Rastatt are to be integrated into the scheme in early 2023.

Complementing the ViaVan service in Bremen, the on-demand shuttle service “VAN2SHARE” has been available at the Sindelfingen location since September 2022: employees are able to make individual travel requests for business purposes, including off-site, via an app. These are then intelligently coordinated. If required, up to six fully electric vans can be in use. “VAN2SHARE” is intended to replace little-used diesel-powered bus services; it is hoped that this will save around 95 t of CO₂ annually.

Reducing interior emissions and allergens

Clean air and allergy-tested surfaces in vehicle interiors are very important for the safety and comfort of the occupants. During the vehicle development, the Mercedes-Benz Group therefore makes sure that emissions and allergens in the interior are reduced.


In addition, it uses filters in the air conditioning system that limit the penetration of allergens. Since 2016, many of the Mercedes-Benz passenger car model series have carried the European Centre for Allergy Research Foundation (ECARF) Seal of Quality for vehicle interiors. The ECARF seal is awarded to products whose anti-allergenic properties have been demonstrated in scientific studies.

The following measures also contribute to reducing interior emissions and allergens in vehicles of the Mercedes-Benz brand:

- Further development of the delivery specifications with regard to emissions and odours in vehicle interiors – including limit value specifications for suppliers
- Continuous component optimisation and further development of the materials and manufacturing processes used for interior components
- Verification of the interior emissions through measurements in the company's own vehicle test chamber

Effectiveness and results

GRI 3-3

The Mercedes-Benz Group regularly reviews the plants' compliance with the internal and external environmental protection requirements and reporting obligations as part of the environmental management activities at its production facilities. Among other things, control checks are carried out to see whether the plants' operations are in compliance with the laws regarding air emissions. Should any environmentally relevant incidents occur, the Mercedes-Benz Group records them and remedies any damage. The management system is monitored both through external audits as part of the ISO 14001 certification and EMAS validation processes as well as through internal environmental risk assessments (environmental  **due diligence** process).

The Mercedes-Benz Group takes the pollutant emissions of its vehicles into account at an early stage of the development process. In the documentation that

accompanies the development, the Group specifies certain characteristics and target values for each vehicle model and engine variant. The Mercedes-Benz Group also uses these specifications to evaluate milestones it achieves during the product development. Here, it compares the actual project status with the target values and – if necessary – initiates corrective measures.

The current Mercedes-Benz vehicles with Euro 6d emission standard have only a very small impact on NO₂ pollution in cities due to their low emission level. The Mercedes-Benz Group has demonstrated this by means of detailed modelling in different high-traffic areas – so-called hotspots – in Stuttgart, Berlin and Munich, and has discussed the matter with external experts. The modelling approach takes into account both vehicle and traffic-related information – for example, the distance the vehicles have travelled to the hotspot. If all cars and vans in these high-traffic areas were to be replaced by new Euro 6d cars with combustion engines, their NO₂ contribution to air quality in these areas would be reduced to less than 2 µg/m³. This means that the Mercedes-Benz new passenger car and van fleet no longer has any relevant influence on inner-city air quality values. Thanks to the increasing electrification of the fleet, the NO₂ values will continue to improve. At the same time, the Mercedes-Benz Group is continuously working on further reducing the emissions of the vehicle fleet with combustion engines in order to meet future emission standards.

Settlement of the legal dispute over diesel emissions

GRI 2-27

In 2020, Mercedes-Benz Group AG – formerly Daimler AG – and its subsidiary Mercedes-Benz USA LLC (MBUSA) took another important step toward obtaining legal certainty in connection with various diesel-related proceedings in the USA. After the US regulatory authorities agreed to a settlement of civil and environmental claims in September 2020, this settlement was approved by the competent US federal court for the District of Columbia in the reporting year. With this court approval, the settlement became effective. The regulatory proceedings regarding the emission control systems of approximately 250,000 diesel vehicles in the USA have thus come to a conclusion.

Mercedes-Benz Group AG and Mercedes-Benz USA LLC have cooperated fully with the US regulatory authorities in the investigation of the incidents. In the course of the proceedings, they did not receive a Notice of Violation from the [🔗 Environmental Protection Agency \(EPA\)](#) or the [🔗 California Air Resources Board \(CARB\)](#). In contrast to the settlement agreements of other manufacturers, Mercedes-Benz Group AG and Mercedes-Benz USA LLC were also not placed under the supervision of an external controller (compliance monitor).

Another settlement agreement for civil claims brought by consumers for 215,000 vehicles was implemented after its court approval. The settlement period ended on 1 October 2022, as a consequence of which the implementation of the settlement was completed shortly afterwards.

As set forth in the settlement agreements, Mercedes-Benz Group AG and Mercedes-Benz USA LLC deny the allegations made by the agencies and claims made by consumers in the class action lawsuit resolved by the settlement and do not admit any liability vis-à-vis the USA, California, the plaintiffs or otherwise. The settlements mark the end of the pending civil proceedings of Mercedes-Benz Group AG and Mercedes-Benz USA LLC with the US authorities and consumers, without establishing whether functionalities in the vehicles constitute inadmissible defeat devices.

On the basis of the existing compliance programme, the Mercedes-Benz Group consolidated its existing processes and structures into a Group-wide “technical Compliance Management System” (tCMS) in the year 2016 and has instituted a series of measures to reinforce technical compliance since that time. To this end, the Mercedes-Benz Group AG has invested in appropriate resources and created jobs. The elements of the tCMS are listed in the Compliance Operating Plan, which is an annex to the settlement agreement with the US government. As part of the settlement with the US authorities, Mercedes-Benz Group has agreed to keep advancing the existing tCMS on a continuous basis.

A detailed description of the institutional proceedings related to diesel emissions can be found in the Group’s risk report.

[🌐 Risk and Opportunity Report, AR 2022](#)

In the reporting year, the European Commission, Mercedes-Benz Group AG and other German car manufacturers also agreed on a settlement, and thus concluded the proceedings for anti-competitive behaviour in connection with the development of SCR [🔗 catalytic converter](#) systems for passenger cars with diesel engines. The proceedings related to the period between 2009 and 2014.

Key figures

Airborne emissions (in t)

GRI 305-7

	2021 ¹	2022
Solvents (VOC)	3,780	4,036
Sulphur dioxide (SO ₂)	13	20
Carbon monoxide (CO)	1,269	1,077
Oxides of nitrogen (NO _x)	625	455
Dust (total)	149	108

¹ These data have been adjusted due to the spin-off and hive-down of the Daimler commercial vehicle business as an independent company, nonetheless, they still contain minor uncertainties as adjustments for combined locations and units can first be made in financial year 2022.

A photograph of a wooden block with a pile of dark, crumbly material on top, set against a teal background with falling particles.

Resource conservation

Materiality and targets

GRI 3-3

Target	Target horizon	Status as of 2022
Increase the share of secondary raw materials per vehicle ¹ – Cars 40%	2030	According to plan
Reduce energy consumption per vehicle ² – Cars –43% – Vans –25%	2030	According to plan
Reduce water consumption per vehicle ² – Cars –33% – Vans –28%	2030	According to plan
Reduce the amount of disposal waste per vehicle ³ – Cars –82% – Vans –85%	2030	According to plan
Reduce the total amount of waste per vehicle ³ – Cars –35% – Vans –30%	2030	According to plan

1 On average for the Mercedes-Benz passenger car fleet excluding smart and Vans.

2 In production compared to average for 2013/2014.

3 In production compared to 2018.

The increasing demand for mobility is also leading to an increase in the worldwide consumption of resources — with negative consequences for the environment and society. For example, in many cases the extraction and further processing of primary raw materials is energy-intensive and leads to the emission of pollutants into water, soil and air. Not least, the use of natural resources also entails social risks. That's why the goal of the Mercedes-Benz Group is to increasingly decouple its consumption of resources from the growth of its production volume: it has set out to reduce the use of

primary resources per vehicle. By 2030, the share of secondary raw materials for the passenger car fleet is to be increased to an average of 40%. This is how the Group wants to contribute to the promotion of both economic growth and sustainability. The Mercedes-Benz Group can only succeed in this by consistently conserving resources and further closing the recycling loops.

