

## Innovation and safety

**Innovations for the mobility of the future.** The greatest possible customer utility, the most stringent safety standards, maximum environmental compatibility and efficiency – we rely on innovative concepts and environmentally sound product development to help us achieve all of those goals simultaneously. Our innovations range from pioneering vehicle and drive-system technologies to intelligent lightweight engineering concepts and sophisticated assistance systems that can prevent accidents. Over recent years in particular, we have made tremendous progress on the road to accident and emission-free driving. We have a greater range of electric vehicles on the road than any other automaker and we also set standards for safety. We have established a leading position in the area of autonomous driving in particular, and we plan to further strengthen this position.

**On the road to emission-free mobility.** Finite oil reserves, population growth – especially in urban centers – and the unabated demand for mobility require new solutions for all aspects of transport. Our goal is to safeguard mobility for the generations to come. We therefore strive to offer our customers safe and efficient low-emission vehicles and associated services. Our vision for the future is to establish a mix of drive systems that reflect market demands. Our “Road to Emission-free Driving” initiative defines the key development approaches for creating extremely fuel-efficient and environmentally friendly drive-system technologies at all of our divisions:

1. We continue to enhance our vehicles with state-of-the-art internal combustion engines that we are optimizing to achieve significantly lower fuel consumption and emissions.
2. We are achieving further perceptible increases in efficiency through customized hybridization, i.e. the combination of combustion engines and electric motors.
3. Our electric vehicles, powered by batteries or fuel cells, are making locally emission-free driving possible. [↗ B.40](#)

During the year under review, new products and technologies once again enabled us to make substantial progress on the “Road to Emission-free Driving.” The examples on the following pages show how this is happening.

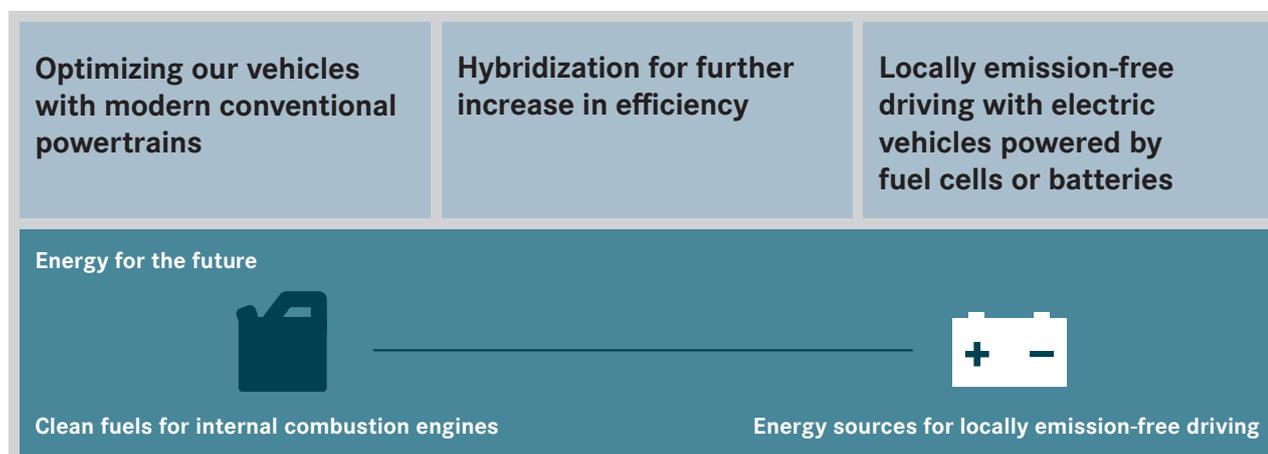
**Efficient cars and commercial vehicles with internal combustion engines.** Much of our research and development work continues to focus on making our cars and commercial vehicles with internal combustion engines even more efficient. This is largely made possible by engines with low displacement and turbochargers, as well as by lightweight engineering, aerodynamic improvements, tires with low roll resistance, demand-appropriate energy management and an automatic start-stop function. A good example of this is the new C-Class, which we began to deliver to customers in April 2014. The improvements we made to the vehicle body, as well as to the model’s engines and auxiliary systems, have significantly decreased fuel consumption, by as much as 32% in some cases. We are exploiting additional potential through intelligent and customized hybridization. For example, the most fuel-efficient C-Class model at present – the C 300 BlueTEC HYBRID<sup>1</sup> – consumes only 3.6 liters of diesel per 100 kilometers (NEDC combined) and has CO<sub>2</sub> emissions of just 94 grams per kilometer. The most economical variant of the new updated B-Class – the B 180 CDI BlueEFFICIENCY Edition<sup>2</sup> – boasts fuel-consumption and emission figures that are just as low.

