



# Corporate Responsibility at MAN in 2018

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## Responsibility for products

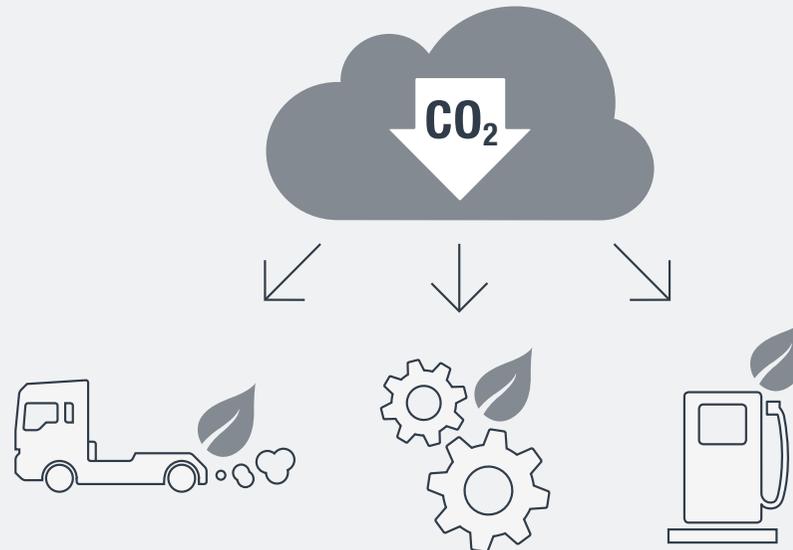
MAN stands for efficient and safe transportation and energy solutions. Our approach to product responsibility is broad and comprehensive: we are continuously reducing fuel consumption and focusing on alternative drive systems such as gas or electric drive technology. When developing our products, we take into account the entire product life cycle, from raw materials extraction through end-of-life disposal.

## Efficient products

We are committed to continuously improving the efficiency of our products. After all, in most cases our customers base their decision to buy a product on the total cost of ownership. In the freight transportation sector, fuel costs account for approximately one-third of this sum, which is why the quest for greater efficiency and low emissions is a key technology driver.

### Achieve technology leadership through

- reducing fuel consumption and emissions,
- alternative drive concepts, and
- alternative fuels.

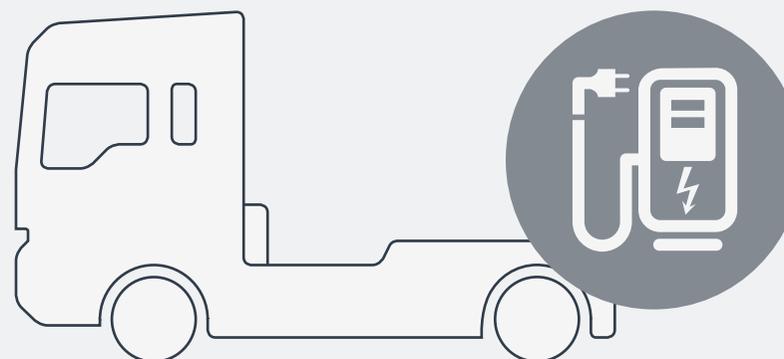


## Electricity – the climate-friendly drive technology

With zero pollutant emissions from fuel combustion and low noise, plus a better carbon footprint with the right electricity mix, electricity is set to be the drive technology of the future – at least around town and on shorter journeys. We are preparing for the series production of purely electric city buses and trucks. This is MAN's way of forging ahead with efforts to promote electric mobility in commercial vehicles. Our economically robust electric mobility solutions are being developed in close collaboration with cities and logistics partners.

### Field testing of electric trucks begins

MAN started testing eTrucks in practice in 2018. Nine partner companies of the Austrian Council for Sustainable Logistics (CNL) are putting the electric trucks through their paces in day-to-day logistics operations for a period spanning several months. With the official handover of the eTrucks in September 2018, MAN Truck & Bus set another milestone on the road to the electrification of urban distribution transportation, where freedom from emissions and reduced noise pollution are working their way up the agenda.