To reduce the consumption of energy, water and waste, the Group works continuously to make its production more efficient and environmentally friendly.

More resource-efficient vehicles

Strategy and concepts

Decoupling resource consumption from growth

GRI 3-3

Today, the vehicles of the Mercedes-Benz Group consist mainly of materials such as steel, iron, aluminium and plastic. However, natural resources are required for their production. The Group's goal is to keep precisely this consumption of natural resources as low as possible.

As electric mobility becomes more widespread, the demand for specific raw materials is also changing. Examples are cobalt and lithium, along with nickel, graphite, manganese and copper. The Mercedes-Benz Group takes an in-depth look at these raw materials in the context of comprehensive raw material assessments in order to counter both potential human rights risks and environmental risks. In addition, the Mercedes-Benz Group has a strategy for important raw materials that are sourced both directly and indirectly, which safeguards its requirements for the long term. In the case of critical raw materials, the strategy focuses on intensive research of substitution technologies and ensuring the responsible procurement of raw materials.

[➔ Battery development](#)

The Mercedes-Benz Group's vision therefore is, as far as possible, to transform its entire value chain into a closed loop. To this end, it wants to return its production waste and used materials to the material cycle, including for example the batteries from electric vehicles, which still contain a considerable quantity of valuable materials. The recycling and reuse of these and many other raw materials is at the focus of the Group's current strategic activities and will remain so in the future. It is both important and necessary to involve suppliers even more strongly – for example through dialogue and clear objectives. In addition, the Mercedes-Benz Group is involved in various initiatives

with the aim, among other things, of reducing the resource consumption of important raw material industries.

Resource use

GRI 3-3 GRI 301-1

In the Mercedes-Benz Group, the areas of vehicle concepts, vehicle development, procurement, production planning and manufacture are primarily responsible for ensuring that resources are used sparingly. Decisions in this topic area are made by the specialist committees responsible for the respective model series, comprised of representatives of the individual shops involved.

Decoupling

Global vehicle sales




Promoting the circular economy
Reducing resource consumption



Resource consumption

Time

Corporate management is always involved in fundamental decision-making regarding design concepts, manufacturing technologies and the utilisation of materials. When making such decisions, it takes multiple factors into account. These include costs, resource-efficient technologies, and the use of alternatives such as secondary materials and renewable raw materials and the potential for industrialisation. In the process, the Group's management examines the extent to which development results can be transferred to large-scale industrial production, for example, with regard to the use of raw materials.

Mercedes-Benz Cars and Mercedes-Benz Vans use approximately 4.7 million t of raw materials per year for the production of their products. Both segments are focusing on further reducing the quantities of raw materials required per vehicle in particular. To this end, they already follow the “Design for Environment” approach during vehicle development: accordingly, the specialist units already consider the composition of all materials to be used and investigate more sustainable alternatives during the concept phase. This applies both to surface materials and to materials which are not visible to customers. Examples in vehicle interiors include sustainably processed leather, fabrics with a high  **recycled content** and innovative materials. For the body panels and body-in-white, Mercedes-Benz uses materials such as recycled aluminium and steel, among others. Going forward, the aim is for the vehicles to be more resource-efficient and environmentally friendly throughout their entire lifecycle. The cornerstones of the approach are the use of recycled materials as well as lightweight construction techniques and recycling.

Identifying critical raw materials


Several types of raw materials which are needed for the production of electric vehicles are associated with certain risks. In order to better assess how critical the use of a raw material is or can become, Mercedes-Benz Cars and Mercedes-Benz Vans, together with partners from industry and science, conducted the “ESSENZ” research project back in 2015. The result is a holistic approach that is still used by engineers in both segments in the early stages of vehicle development. The procedure of the “ESSENZ” method is based on the lifecycle assessment methodology, which allows a systematic analysis of the environmental impacts along the entire lifecycle of a vehicle. However, in the “ESSENZ” approach, along with the geological availability, consideration is also given to socio-economic factors as well as social and societal risks.

Resource conservation along the supply chain

GRI 3-3 **GRI 308-1/-2**

The supply chain plays an important role in efforts to conserve resources. The Mercedes-Benz Group wants to decouple resource consumption from economic growth. To achieve this goal, it is relying on the support of its suppliers. It wants to continuously increase the use of secondary and renewable materials in its vehicles.

Against this background, Mercedes-Benz AG already carried out a risk analysis in 2018. **Steel, aluminium and plastics have been identified as particularly important materials in Mercedes-Benz vehicles. We need large volumes of these materials for the production of our vehicles, and their extraction and processing also consume large amounts of energy and resources. In 2020, Mercedes-Benz AG defined secondary material targets for these resources for Mercedes-Benz Cars and Mercedes-Benz Vans and anchored these in the requirements for all contract awards.**

With its  **Responsible Sourcing Standards**, the Mercedes-Benz Group has also incorporated other environmental requirements into its supplier agreements, including stipulations relating to compliance with environmental due diligence obligations and the use of resource-efficient production methods.


 **Sustainable materials**

Measures

Secondary materials and renewable raw materials

GRI 301-2

The closing of material cycles and the use of renewable raw materials are key measures for the responsible utilisation of resources. In order to achieve these goals, the Mercedes-Benz Group uses resource-efficient technologies and production processes. In addition, the Mercedes-Benz Group is increasingly using secondary materials such as recycled materials in its vehicles, along with renewable raw materials.

The Mercedes-Benz Group has set itself the target of increasing the use of secondary raw materials for the passenger car fleet to an average of 40% by 2030. In addition, since 2005 it has already been providing transparency concerning those products in which secondary raw materials are used. For this purpose, publicly viewable environmental certificates are created for the  **“360° Environmental Check”**. The test reports show, among other things, which components are made partly from resource-saving materials.

Use of secondary raw materials

Today, numerous series-production vehicles from Mercedes-Benz Cars and Mercedes-Benz Vans already contain recycled materials such as aluminium. This light alloy can be recycled without any loss of quality, while the recycling process uses only about 5% of the energy that would be needed to produce the aluminium from scratch. In its efforts to keep increasing the recycled content, Mercedes-Benz AG is working with its suppliers to develop aluminium alloys with a high end-of-life scrap potential, for example from old vehicles or packaging, which at the same time meet the high expectations in terms of quality, safety and durability.

For the vehicle interior, the Mercedes-Benz Group offers various leather-free trim and upholstery options. These include high-quality man-made leather and a microfibre weave. The latter is used for components such as seat covers, roof liners or pillar claddings, and is made up of around 50% recycled material. The recycled content is to be steadily increased in the future. In addition, Mercedes-Benz offers various interior upholstery fabrics produced from up to 100% recycled PET bottles. As part of its sustainable business strategy, the Mercedes-Benz Group also relies on the use of natural fibres and textiles to replace conventional plastics with renewable raw materials.