We have also further reduced the fuel consumption of the most recent additions to our range of trucks. Our new Actros, Arocs, Antos and Atego series and the heavy-duty Freightliner Cascadia Evolution in the United States, and the new FUSO Super Great V are all the cleanest and most economical trucks in their respective classes. In addition, our new buses are making a huge impression with outstanding fuel efficiency.

[👁 see page 109](#)

## B.40

### Road to emission-free mobility



**First plug-in hybrid with the star.** The first certified “three-liter” luxury sedan in the world marks yet another milestone on the road to emission-free mobility. The new Mercedes-Benz S 500 PLUG-IN HYBRID<sup>3</sup> combines an ultramodern hybrid drive concept with the unique innovations and luxurious appointments typical of the S-Class. This long-wheelbase sedan, which we began to deliver to customers in October 2014, makes a huge impression with its exceptionally dynamic handling and efficiency. [see pages 4 ff](#)

The S 500 PLUG-IN HYBRID<sup>3</sup> joins the S 400 HYBRID<sup>4</sup> and the S 300 BlueTEC HYBRID<sup>5</sup> as the third hybrid model in the S Class series. We will launch a total of ten plug-in hybrid cars in the period until 2017. It will be possible to recharge all these models batteries’ also from external power sources.

**Intelligent energy management for hybrid vehicles.** The engineers who develop new hybrid models are benefiting more and more from cooperation with our successful Formula 1 racing team, which also uses high-tech hybrid drive to save on fuel. The synergies here benefit both production vehicles and race cars. Many hybrid vehicles fail to take on energy when driving downhill because their high-voltage batteries are often too fully charged at the wrong moment to absorb the additional energy recovered in such situations. The “Intelligent HYBRID” operating strategy that Mercedes-Benz utilizes in the S-Class and will use in other models in the future ensures that the high-voltage battery remains in a charging stage that allows all the possibilities offered by energy recovery on a given road and terrain to be fully exploited. If the battery is too fully charged, the electric motor automatically supports the combustion engine in order to allow the battery to discharge to a level that enables it to fully absorb the anticipated amount of recovered energy. The system uses data from the COMAND Online navigation system to calculate the recovery potential along the

road ahead. “Intelligent HYBRID” is the only predictive operating strategy in existence to engage not only when a destination is programmed into the navigation system, but also when the destination-guidance feature is inactive. In this case, the system bases the probability the vehicle will stay on its current route on the type of road it is traveling on. [see pages 8 ff](#)

Another new feature in the Mercedes-Benz S 500 PLUG-IN HYBRID<sup>3</sup> is the so-called haptic gas pedal, which gives drivers a double impulse signal to indicate when they should take their foot off the gas in order to coast the vehicle and recover energy. When the vehicle is in the pure electric mode, the system can tell the driver when it is time to engage the combustion engine. The current energy flow is shown in the instrument cluster and on a central display in all operating modes if the customer chooses to activate this function.

- 1 C 300 BlueTEC HYBRID: fuel consumption in l/100 km: urban 4.1-3.9, extra-urban 3.9-3.4, combined 4.0-3.6; CO<sub>2</sub> emissions in g/km: combined 104-94
- 2 B 180 BlueEFFICIENCY Edition: fuel consumption in l/100 km: urban 4.3, extra-urban 3.2, combined 3.6; CO<sub>2</sub> emissions in g/km: combined 94
- 3 S 500 PLUG-IN HYBRID: fuel consumption in l/100 km: combined: 2.8; CO<sub>2</sub> emissions in g/km: combined 65; electricity consumption in kWh/100 km: 13.5
- 4 S 400 HYBRID: fuel consumption in l/100 km: urban 7.4-6.6, extra-urban 6.5-6.1, combined 6.8-6.3; CO<sub>2</sub> emissions in g/km: combined 159-147
- 5 S 300 BlueTEC HYBRID: fuel consumption in l/100 km: urban 4.8-4.7, extra-urban 4.6-4.3, combined 4.7-4.4; CO<sub>2</sub> emissions in g/km: combined 124-115

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### Intelligent operating strategy: Operating modes