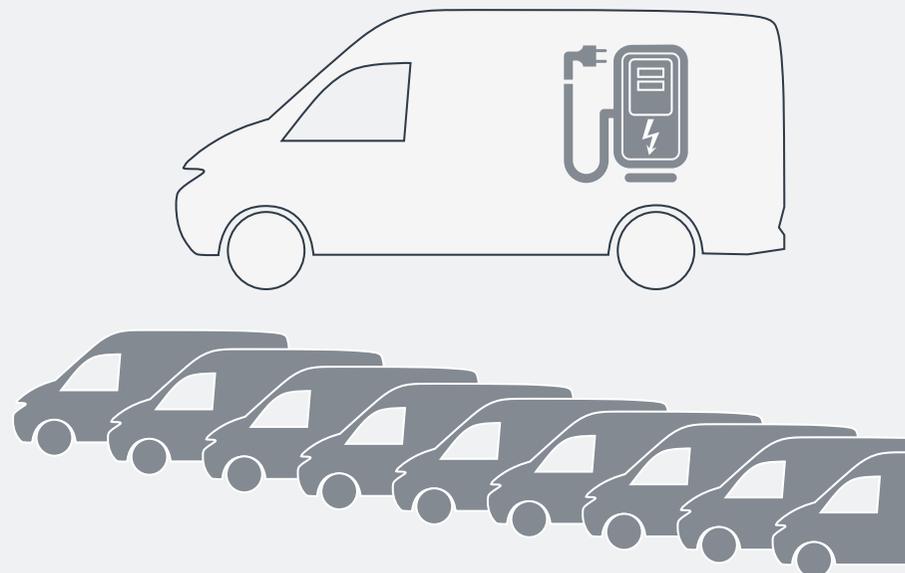


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### Series production of electric vans

2018 saw MAN launch its first series-produced electric vehicle, the eTGE. The fully electric van allows MAN to take another step forward in the direction of zero-emission metropolitan areas. Production started back in July 2018.



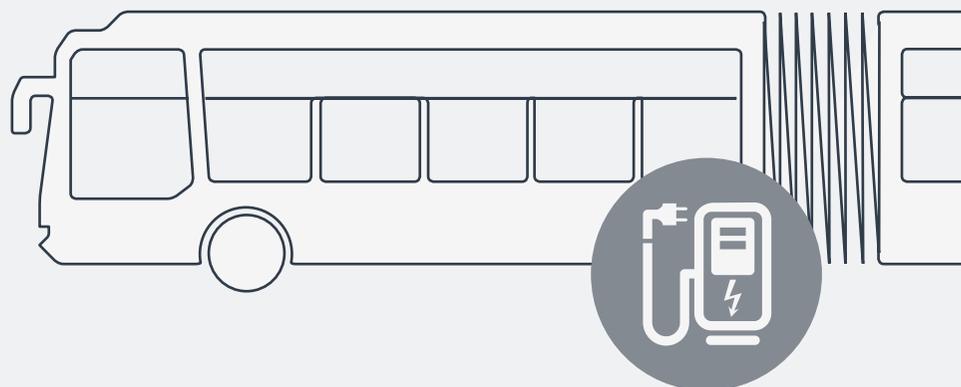
## Electric buses

MAN's solo and articulated buses will also be available with battery-electric drive systems: in 2020, a purely electric demo fleet that is close to series production will be tested in practice at selected customers' premises, with series production set to start after the testing process.

### City partnerships

We are working with several cities – including Munich and Hamburg – in a quest to press ahead with the development of line-service buses powered by alternative drives. One of the aims of this collaboration is to develop a financially optimized, zero-emission concept for electric mobility.

To begin with, a demo fleet will be tested under everyday conditions involving several public transportation companies. Our close collaboration with public transportation companies as part of our cooperation projects has revealed a desired range of up to 200 km a day under realistic operating conditions. We are developing our concepts accordingly.