Another example of the possible use of secondary raw materials is SUSTAINEEER, a [technology platform](#) based on the eSprinter: its underbody panelling is made of recycled polypropylene, used tyres and the filler UBQ™. Mercedes-Benz Vans uses natural straw panels for the partition wall between the cab and load compartment. They are recyclable, biodegradable, formaldehyde-free and can be given a waterproof coating. All wooden elements are FSC®-certified; in other words, the wood comes from sustainably managed forests.

In the EQS, components with a total weight of over 80 kg are made partly from resource-saving materials. For example, the load compartment recess for the EQS is manufactured in an innovative injection moulding process and includes 60% recycled content. In addition, the thermoplastic material is easy to recycle, which conserves resources. In the upcoming E-Class, it is planned to make the load compartment well out of

recycled material to 80%. The floor coverings in the EQS use a nylon yarn made from recycled carpets and recycled fishing nets. In the EQE a total of 184 components, as well as small parts such as press studs, plastic nuts and line fasteners, representing a total weight of 78.3 kilos, can currently be made partly from resource-saving materials.

As part of a pilot series, both the EQE and EQS will be equipped with cable ducts containing the plastic-substitute material UBQ™. The UBQ™ material is obtained from mixed household waste, which was previously difficult to recycle and was therefore often incinerated or ended up as landfill. Food scraps and mixed plastics are among the materials used to make UBQ™. Additional applications of this new material for the production of underbody panels, wheel arch linings and engine compartment covers are being tested.

The Mercedes-Benz Group also relies on further innovative recycling processes and cooperations with partners to close the recycling loops. One example is chemical recycling: the company Pyrum Innovations AG first produces a [pyrolysis oil](#) from old tyres, which is then combined with biomethane from agricultural waste by the chemical company BASF. Using the two raw materials, the [mass balance approach](#) is used to create a recycled plastic, which for the first time has the same properties as new plastic made from fossil raw materials and is therefore suitable for technically demanding and safety-relevant Mercedes-Benz vehicle components. The approach is examined and independently certified according to [“REDCert2”](#) and [“ISCC PLUS”](#). Bow door handles were the first components to be fitted as standard in the S-Class and EQE in the reporting year. Upcoming models such as the EQE SUV will feature bow door handles made of this innovative plastic. In future, the use of the more sustainable recycled material is to be successively increased, and chemical recycling will also be used for other plastic components in the vehicle.

As far as new Mercedes-Benz passenger cars are concerned, the Group already defines a minimum proportion of [recycled content](#) for each component in its requirement specifications. This share varies depending on the vehicle's model and series.

To further promote the use of recycled materials, the Mercedes-Benz Group encourages dialogue between its experts and component and recycled material suppliers: before any contract is awarded, and during the joint design of components, suppliers of the Mercedes-Benz Group must present newly developed recycled materials and determine whether it is possible to switch components to the use of recycled content. Technical issues can be directly discussed.

Use of renewable raw materials

The Mercedes-Benz Group can also reap many benefits from the use of renewable raw materials: By using them, it is possible to reduce the weight of components. Moreover, their CO₂ balance is almost neutral when their energy is recovered, because the CO₂ released is only as much as was absorbed by the plant during its growth. Last but not least, renewable raw materials help to reduce the consumption of fossil resources. The Mercedes-Benz Group uses a wide range of renewable raw materials such as hemp, kenaf, wool, paper and natural rubber.

The Mercedes-Benz S-Class shows how many components can be made partly from renewable materials: for the interior, a microsandwich material was developed that is reinforced with natural fibres in many components. It is used in the map pockets in the door trims, in the tensioning part of seat backrests and for the rear shelf. The material weighs 40% less than a comparable conventional component. The lower weight leads to a decreased need for primary energy along the vehicle's path from production to use and finally to the end-of-life phase. Moreover, this material, which is made of natural fibres, is very break-resistant and thus contributes to vehicle safety.

Sustainable materials

The Mercedes-Benz Group attaches great importance to a more environmentally compatible processing of materials, such as leather. In the reporting year it tightened up its requirements for leather suppliers: starting in 2023, the Group hopes to shift gradually to using only sustainably produced and processed leather in all model series. The criteria range from animal husbandry to the tanning process. For example, Mercedes-Benz prescribes compliance with various animal welfare criteria. The Group requires its suppliers

to comply with the Animal Welfare Committee's "5 Freedoms Of Animal Welfare" for animal husbandry, for example. In addition, in a less environmentally damaging tanning process, only vegetable or other alternative tanning agents which are completely free of chromium may be used in the future – for example dried coffee bean husks, chestnuts or extracts from other renewable raw materials. Furthermore, the leather may only be processed in tanneries that are certified according to the Gold Standard of the "Leather Working Group". This includes important environmental aspects such as reducing the use of water, energy and chemicals in the tanning process.

In addition, the Mercedes-Benz Group works together with suppliers to continually improve the environmental compatibility of leather products. Partners must, for example, show a lifecycle assessment for the full value chain. In this way, targeted measures can be taken to reduce the ecological footprint of the leather.

The Mercedes-Benz Group emphatically opposes any form of illegal deforestation. It requires its suppliers not to contribute to or benefit from illegal deforestation in the course of their own business activities. Moreover, it contractually obligates its suppliers to take due diligence measures to support the protection of natural forests in the upstream supply chain.

At the same time, the Mercedes-Benz Group is researching animal-free, resource-conserving alternatives to genuine leather. In the development and selection of these materials, it pays attention to the highest possible recycled content or the use of renewable raw materials instead of crude oil-based raw materials. In the Mercedes-Benz "VISION EQXX" technology platform, various alternatives to real leather have already been presented – including a material made from powdered cactus fibres and a leather alternative made from mushroom mycelium, the underground root-like structure of fungi.

Battery development

Batteries are a key component of electric mobility. At the Mercedes-Benz Group, experts from various disciplines are working on all aspects of battery technology – from basic research to production maturity. The Mercedes-Benz Group is pursuing two

goals in this respect: on the one hand, it wants to keep reducing the use of critical materials such as cobalt in its batteries. Secondly, it intends to source battery cells exclusively with raw materials from mines that are audited in accordance with the “Standard for Responsible Mining” of the [Initiative for Responsible Mining Assurance \(IRMA\)](#).

The Mercedes-Benz Group has been investing in resource-efficient technologies and manufacturing processes for batteries for many years and is continuously working on optimising the present lithium-ion battery. To drive the development of present and future battery technologies, it is working with partners to increase the energy density of lithium-ion batteries, for example. Anodes with a high silicon content, for instance, and solutions in combination with solid-state technology are being tested.

In the middle of the reporting year, Mercedes-Benz AG also entered into an important strategic partnership with the start-up Rock Tech Lithium Inc. in order to secure the lithium supply for the all-electric future. The aim is to secure the raw materials for battery production in the course of strategic direct procurement. The partnership enables Mercedes-Benz AG to supply its battery partners with high-quality lithium hydroxide to increase its production of all-electric vehicles. Under this agreement, Rock Tech has pledged to supply Mercedes-Benz AG and its battery partners with an average of 10,000 t of lithium hydroxide per year. The cooperation will start in 2026 with a qualification phase.

Lightweight construction

Intelligent lightweight construction can reduce the weight of a vehicle. To guarantee the high safety and comfort standards at the same time, it is important to choose the right materials. Component design and manufacturing technology also play an important role here. The highest share of the total weight of a conventionally powered passenger car is accounted for by the bodyshell, at 35%. This is followed by the suspension at 25%, the comfort and safety features at 20% and the engine and transmission, likewise at 20%. Thus the most effective approach is to focus on the vehicle's bodyshell.