HYBRID	E-MODE	E-SAVE	CHARGE
<ul style="list-style-type: none"> <li>→ Electric operation or driving with the combustion engine is possible</li> <li>→ Automatic selection of drive type</li> </ul>	<ul style="list-style-type: none"> <li>→ Pure electric operation</li> <li>→ Metering of electric output via the haptic accelerator pedal (variable pressure point)</li> </ul>	<ul style="list-style-type: none"> <li>→ The current charge status is maintained</li> <li>→ Limited electric operation is possible</li> </ul>	<ul style="list-style-type: none"> <li>→ The HV battery is charged via the combustion engine</li> <li>→ Electric operation is not possible</li> </ul>
<ul style="list-style-type: none"> <li>→ Optimum use of combustion engine and electric motor</li> </ul>	<ul style="list-style-type: none"> <li>→ Maximum availability of electric motoring</li> </ul>	<ul style="list-style-type: none"> <li>→ Preservation of the HV battery capacity for future electric motoring</li> </ul>	<ul style="list-style-type: none"> <li>→ Charging of the HV battery for future electric motoring</li> </ul>



**A unique spectrum of electrically powered vehicles.** Our spectrum of electric vehicles ranges from cars to vans, light trucks and buses. The following is a list of electric Daimler vehicles currently on the road: the smart fortwo electric drive<sup>1</sup>, the A-Class E-CELL<sup>2</sup>, the SLS AMG Coupe Electric Drive<sup>3</sup>, the B-Class F-CELL<sup>4</sup>, the B-Class Electric Drive<sup>5</sup> and, in the commercial vehicle segment, the Vito E-CELL, the Mercedes-Benz Citaro FuelCELL Hybrid, the FUSO Canter E-CELL and the Freightliner Custom Chassis MT E-CELL All-Electric.

The smart fortwo electric drive<sup>1</sup> is now available in 18 markets worldwide and is also one of the best-selling electric cars in Germany. More than 1,300 e-smarts are also being used around the clock in various cities as part of our innovative car2go mobility service.

The new B-Class Electric Drive<sup>5</sup> was initially launched in the US market in 2014 and was later introduced in Germany as well in November. The model sets standards for compact electric vehicles in terms of comfort, quality and safety. Its quiet, locally emission-free operation is made possible by a 132 kW electric motor, which delivers its maximum torque of 340 Nm as soon as the driver presses the gas pedal. That is about the same as the amount of torque provided by a state-of-the-art three-liter gasoline engine. Energy for the electric drive system is supplied by a powerful lithium-ion battery, which is located in the “energy space” of the car’s underbody, where it is safely protected and takes up little room. This setup is also what allows the five-seater to maintain the famously spacious interior and cargo area of the conventional B-Class. To extend the car’s range, its top speed is electronically limited to 160 km/h. The vehicle has a range of about 200 kilometers, depending on the driving cycle.

In China, we launched the first electric car of the DENZA brand in September 2014. We jointly developed, and now locally produce, this innovative model with our partner BYD. The DENZA fully lives up to its promise to be the safest, most reliable and most sophisticated electric vehicle from and for China. With its range of up to 300 kilometers, the DENZA is the perfect automobile for daily use. Thanks to a wheelbase that corresponds to that of a Mercedes-Benz E-Class, this electric car is also able to offer plenty of legroom in the back as well, not to mention cargo volume of 460 liters. As a result of its outstanding safety concept, the DENZA was also the first electric vehicle to receive five stars in a crash test for China’s new-car assessment program (NCAP).

**Fuel cell endurance test.** In October 2014, a B-Class F-CELL<sup>4</sup> from Mercedes-Benz’s current fuel-cell fleet set a new endurance record after being driven for more than 300,000 kilometers in totally normal conditions. This test, which had never before been conducted anywhere in the world, shows that fuel-cell vehicles also operate reliably under extreme stress and can be driven for many years. Daimler AG was presented with the “f-cell Award 2014” for the record-setting test, which marked the third time the company has won this fuel cell innovation competition.

The Mercedes-Benz B-Class F-CELL<sup>4</sup> is manufactured under series production conditions. Customers in Europe and the United States have been driving the model under normal everyday conditions since 2010. Daimler’s fuel-cell fleet, which together with a large number of research cars now totals more than 300 vehicles, has clocked up well over nine million kilometers of driving to date. Our engineers continue to use the results of studies on how they operate to identify additional optimization potential and to make corresponding improvements in the development of the next generation of fuel-cell vehicles. Daimler is still working with the clear goal of manufacturing and marketing competitive fuel-cell vehicles in 2017.