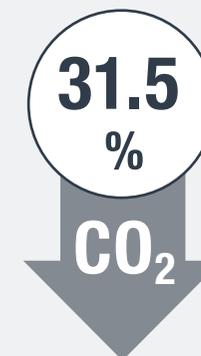


## Efficient diesel engines

Ever since Rudolf Diesel developed the diesel engine in the late 19th century together with engineers at Maschinenfabrik Augsburg – a forerunner of MAN – we have worked continuously to improve the efficiency and performance of this internal combustion engine. And our hard work has paid off: today, economical and efficient transportation and energy solutions from MAN are in operation all over the world.

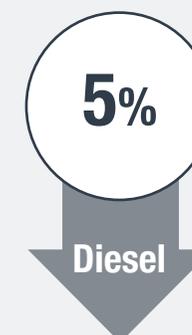
### Reducing emissions

For the purposes of a study conducted by the ACEA (European Automobile Manufacturers' Association), MAN calculated the reduction of CO<sub>2</sub> emissions in commercial vehicles from 1994 through 2016. This involved comparing semitrailer tractors from different eras as they drove three times on a 360-kilometer route accompanied by the technical inspection authority TÜV Süd. The result shows a 31.5% reduction in fuel consumption and, as a result, in CO<sub>2</sub> emissions in the 1994–2016 period.



### Coaches

With its aerodynamically optimized design, the NEOPLAN Skyliner double-decker coach returns fuel consumption of less than 30 l/100 km – a saving of approximately 5% in highway driving at a constant speed of 100 km/h. This has benefits for the environment as well, with CO<sub>2</sub> emissions of just 12 g/passenger kilometer when operating at full passenger capacity.



## Low-pollutant natural gas engines

As a clean fuel, natural gas plays a key role in our product portfolio. As well as providing low-emission propulsion for buses, trucks, and ships, natural gas is also ideally suited for use in the power generation industry.

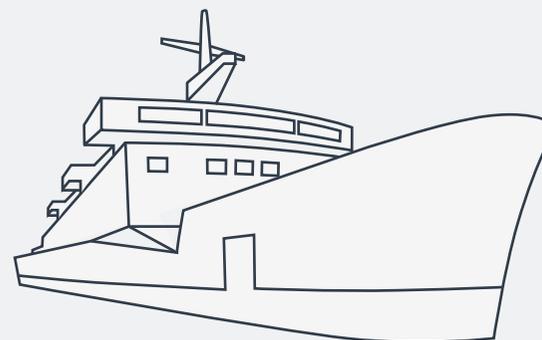
### City buses

When operated on special biogas, the MAN Lion's City GL CNG natural gas-powered city bus is virtually carbon-neutral. Gas-powered buses accounted for around one in five of all MAN city buses sold during the year under review. MAN Truck & Bus is the leading European supplier of gas buses, with a current average market share of around 30 %.



### Dual-fuel engines

With its dual-fuel engines, which are capable of operating on both gaseous and liquid fuels, MAN Energy Solutions offers a low-carbon propulsion solution for ships that combines energy efficiency with flexibility. As well as liquefied natural gas (LNG), MAN Energy Solutions also offers engines capable of running on methanol, ethanol, or liquefied petroleum gas (LPG).