Aluminium is light, strong and has other positive properties. For the bodyshell, the Mercedes-Benz Group is increasingly using aluminium alloys for exposed automotive panelling (bonnet, wing, roof, boot lid) and reinforcement components (inner part of the bonnet, roof reinforcements).

Involvement in raw material initiatives

GRI 308-2

Raw materials initiatives serve as important platforms to drive responsible, more environmentally and climate-friendly procurement of raw materials. At the Mercedes-Benz Group, the focus is on [aluminium](#) and steel.

Aluminium Stewardship Initiative: The Mercedes-Benz Group joined the Aluminium Stewardship Initiative (ASI) in 2018. In doing so, it is supporting the introduction and dissemination of an independent certification system for the entire aluminium value chain that combines ecological and social aspects. As a participant in the ASI's Standards Committee, in the reporting year, the Group contributed to the further development of the initiative's “Performance Standard” and “Chain of Custody Standard”.

These standards play an important role for the Group, both as awarding criteria in aluminium procurement and for the optimisation of its own production: suppliers to the Mercedes-Benz Group's European foundries and extrusion plants now only receive awardings on condition that the primary aluminium used has passed through ASI-certified production stages from the mine to the rolling mill. The “Performance Standard”, for example, is applied in the press plants of the Group's own production facilities: in 2022 all five European press plants, at which parts such as bonnets are stamped, were successfully certified according to the ASI “Performance Standard”. Among other things, the environmental design of their aluminium products and their efforts in scrap segregation were audited for this purpose.

Responsible Steel Initiative: The Mercedes-Benz Group has been a member of the Responsible Steel Initiative since 2018, because steel is the material that is proportionally most used in cars and represents the world's largest raw materials industry. The Responsible Steel Initiative has developed a uniform certification

scheme which includes requirements for the responsible use of resources and addresses the greenhouse gas emissions of the steel industry. The requirements for the certification scheme were drawn up with the involvement of various stakeholders, including the Mercedes-Benz Group. In this regard, the perspective of the end customers has been given special consideration. Since 2022, product-specific certification has been possible, as well as plant certification. For this purpose, corresponding requirements have been developed in the areas of “CO₂” and “Responsible Sourcing”.

➤ Steel

➤ Aluminium

The circular economy

GRI 301-3

The overriding goal of the ➤ **Circular economy** is to preserve the value of products, components and materials for as long as possible. The Mercedes-Benz Group too is increasingly depending on measures that promote the circular economy. In doing so, it follows the ➤ **Waste hierarchy**: the top goal is to avoid waste. To achieve this, the Mercedes-Benz Group is working on extending the service life of all vehicle components – for example, by using particularly durable materials. It also uses resources efficiently and reduces the use of raw materials with limited availability. Only then does it move down the hierarchy of waste to measures for reusing various components and parts and for recovering materials by means of recycling.

Reuse – new life for used parts

At the Mercedes-Benz Used Parts Centre (MB GTC), was founded in 1996, more than 5000 vehicles are dismantled each year. The aim is to remove as many components as possible in order to sell them as used replacement parts.

Initially, in-house experts check all removed parts for their quality. The parts are offered for sale with the same warranty as new parts only if they meet the standards of MB GTC. According to the waste pyramid, reuse is the highest level of the circular economy, so that MB GTC makes a valuable contribution to sustainability and resource conservation.

Components that do not meet MB GTC's requirements go on to be further reprocessed. This recycling process

means that valuable raw materials can be recovered and kept in circulation – for example copper from vehicle wiring, gold from the circuit boards of control units or platinum from ➤ **catalytic converters**.

Remanufacturing – value retention for prolonged life

In the remanufacturing process, the Mercedes-Benz Group reconditions used vehicle parts in order to reuse them. In this process, Mercedes-Benz genuine parts for passenger cars and vans are reconditioned so that they correspond to a new part in terms of function, safety and quality. The vehicle parts are only recycled when they can no longer be reused in a vehicle.

Remanufacturing enables avoiding waste, conserving raw materials and reducing energy consumption. A calculation certified by TÜV SÜD shows that the remanufacturing of a NAG2 transmission saves about 215 kg of CO₂ and 3074 MJ (854 kWh) of energy compared to a new unit.

Re-utilisation of high-voltage batteries

Lithium-ion batteries contain valuable raw materials such as lithium or cobalt. For this reason, the Mercedes-Benz Group aims to reuse batteries in vehicles before recycling them, to conserve resources as much as possible.

To this end, the Group is successively expanding its portfolio of solutions for the recycling and reuse of defective batteries to include newer generations. The batteries are reconditioned according to the Group's high quality standards. Their function and quality are tested in detail – based on the specifications for series production. Batteries that are no longer suitable for reuse in vehicles – for example due to reduced capacity – can be reused in a stationary energy bank. In this way, the Group improves the environmental balance of electric vehicles – and at the same time contributes to a sustainable energy economy.

Mercedes-Benz Energy GmbH, based in Kamen, Germany, is a subsidiary of Mercedes-Benz AG and is responsible for the development of innovative energy storage solutions like this. These use the automotive battery technology employed in the electric and hybrid vehicles from Mercedes-Benz and smart. By building stationary energy banks, Mercedes-Benz Energy GmbH,

in cooperation with partners from the energy industry, is bringing electric car batteries from the car to the grid, so to speak. The spectrum of large-scale energy bank applications by Mercedes-Benz Energy ranges from [peak demand](#) compensation and “black starting” – power plant ramp-up independent of the electricity grid – to an uninterruptible power supply. One of the key areas of focus is the procurement and operation of second-life batteries, battery modules and battery management components, along with specification services for energy storage units.

Recycling – keeping the end in mind from the start

GRI 306-4

When developing products, the Mercedes-Benz Group keeps the circular economy in mind from the start and draws up a recycling concept for each new model series. For this, it analyses all components and materials and examines the extent to which they are suitable for the various stages of the recycling process. All Mercedes-Benz passenger car models and light commercial vehicles ([Vehicle classification N1](#)) have a materials recycling rate of 85% according to ISO 22628. In addition, they are in compliance with the European End-of-Life Vehicles Directive 2000/53/EC. This stipulates that cars and vans with a gross vehicle weight of up to 3.5 t must be 95% recoverable.

Mercedes-Benz recycles drive batteries

Once it is no longer possible to recondition or reuse a battery, it is recycled in order to recover valuable raw materials. Today, the Mercedes-Benz Group is already in a position to go far beyond merely fulfilling the recycling quotas for drive batteries prescribed by battery legislation. The battery housings, the cables and the busbars can be recycled without any difficulty. Recycling the battery modules, which contain most of the valuable materials, is somewhat more complicated. The processes already exist, but they still need to be further developed so that the valuable raw materials can be recovered in as pure a state as possible.

The basic goal is to increase recycling rates even further. The vision: today's old batteries are the mines for tomorrow's batteries. To achieve this, the Mercedes-Benz Group is involved in researching and developing new recycling technologies and their establishment on the market. Together with specialised

partners, it works to further optimise the recycling process and participates in funding and research projects.