**Autonomous driving in the United States.** In September 2014, Mercedes-Benz became one of the first automakers to receive permission to test autonomously driving vehicles on public roads in California. Since October 2014, Daimler has also been using the largest test site in the United States – the Concord Naval Weapons Station (CNWS) – for conducting additional tests with this forward-looking technology. Self-driving vehicles can be safely tested in Concord, California, even in particularly dangerous conditions and situations. Nevertheless, our research here continues to focus on tests under real-life conditions. Our research activities in the United States are designed to promote the development of autonomous driving worldwide, as the road infrastructure in the United States differs from that in Germany in many ways. For example, streets, roads and highways in Germany are generally narrower than in the United States, where lanes are also wider and some major highways can have six or even eight lanes. Traffic lights in the United States are also mounted on the other side of the intersection from where the vehicle is standing. In addition, merging traffic is more common in the United States, which also has four-way stop signs that give the right of way to the first vehicle that arrives at the intersection. The knowledge Mercedes-Benz gains in the US is helping the brand take significant steps forward with the development of autonomous driving technology.

In 2013, Daimler impressively demonstrated in Germany that autonomous driving is already technologically possible even in complex urban and rural traffic situations: In August 2013, the Mercedes-Benz S 500 INTELLIGENT DRIVE – a new S-Class equipped with technology close to series production – drove completely autonomously along the roughly 100-kilometer historical route once traveled by Bertha Benz from Mannheim to Pforzheim.

**Intelligent automobile connectivity.** Digitization has long since become a normal part of our lives. Today’s automobiles are also “always on” and intelligently connected. Mercedes-Benz brought the Internet into the automobile many years ago; now it is connecting the car itself to the Web. Beginning with the new C-Class station wagon, our “Mercedes connect me” system has enabled us to successively equip our models with a state-of-the-art communication module that makes it possible for our customers to access their vehicle anytime and from anywhere via their smartphone, tablet or any other computer. This communication module also allows traffic information to be called up in the vehicle in real time and ensures rapid assistance in the event of an accident.

 [mercedes-benz.com/en/mercedes-me/](http://mercedes-benz.com/en/mercedes-me/)

It goes without saying that safe and comfortable operation was a top priority in the development of all of our new infotainment systems. That's because minimal driver distraction and a high degree of user-friendliness are more important to us than the integration of technical gimmicks.

Naturally, we also paid close attention to data protection from the very beginning. The car of the future will increasingly become a digital companion, which means data always has to be just as safe and secure as the vehicle and its occupants. We therefore refer to our approach here as "Privacy by Design," by which we mean that data protection is given top priority as early as the design stage for networked services.

**F 015 Luxury in Motion.** In early January 2015, Mercedes-Benz presented the new research vehicle "F 015 Luxury in Motion" at the International Consumer Electronics Show (CES) in Las Vegas. The autonomously driving luxury sedan shows how the automobile is being transformed from a vehicle into a space for private relaxation. With a very roomy lounge-style interior, the F 015 raises the aspects of comfort and luxury to a new level. A key idea of the research vehicle is the continuous exchange of information between car, occupants and the outside world. This takes place with the help of six displays harmoniously integrated into the dashboard as well as the sides and rear of the passenger compartment. The occupants can interact with the connected car intuitively using gestures, eye movements or the high-definition touch screen. And the F 015 Luxury in Motion is in touch with its environment using laser projection and LED signals, and thus becomes an interactive partner

in road traffic. The research vehicle sets standards also in terms of its drive system: Its total range under electric power with fuel cells is approximately 1,100 kilometers. Approximately 200 km can be driven under battery power and 900 km with electricity from the fuel cells. [see pages 36 f](#)