## A new logistics platform

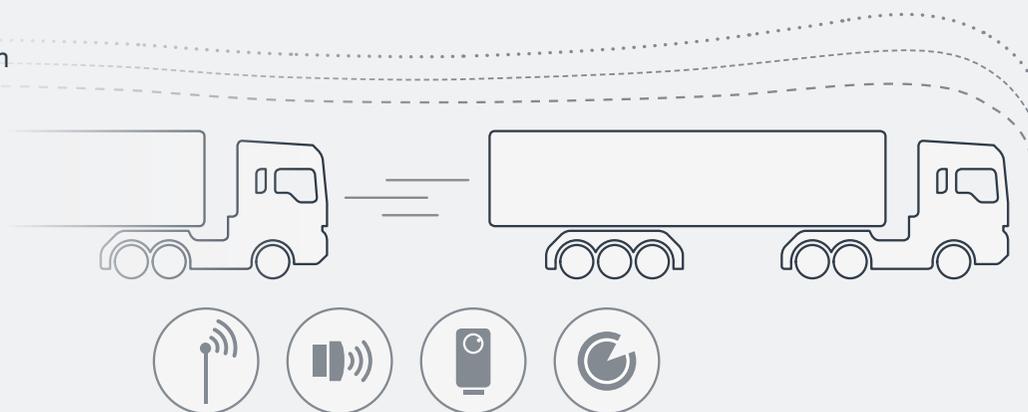
As a digital brand of the TRATON GROUP, RIO offers digital solutions for the entire transportation and logistics ecosystem on its open and cloud-based platform. The RIO Box, which forms the basis for connecting the vehicles with the platform, has already been fitted as standard in all brand new MAN truck series in Europe since August 2017. The services offered on the RIO platform allow RIO and MAN to make a significant contribution to protecting the environment and the climate: for example, MAN customers can save fuel and CO<sub>2</sub> by improving tour and route planning and avoiding empty journeys.



## Platooning

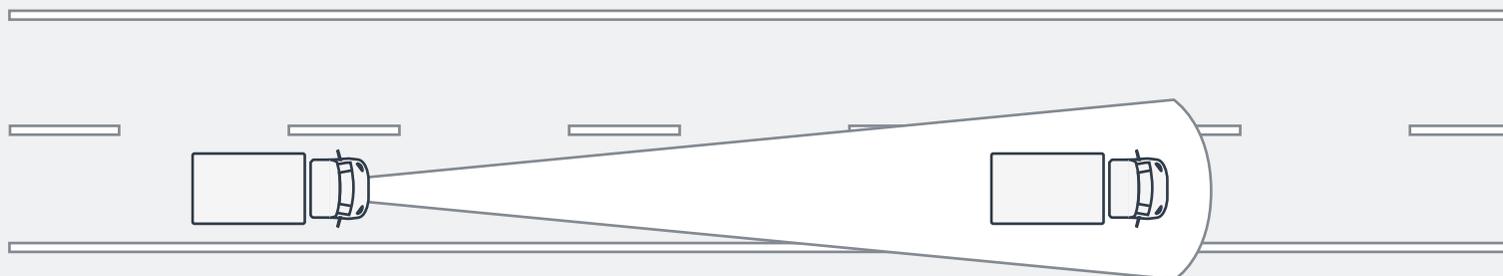
A research project initiated by DB Schenker, MAN Truck & Bus, and the Fresenius University of Applied Sciences puts networked trucks into practical operation in everyday logistics for the first time. DB Schenker tested these vehicles as part of its regular logistics operations and using professional drivers on the digital test site, a section of the A9 highway between Munich and Nuremberg, for several months starting in June 2018.

MAN defines platooning as a vehicle-based system, still at the development stage, in which two or more semitrailer combinations follow each other in close proximity with the aid of driver assistance systems, steering technology, and vehicle-to-vehicle communication. The lead vehicle dictates the speed and the direction and the resulting “slipstreaming effect” achieves significant fuel savings, depending on vehicle model and convoy length, for the platoon as a whole, which also leads to reduced CO<sub>2</sub>, nitrogen, and particulate emissions.



## Effective driver assistance systems

Based on many years of accident research, MAN Truck & Bus is working to continuously improve the safety of its vehicles. MAN's driver assistance systems (Adaptive Cruise Control (ACC) and Lane Guard System (LGS)) increase road safety and reduce fuel consumption. This is also confirmed by the European research project euroFOT, with companies and institutions from ten different countries taking part.



# 94%

of the drivers surveyed said that Adaptive Cruise Control (ACC) significantly improved safety – and rated it as one of the most important driver assistance systems for trucks.