The volume of batteries to be recycled will gradually increase as the market penetration of electric cars continues. In view of the lifecycle of electric vehicles, the Group expects significant amount of recyclable material to become available in the 2030s. To create capacities for this, Mercedes-Benz AG is building its own CO₂-neutral on the balance sheet pilot plant for the recycling of lithium-ion battery systems at its Kuppenheim location. This is an important part of the global Mercedes-Benz battery recycling strategy. For this purpose, the Group has founded [LICULAR GmbH](#) as a wholly-owned subsidiary. The Kuppenheim facility is being built in two stages: initially, the plan is for a facility for mechanical dismantling to be built by 2023. In a second step – subject to regulatory developments – special plants for the [hydrometallurgical](#) processing of the battery materials will go into operation. This process, for which promising approval discussions have already been held with the public sector, makes recovery rates of more than 96% possible. Following this example, Mercedes-Benz AG is planning to set up a closed-loop recycling system for batteries in China and the USA together with partners.

Effectiveness and results

Effectiveness of the management approach

GRI 3-3

In its management approach to resource conservation, the Mercedes-Benz Group aims to increasingly decouple resource consumption from sales growth. To this end, the Group has defined certain requirements in the vehicle requirement specifications and is introducing corresponding measures. The goals and specifications are monitored within the framework of the “Mercedes-Benz development system”.

Results

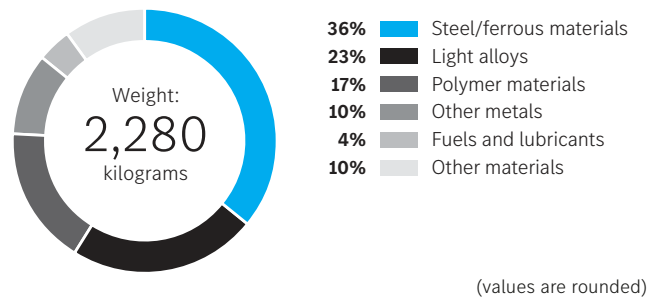
GRI 306-5

In order to assess the resource efficiency of its vehicles, the Mercedes-Benz Group considers, among other things, the medium and long-term availability of raw materials, social acceptance, and social and environmental impacts

and risks. In development, the Group also uses material balances to evaluate and compare different vehicles, components and technologies.

Material composition EQE 350+^{1,2}

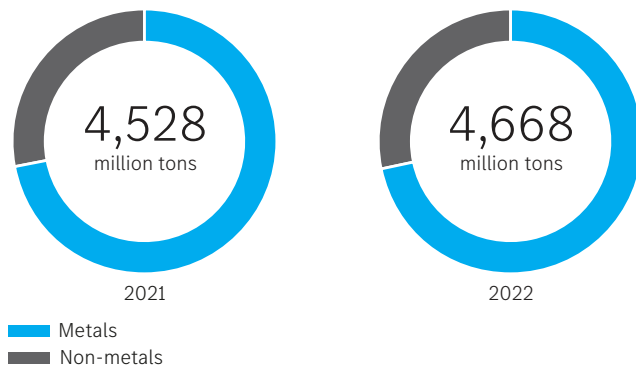
GRI 301-1



- 1 EQE 350+ (WLTP: combined electrical consumption: 18.7 – 15.9 kWh/100 km; combined CO₂ emissions: 0 g/km)
- 2 Renewably generated energy for cell production and charging current

Material balance – use of metals and non-metals

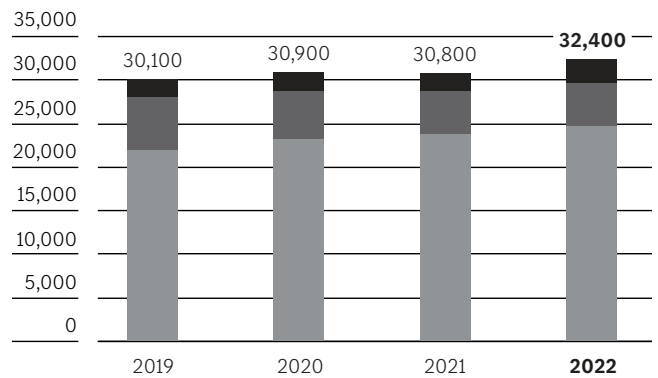
GRI 301-1



As part of the “MeRSy” workshop disposal system, workshop waste – dismantled vehicle parts, fluids and replacement parts packaging – generated during vehicle servicing or repair is collected and recycled. In the reporting year, a total of 24,600 t of dismantled vehicle parts, 2,800 t of fluids and 5,000 t of packaging were collected in Germany and sent for recycling.

Workshop disposal with MeRSy

in t



- liquids
- packaging
- uninstalled vehicle parts

Resource conservation in production

Strategy and concepts

More resource-efficient production

GRI 3-3

The use of resources in the vehicle as well as the consumption of resources in production play an important role in the environmental compatibility of a vehicle. For this reason, the Mercedes-Benz Group is continuously working on making production more efficient and environmentally compatible. In order to improve its environmental footprint in production operations, the Group therefore plans to use less energy and water and fewer raw materials.

One important lever for reaching this goal is to increase energy efficiency. In this way, the company reduces energy consumption, conserves resources and at the same time reduces CO₂ emissions in production. The Mercedes-Benz Group also wants to reduce water consumption – for example by closing water loops. Conserving resources also means reducing waste volumes. To achieve this, the Group is stepping up its efforts to reduce the consumption of raw materials and other materials at its locations.

For its production sites worldwide, the Mercedes-Benz Group has set reduction targets for energy and water consumption, total waste volume and the volume of waste for disposal per vehicle. In order to achieve its goals, the Group uses Group-wide resource management with its environmental and energy management systems to ensure that appropriate measures are developed, adapted to challenges where necessary, and monitored.

Group-wide resource management

GRI 2-12 / -23 / -24 | GRI 3-3 | GRI 303-1

Reducing the ecological footprint of production processes is an integral part of the Mercedes-Benz Group's sustainable business strategy. In order to ensure efficient, high-quality, and environmentally

friendly manufacturing operations, the Group has established environmental management systems in accordance with EMAS or ISO 14001 at its production sites around the world. Since 2012, it has also introduced energy management systems certified in accordance with the DIN EN ISO 50001 standard at its German production sites. These energy management systems are certified at regular intervals. The Mercedes-Benz Group is currently also implementing ISO 50001 systems at a number of individual sites outside Germany. In accordance with the standard, it has embedded environmental and energy management within its organization. The individual divisions and production locations are similarly responsible for the conservative use of resources. They set overarching and location-specific targets and report on these topics to the respective management. This approach is derived from the target system adopted by the Board of Management as part of the sustainable business strategy.

With its environmental and energy management systems, the Mercedes-Benz Group ensures, among other things, clear responsibilities, transparent, standardised implementation of internal and external environmental protection and energy efficiency requirements, and comprehensive reporting at its production locations worldwide. As part of the local environmental management systems and the overarching Group-wide risk assessments, the Mercedes-Benz Group monitors the legal conformity of operations in the areas of waste management, airborne emissions, waste water discharge and soil/ groundwater contamination in connection with the handling of environmentally hazardous substances is monitored. If any relevant shortcomings are identified, the Mercedes-Benz Group records and rectifies them.

To protect people and the environment, the safe and legally compliant use of hazardous substances must be ensured. To this end, the Mercedes-Benz Group has developed and implemented a comprehensive

IT-supported hazardous substance management system at its German locations and individual locations outside Germany. This includes a number of internal specifications and processes, among others, for the approval of hazardous substances or the testing of substitutes with lower risks. Compliance with the requirements is monitored by suitable control mechanisms. In addition, important key figures on hazardous substance management are presented transparently at the plant, department or cost centre level. In this way, unit-specific targets can be systematically defined and pursued. In addition, the Mercedes-Benz Group has been working since as far back as 2017 with the globally applicable standard “Handling of Hazardous Substances” and has implemented this as an accompanying regulation within the Group’s “Environmental and energy policy” as a way of documenting requirements in relation to the legally compliant use of hazardous materials and corresponding regulations on the verification of substitutions and thus use of less critical hazardous materials.