#### World premiere of the future of truck transportation.

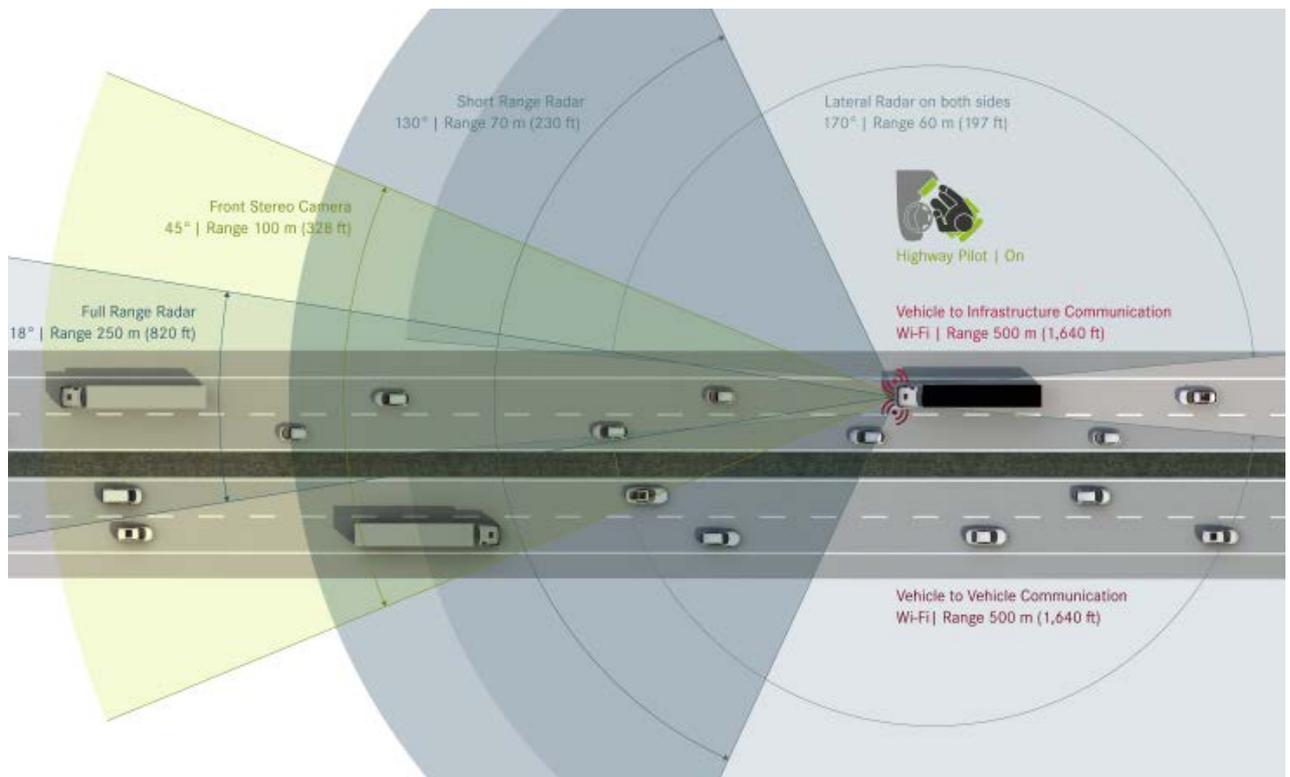
From a vision to reality – the spectacular Mercedes-Benz Future Truck 2025 study, which was presented at the IAA Commercial Vehicles show in September 2014, offers a visually fascinating and technically feasible preview of the long-distance trucks of tomorrow. In ten years, trucks could be driving autonomously on highways, which would be good for the economy and society. Such a development would boost transport efficiency, make driving safer for everyone, and further reduce fuel consumption and CO<sub>2</sub> emissions. Mercedes-Benz therefore continues to link existing assistance systems with improved sensor technology in its "Highway Pilot" system, which has already made autonomous driving at realistic speeds on highways a reality today.

[see pages 14 ff](#)

- 1 smart fortwo electric drive: electricity consumption in kWh/100 km: 15.1; CO<sub>2</sub> emissions in g/km: 0.0
- 2 A-Class E-CELL: electricity consumption in kWh/100 km: 17.5; CO<sub>2</sub> emissions in g/km: 0.0
- 3 SLS AMG Coupe Electric Drive: electricity consumption in kWh/100 km: 26.8; CO<sub>2</sub> emissions in g/km: 0.0
- 4 B-Class F-CELL: H<sub>2</sub> consumption in kg/100 km: 0.97; CO<sub>2</sub> emissions in g/km: 0.0
- 5 B-Class Electric Drive: electricity consumption in kWh/100 km: 16.6; CO<sub>2</sub> emissions in g/km: 0.0

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### Autonomous driving with the Mercedes-Benz Highway Pilot



**Our “road to accident-free driving.”** Vehicle safety is one of our core areas of expertise and a key component of our product strategy. An important chapter in the history of vehicle safety actually began 75 years ago when the engineer Béla Barényi joined the former Daimler-Benz AG. Mercedes-Benz has been shaping the development of safety systems ever since that time. Many of the company’s innovations, especially those for protecting vehicle occupants and other road users, have saved countless lives. Our vision of accident-free driving will continue to motivate us to make mobility as safe as possible for everyone in the future.