The effectiveness of the management systems is monitored by external auditors as part of the certification process (ISO 14001, EMAS, ISO 50001), as well as in the environmental sector by internal environmental risk assessments (environmental due diligence process).

As long ago as in 1999, the Group developed an environmental due diligence method in order to make potential environmental risks at the production locations transparent as well as evaluate and to prevent

them accordingly. Since then, the Mercedes-Benz Group has applied these throughout the Group – both internally at all production locations in which the Mercedes-Benz Group holds a majority stake and externally in [merger and acquisition projects](#). The company also has a standardized process in place for reviewing and assessing its consolidated production sites every five years. The results of this process are reported to the respective plant and company management so that any necessary optimizations can be carried out. In addition, the Group undertakes an annual review of the extent to which the recommendations for risk minimisation have been implemented at the locations. The aim of the environmental risk assessment is to maintain a high environmental standard at all production sites worldwide.

Four risk assessment cycles were completed at Mercedes-Benz Cars and Mercedes-Benz Vans production locations between 2000 and 2019. The fifth round of these environmental risk assessments started in 2019 and will run until 2026.

Travel restrictions and lockdown regulations due to the Covid-19 pandemic limited the number of site inspections that could be carried out in 2021. Van production sites were evaluated during the year under review. The inspections that had to be cancelled will now be carried out over the next few years so that the Mercedes-Benz Group can maintain the five-year cycle for its production sites. The Mercedes-Benz Group is continuing the internal reporting process and the controlling of the improvement measures as before.

Environmental risk assessment



Measures

Training sessions on environmental protection

The Mercedes-Benz Group conducts environmental protection courses at its locations. The important content includes waste and hazardous materials management, water pollution control, wastewater treatment, emergency management in case of environmentally relevant malfunctions and the planning of plants and workplaces in accordance with environmental protection principles.

The content and frequency of the various environmental training courses, completion of which is in some cases mandatory, depend on personal responsibilities and functions in the Group, the local conditions and the current legal requirements.

Reduction of energy consumption

GRI 302-1/4/-5

The Group raises awareness of the topic of energy-saving among the workforces at the plants – among other things with generally visible tips, training courses and other initiatives. Within a project, for example, multipliers are nominated in all teams, across the board, and given special training. The aim is to enhance awareness within the teams and to contribute actively to the shaping of sustainability issues.

When procuring new production facilities and converting buildings, the Mercedes-Benz Group pays attention to high energy efficiency. The focus here is on the control systems for all technical installations and components, as well as a transparent system for measuring consumption. It is important, for example, that the production facilities can be switched off during breaks and non-production time, and can also be operated efficiently under [partial load](#).

The Mercedes-Benz Group regularly measures and assesses essential energy consumption in order to identify and take advantage of savings potential in the areas of production and infrastructure.

Innovative energy management software is now being used on a worldwide basis as a means of gaining transparency over energy sourcing and to record and analyse energy consumption. This is used to record and analyse the consumption for production plants and buildings,

as well as for individual systems. In the event of any divergences, corresponding countermeasures will then be automatically introduced.

In order to save energy, the Group is investing in the efficient control of all energy supply and building services systems, for example through needs-oriented control of local lighting, the regulation of [air flow volume](#) in air intake and extraction systems as well as load-dependent volume control of the air supply in the case of paint drying systems.

In addition, the Group makes use of intelligent robot control systems, highly efficient [turbocompressors](#) for the central generation of compressed air, updated ventilation systems featuring highly efficient heat recovery technology and a systematic reduction in the [base load](#) of the administration and production areas, as well as systematically updated lighting technology at all locations.

In the reporting year, Mercedes-Benz AG used highly efficient robots to assemble the new S-Class and the EQS. This enabled energy consumption to be significantly reduced compared to the previous years.

In addition, in 2021 the Mercedes-Benz Group has increased the energy efficiency at the US plant in Tuscaloosa – among other things by optimising existing ventilation systems, converting to LED lighting and using a highly efficient chiller to supply the new battery plant, which started operations in March 2022.

At all Mercedes-Benz Vans production locations, the Mercedes-Benz Group is continually optimising the energy efficiency of technical systems and building facilities: in 2022, for example, a heat pump was installed in the paint pre-treatment area at the Düsseldorf plant, the waste heat from which is fed into the hot water system. In the Ludwigsfelde and Vitoria (Spain) plants, the Group converted the lighting to LED technology.

Mercedes-Benz Group in China

Beijing Benz

Automotive Co. Ltd. (BBAC)

Ownership

51% BAIC
38.66% Mercedes-Benz Group AG
10.34% Daimler Greater China Ltd (DGRC)

Location

Beijing

Production volume in 2021

601,000 units

Production

E-Klasse L/C-Klasse L/A-Klasse L/AMG A35L/
GLC/GLB/GLA/EQE/EQE SUV/EQC/EQB/EQA

Energy consumption

1,182.9 GWh
– thereof electricity: 612.0 GWh
– thereof natural gas: 570.9 GWh

Fujian Benz

Automotive Co. Ltd. (FBAC)

Ownership

50% Mercedes-Benz Vans Hong Kong Limited
35% BAIC Motor Corporation Ltd.
15% Fujian Motor Industry Group Corporation

Location

Fuzhou

Production volume in 2021

33,316 units

Production

V-Klasse, Vito

Energy consumption

101.4 GWh
– thereof electricity: 47.5 GWh
– thereof natural gas: 53.9 GWh

Efficient water utilisation

GRI 303-1/-2/-3/-4/-5

Risks for the water supply as a consequence of climate change – for example through a reduction in precipitation – affect people and the environment generally, as well as the various locations of the Mercedes-Benz Group. It therefore also wants to play its part in ensuring the more sustainable management of water resources. In order to achieve this, the Mercedes-Benz Group adopted a [Water policy](#) in July 2022. It is based on the following strategic pillars “Fresh water protection including reduction of consumption”, “Efficient use and treatment of waste water” as well as “Avoidance of soil and groundwater degradation and flood protection”.

➤ Managing sustainability

The Mercedes-Benz Group wants to close water cycles – for instance by treating used process water and using closed-loop cooling systems instead of open ones. In its rain test, in which new vehicles are tested for water resistance, the Mercedes-Benz Group has implemented water-saving measures: for example, at some locations it utilises a biological water treatment process which uses no biocides. As a result, the wastewater contains

fewer pollutants and the volume of water can be retained and reused within the cycle about three times as frequently. Waste water from production and sanitary facilities is either transferred to local waste water treatment facilities in accordance with local regulations, or is pre-treated or purified on the Group's own premises. At certain locations the Mercedes-Benz Group, in some cases in collaboration with municipal waste water disposal authorities, is using purified waste water from biological treatment plants: in Sindelfingen, for example, a third of all fresh water is set to be replaced from May 2023 by treated waste water from the nearby sewage treatment plant. This project serves as a pilot for further recycling projects in other plants.

The Mercedes-Benz Group wants to reduce its water consumption. In its new paint shops, for example, it uses dry instead of [wet separation technologies](#). Furthermore, at the Bremen and Untertürkheim plants, the Group has installed additional filter stages in the osmosis systems. These systems produce (fully) desalinated process water from certain raw waters. The additional filter stages will save about 100,000 cubic metres of raw water per year.

In order to improve water quality and minimise the risk of water pollution, the Mercedes-Benz Group's commitment to waste water discharge includes, for example, regular waste water inspections and their documentation. To initiate targeted measures at the locations, the Group developed the "Storm Water Protection – Pollutant Discharge Elimination" standard in 2014. This standard provides fundamental information and guidelines for the prevention and reduction of potential environmental damage through the rainwater management systems at production facilities, Group-owned sales and service outlets, and workshops. Since then, it has provided a basis for the targeted improvement of water quality.

Assessing water-related risks

At Mercedes-Benz locations, the Mercedes-Benz Group also assesses water risks every five years as part of its environmental risk assessments. The focus is on water extraction, waste water treatment, discharge, contamination, flooding, scarcity and retention in an emergency. If necessary, remedial measures are initiated and their implementation is monitored. This ensures that technical and organisational risks are reduced in a demonstrable manner. Based on the assessments of the past five years, only a few locations were identified as suffering from water-related risks.

In addition, since 2021 Mercedes-Benz AG uses the so-called "Water Risk Filter" of the World Wide Fund For Nature (WWF) as a means of identifying locations that are subject to water-related risks. Analyses according to the criteria of the WWF Water Risk Filter were conducted at all production locations during the reporting year. Corresponding data relating to water extraction and water consumption are available for all production locations (including for areas with a higher risk of water stress). Data on water recirculation are available for individual production locations with a higher risk of water stress.

Less waste

GRI 306-1/-2

The Mercedes-Benz Group has the goal of keeping the amount of waste generated in production as low as possible. To this end, it wants to reduce total waste, including the waste for disposal.

In accordance with the waste hierarchy, the Mercedes-Benz Group's primary goal is to avoid waste. The following then apply, in decreasing order of priority: reuse, recycling and reprocessing. The Mercedes-Benz Group disposes of the waste only if none of these four measures can be applied. Accordingly, about 1% of the waste from Mercedes-Benz Cars had to be disposed of in the reporting year.

In order to reduce total waste, it is important to create transparency about the waste value streams and to correctly separate the different types of waste. In Europe, for example, the Mercedes-Benz Group records waste according to waste code numbers and treats and disposes of it in accordance with the legal regulations. For the professional disposal of waste, the Group always works with licensed and regularly certified waste disposal companies. It also continues to reduce waste such as offcuts, sand, filter materials and sludges through new or optimised production processes.

Among other things, in a pilot trial at the Hedelfingen and Sebes (Romania) plants, only cardboard without plastic coating is in use since the beginning of 2022. As a result, around 1000 t of cardboard can be recycled per year – previously, only thermal reprocessing was possible. At the Sindelfingen plant, the Group has succeeded in transferring steel scrap from the press shop into a closed cycle since the beginning of 2022: each year, about 24,000 t of steel scrap will be returned to the supplier. New steel sheets are made from this and cycled back into production in Sindelfingen. The Mercedes-Benz Group also works with its suppliers to avoid waste: load carriers and materials for load securing have been transferred into a cycle and can be reused from now on.

Waste and CO₂ emissions in the catering sector

Mercedes-Benz Gastronomie GmbH supplies the company's workforce with food and beverages on a daily basis in canteens and shops throughout Germany. The production, distribution and disposal of these foods have a negative impact on the environment. The aim of Mercedes-Benz Gastronomie GmbH is to reduce the CO₂ balance and the amount of food waste, as well as to offer more environmentally friendly packaging.

To achieve this, non-avoidable disposable packaging consists of renewable raw materials that are biodegradable or recyclable. However, the Group is focusing on more sustainable reusable alternatives: for example, the already established reusable system for take-away food saved nearly 40,000 packages having to be disposed of in the reporting year.

Mercedes-Benz Gastronomie GmbH is also expanding its range of vegan products. Furthermore, the Group sources regional and seasonal food. In 2022, 54% of these were sourced from regional suppliers. The associated shorter transport routes have a positive effect on the CO₂ balance of the food. Since March 2022, this balance has been shown for the individual dishes throughout Germany in order to sensitise the employees of the Mercedes-Benz Group to a conscious and more climate-friendly diet. The target of reducing the CO₂ emissions of purchased and produced food by up to 15% in 2022 was achieved. This measure, in conjunction with the introduction of a gastronomic traffic light system and the calculation of a health index for the dishes, has had a positive effect on employees' eating habits. For example, the health value of all food consumed increased by 6% in the year under review.

The health index is an internal indicator for the nutritional behaviour and health orientation of employees. To determine it, all recipes are evaluated according to the quality of the ingredients, as well as the preparation method, fat content and quality, sugar content and keep-warm times, among other factors. The Mercedes-Benz Group makes it easier for its employees to choose healthier and thus frequently also more sustainable alternatives, as indicated by the traffic light colours green, yellow and red on the menu.

In addition, Mercedes-Benz Gastronomie GmbH tries not to waste any food and to avoid food waste along the entire value chain from purchasing to food production. For this purpose, the Group continuously weighs its food waste, compares it between locations and derives appropriate measures. In this way, it can avoid over-production, reduce the amount of food replenishment required at the end of serving times and work towards resource-saving ordering behaviour. The measures are also enshrined in the local environmental protection and energy targets of the Mercedes-Benz Group.

Biological diversity

GRI 3-3 GRI 304-1/-2/-3/-4

The decline of biodiversity is a global problem that is steadily growing. The Mercedes-Benz Group also bears responsibility in this regard since the use of land and resources, the emission of pollutants and production-related interference with the environment can have a negative impact on biodiversity. The Group is aware of this. For this reason, the goal of the Mercedes-Benz Group is therefore to act in an environmentally aware manner at all locations, and to continually improve its operational environmental performance. This also includes promoting and preserving biodiversity at the production locations. When creating the location profile as part of the Due Diligence process for evaluating environmental protection in the plants, factors considered include the surface sealing level of the site, the hydrogeological situation, the classification of the location and its neighbourhood by the local authorities and the existence of ecologically sensitive areas or protected zones in the vicinity of the site. These are then taken into consideration during the further analysis of risks at the site. In its location planning, the Group takes into account criteria like the land use for construction projects, among others. In principle, this should be kept as low as possible – for example through multi-storey, dense building construction.

Some of the German plants of the Mercedes-Benz Group evaluate their sites using the Biodiversity Index (BIX), which was developed in-house. The BIX index ranges from Level 0 (area of no ecological importance) to Level V (very high ecological importance) and can assess sites in terms of their potential for enhancing biodiversity.

Furthermore, internal recommendations for action on “Biodiversity” have been developed for the German locations of the Mercedes-Benz Group. These provide practical advice on designing plant areas that are as far as possible in harmony with nature. The Group has also developed recommendations for its locations on how to cultivate living roofs and facades.

The Mercedes-Benz Group wide measures for the awareness and promotion of biodiversity are coordinated by the Environmental and Energy Management unit. The Chief Environmental/Energy

Officer of the Mercedes-Benz Group also represents environmental and energy issues on the Group Sustainability Board, the central governance body for sustainability issues. At the executive level (plant management), biodiversity aspects are also part of the environmental management assessment process at the individual locations.