**Intelligent Drive in the new C-Class.** Ensuring the highest degree of safety for everyone – this is the stated goal of Mercedes-Benz. That is why within the framework of the Mercedes-Benz Intelligent Drive program, we equipped the new C-Class with many of the new assistance systems with expanded features that celebrated their world premiere in the S-Class and E-Class. Although the European NCAP (New Car Assessment Program) crash tests were more extensive and stringent in 2014 than in the previous year, the new Mercedes-Benz C-Class passed them with flying colors. The model thus received the best rating of five stars for occupant safety, child safety, pedestrian protection and its assistance systems. The Mercedes-Benz C-Class also received the Euro NCAP Advanced Reward for two of its safety systems: ATTENTION ASSIST, which detects signs of driver fatigue, and the PRE SAFE® anticipatory occupant protection system. The Mercedes-Benz GLA compact SUV and the V-Class underwent NCAP tests as well and also received top marks.

**PRE-SAFE® expanded to include important new functions.** Ten years ago, Mercedes-Benz presented a groundbreaking safety-technology concept in the form of the PRE-SAFE® anticipatory occupant protection system, which has been continuously further developed ever since. New important components were also added in 2014. These new PRE-SAFE® functions can help prevent accidents with pedestrians and rear-end collisions in city traffic, defuse dangerous situations caused by traffic coming from behind, and enhance the protection offered by seatbelts. The PRE-SAFE® Brake can now also detect pedestrians and initiate an autonomous braking maneuver to avoid a collision at speeds up to 50 km/h. PRE-SAFE® PLUS can recognize an imminent rear-end collision and warn cars behind by rapidly flashing the rear hazard lights. If the danger of a collision persists, the system can also firmly apply the brakes to the stationary car and thus minimize the risk of whiplash by reducing the forward jolt caused by the impact. In addition, the autonomous braking feature to protect against collisions with vehicles ahead has also been significantly improved.

**Blind Spot Assist for trucks.** Collisions during turns occur very frequently and usually cause serious damage. This is especially true when trucks and unprotected pedestrians or cyclists are involved. Blind Spot Assist from Mercedes-Benz helps prevent such collisions by reliably warning truck drivers of potential danger during turns in situations where visibility is limited. Organizations such as the German Insurance Association (GDV) estimate that Blind Spot Assist can prevent around half of all accidents that involve trucks and pedestrians or cyclists. As a result, the number of associated fatalities could fall by nearly one third. The heart of Blind Spot Assist is a radar sensor mounted in front of the truck’s rear axle on the passenger side of the vehicle. The system is arranged in such a way that it covers the entire length of a semi-trailer truck or a truck and trailer combination. The area monitored even extends forward to two meters in front of the truck. The driver is given a visual signal if a moving object is detected in the monitored area at the side of the truck. If there is the risk of a collision, additional visual and audible warnings are issued. Visual and audible warnings are also issued if the sensors detect a stationary obstacle such as a traffic light or street light in the tracking pattern of the truck during the process of turning. This comprehensive support for the driver occurs over the entire speed range of the truck from a standstill to the permitted maximum speed.

**New emergency braking system for touring coaches.** In recent years, the Mercedes-Benz Travego high-deck touring coach has been setting standards for safety technology. The latest world first in the Travego is Active Brake Assist 3 (ABA 3). The predecessor generation, ABA 2, was already able to initiate a braking maneuver when the danger of a collision with slower vehicles ahead or with stationary obstacles existed. The new ABA 3 can do even more. For example, it is able to initiate automatic emergency braking when stationary obstacles are encountered. New legislation requires that all touring coaches newly registered as of November 2015 be equipped with an emergency braking assistance system. These requirements will also be further tightened beginning in the fall of 2018. The Travego with ABA 3 can already do more today than the regulations for 2018 will require.

## Environmental protection

**A comprehensive approach to environmental protection.** Protecting the environment is a primary corporate objective of the Daimler Group. Environmental protection is not separate from other objectives at Daimler; instead, it is an integral component of a corporate strategy aimed at long-term value creation. For Daimler, a focus on the highest possible product quality includes compliance with stringent environmental standards and the sparing use of vital natural resources. Our measures for manufacturing environmentally friendly products therefore take the entire product lifecycle into account – from design, production and product use all the way to disposal and recycling. The environmental and energy-related guidelines approved by the Board of Management define the environmental and energy-related policy of the Daimler Group. This expresses our commitment to integrated environmental protection that begins with the underlying factors that have an impact on the environment, assesses the environmental effects of production processes and products in advance, and takes these findings into account in corporate decision-making.