At its plants, the Mercedes-Benz Group has already established numerous measures designed to maintain the ecological balance. These will continue to be extended in the future. For example, nesting boxes for native birds and insects have been built, the latter by local workshops employing people with disabilities. In addition, wild bee hotels, living roofs, dry brooks, stone areas as habitats for cold-blooded animals, rock gardens and flower meadows have been created. If it is not possible to establish supportive or compensatory measures directly at the Group's locations, the Mercedes-Benz Group will create substitute habitats. The German environmental organisation NABU has provided advice, support and documentation for the Group's programmes benefiting the flora and fauna at these sites. The measures were decided individually at the level of the plant locations and their management, and implemented in cooperation with the environmental protection and technical services departments along with the plant planning departments.

Effectiveness and results

Effectiveness of the management approach

GRI 3-3

For its production sites worldwide, the Mercedes-Benz Group has set reduction targets for factors such as total waste volume and waste volume for disposal per vehicle. As the central governance body for sustainability issues, the Group Sustainability Board is the highest management body. The objectives and current status of the implementation process are discussed here on an annual basis and, should this be necessary, measures initiated to ensure that objectives are met.

For the monitoring of these reduction targets and reporting, the Group systematically collects the most important environmental and energy data from the

German and foreign plants. This data is entered into a central environmental data information system by the worldwide production locations and subsequently evaluated.

Based on this data and with the help of internal and external tools, the Mercedes-Benz Group reviews the extent to which the resource targets for the plants are being achieved. For the internal review it has defined key figures, which are regularly tracked. The Mercedes-Benz Group has entrusted an auditing firm with the external review. This evaluates a selection of the Mercedes-Benz Group's goals and their implementation on an annual basis. The Mercedes-Benz Group uses the audited results to adapt and further develop its resource conservation measures.

Results

GRI 302-3/-4/-5 GRI 303-3/-4/-5

The resource conservation projects were implemented as planned. Due to the implementation of further energy efficiency measures, the energy consumption per vehicle at Mercedes-Benz Cars could be reduced by 18% compared with 2021.

Around 4% of the energy consumption per vehicle produced is accounted for by generating losses from electricity and heat production in Mercedes-Benz Cars' highly efficient combined heat and power plants.

The production sites of the powertrain plants produce products and parts sets for vehicles whose production volumes are not consolidated in the Group's balance sheet. Around 32% of the energy consumption of the powertrain plants is accounted for by these production scopes.

At Mercedes-Benz Vans, energy consumption per vehicle is 15% lower than in the previous year owing to similar effects.

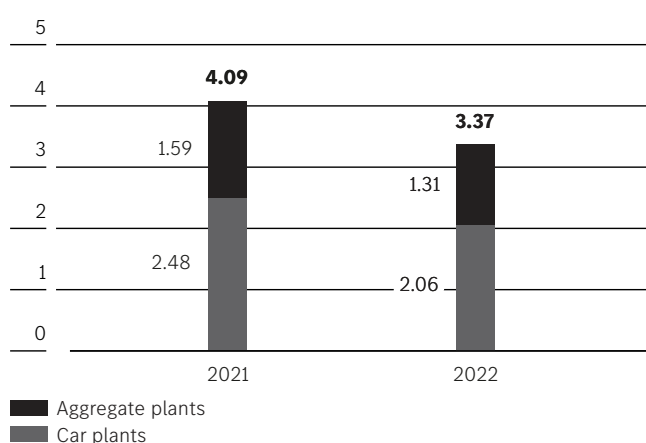
Mercedes-Benz Cars and Mercedes-Benz Vans consumed 5,140 GWh of electricity, natural gas, fuels and other energy sources in 2022, and thus 11% less than in the previous year.

In 2022, of the energy sources supplied from outside the Group (electricity, natural gas and hot water) the

Mercedes-Benz Group passed a total of 451,581 GWh on to third parties. This figure has already been subtracted from the total energy consumption of the Mercedes-Benz Group as reported.

Energy consumption per vehicle broken down by car and powertrain plants

in MWh/vehicle



In the Mercedes-Benz Cars segment, the water consumption per vehicle fell by 10% in the reporting year compared to 2021. Mercedes-Benz Vans, on the other hand, was able to reduce the water consumption per vehicle by 14% compared to the previous year.

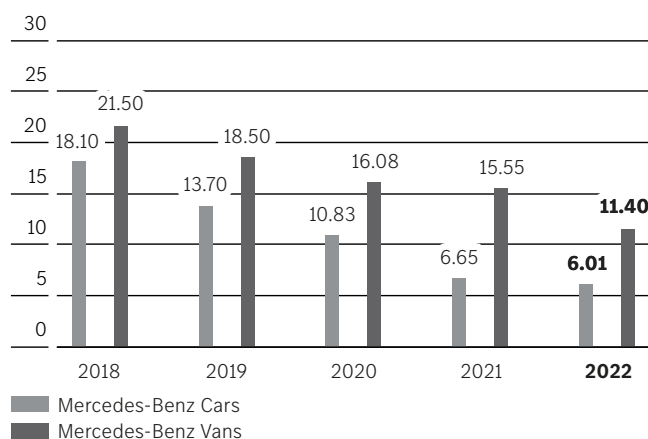
At Mercedes-Benz Group, only renewable fresh water (≤ 1000 mg/l total dissolved solids – TDS) is used. Sea water/brackish water (>1000 mg/l TDS) are not used. In addition, the sector-specific water types “produced water”, “enclosed water” and “cooled water” do not play any role in this form at the production locations. Nor is any waste water or process water retained. In order to reduce the need for water and thus the extraction of water, this is kept within the loop and is thus recycled and reused.

Of the total volume of water sourced externally and specially supplied from wells, the Mercedes-Benz Group in 2022 passed 136,792 m³ on to third parties. This quantity has already been subtracted from the total reported water consumption of the Group. In 2022, a total of 5162 m³ was passed on by the Mercedes-Benz Group AG to third parties via an indirect feed in the form of waste water. Currently only the water that is passed on to third parties falls into the category of water recirculation.

In the reporting year, Mercedes-Benz Cars reduced the total waste per vehicle by 15% and the amount of waste for disposal per vehicle by 10% compared to 2021. At Mercedes-Benz Vans, the total waste per vehicle increased by 4% in the reporting year compared to the previous year, but the amount of waste for disposal per vehicle fell by 27%.

Development of waste for disposal Mercedes-Benz Cars and Mercedes-Benz Vans

in kg/vehicle



Key figures

Energy consumption (in GWh)

GRI 302-1

	2021 ¹	2022 ²
Total	6,786	6,087

- 1 These data have been adjusted due to the spin-off and hive-down of the Daimler commercial vehicle business as an independent company, nonetheless, they still contain minor uncertainties as adjustments for combined locations and units can first be made in financial year 2022.
 2 The key figure was audited in order to obtain limited assurance.

Water withdrawal (in 1,000 m³)

GRI 303-3

	2021 ¹	2022 ²
Total	7,454	7,295

- 1 These data have been adjusted due to the spin-off and hive-down of the Daimler commercial vehicle business as an independent company, nonetheless, they still contain minor uncertainties as adjustments for combined locations and units can first be made in financial year 2022.
 2 The key figure was audited in order to obtain limited assurance.

Waste by category (in 1,000 t)

GRI 306-3/-4/-5

	2021 ¹	2022 ²
Non-hazardous waste for disposal	7	5
Non-hazardous waste for recycling	151	135
Scrap metal for recycling	433	427
Hazardous waste for disposal	8	8
Hazardous waste for recycling	51	47
Total	651	622

- 1 These data have been adjusted due to the spin-off and hive-down of the Daimler commercial vehicle business as an independent company, nonetheless, they still contain minor uncertainties as adjustments for combined locations and units can first be made in financial year 2022.
 2 The key figures were audited in order to obtain limited assurance.