

BLUETEC

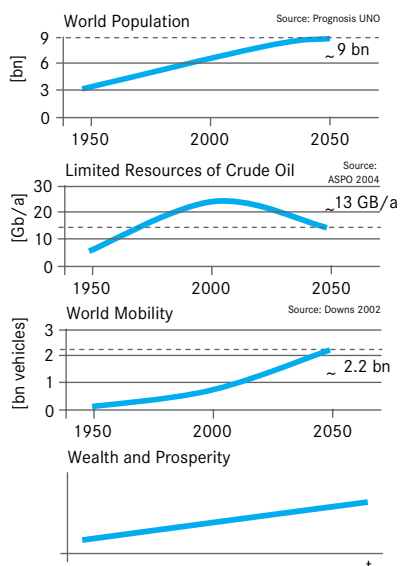
Mercedes-Benz Diesel Technology: Clean, Efficient and Powerful

Dr. Klaus Fieweger, Daimler AG, Stuttgart

Thai Automotive Institute Diesel Symposium, Bangkok, June 13, 2008

Global Challenges and Demands on Vehicles Reduction of Emissions (incl. CO₂-Emission) and Fuel Consumption

Global challenges



Demands on new vehicles

Regulations

- Safety
- Consumption
- Emissions
- Noise

Environment




- Clean Air
- Pollution
- Resources
- Recycling

Customer

- Performance
- Price
- Costs
- Reliability



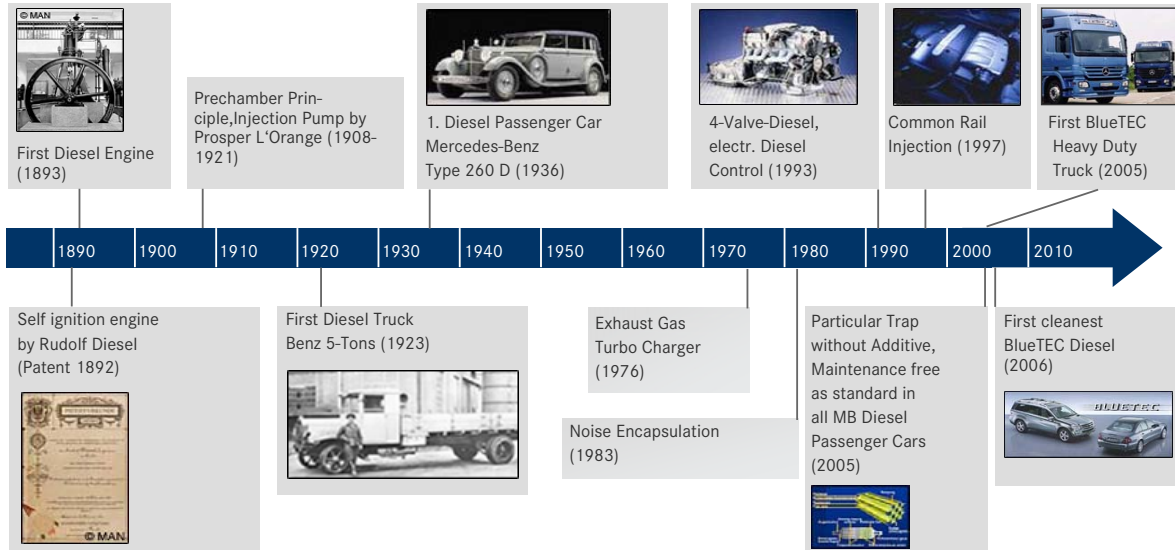
Daimler Roadmap to Sustainable Mobility

<p>Maximum efficiency for vehicles with combustion engines</p> <p>BlueEFFICIENCY CGI, BlueTEC DIESOTTO</p>	<p>Hybridization for further increase in efficiency</p> <p>HYBRID Range Extender Plug-In</p>	<p>Emission-free driving with fuel cell / battery-drive vehicles</p> <p>F-CELL Battery-/E-Drive</p>
		
<p>NGT</p> <p><i>Clean fuels for combustion engines</i></p>	<p>Energy sources for future mobility</p>	<p><i>Emission-free driving</i></p>

Introduction

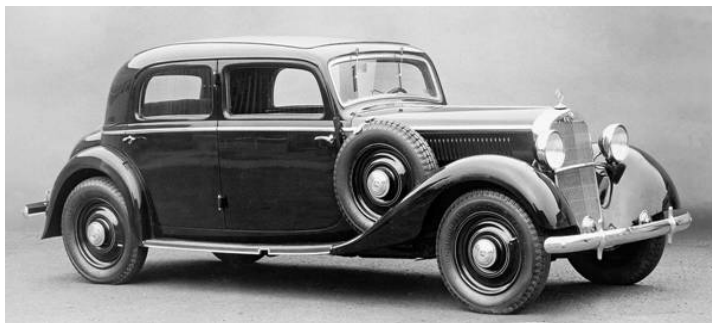
- About 110 years ago Rudolf Diesel invented the self-ignition engine which was named DIESEL engine since then.
- The diesel engine was for a long time known as robust and efficient, but for some attributes like power, driveability, sportiness the gasoline engine was often favoured.
- Due to a lot of technical improvements within the last 15 years, e.g. turbo charging, 4-valve technology, common rail direct injection, particulate trap and BlueTEC, the DIESEL engine has become a competitive power train with outstanding torque and driveability properties.
- Today about 50 % of the customers make their choice for a diesel car and accordingly the diesel share has grown significantly in Europe.
- Looking on the global energy demand, the DIESEL engine has a big potential to save the crude oil reserves and to reduce the total CO₂ emissions, due to economical benefits in terms of fuel economy.
- The technology evolution of today's high performance DIESEL engines was extensively driven by Mercedes-Benz.

Diesel History and Success



The evolution of the Diesel is closely linked to innovative Mercedes-Benz developments.

More than 70 Years of Diesel Competence: Mercedes-Benz 260 D - First Diesel Passenger Car



Mercedes-Benz 260 D



Rudolf Diesel

1936

More than 70 Years of Diesel Competence
Mercedes-Benz E 320 BlueTEC – World's Cleanest Diesel Car



Mercedes-Benz E 320 BlueTEC



Rudolf Diesel

2006

Mercedes-Benz E-Class 320 CDI: World Record in Laredo/USA (2005)
Low Fuel Consumption and High Mileage

**Four Times
around the World**
160.934 Kilometer,
Ø-Velocity
224.823 km/h



**1672 km without
Fueling**
4,75 l/100 km



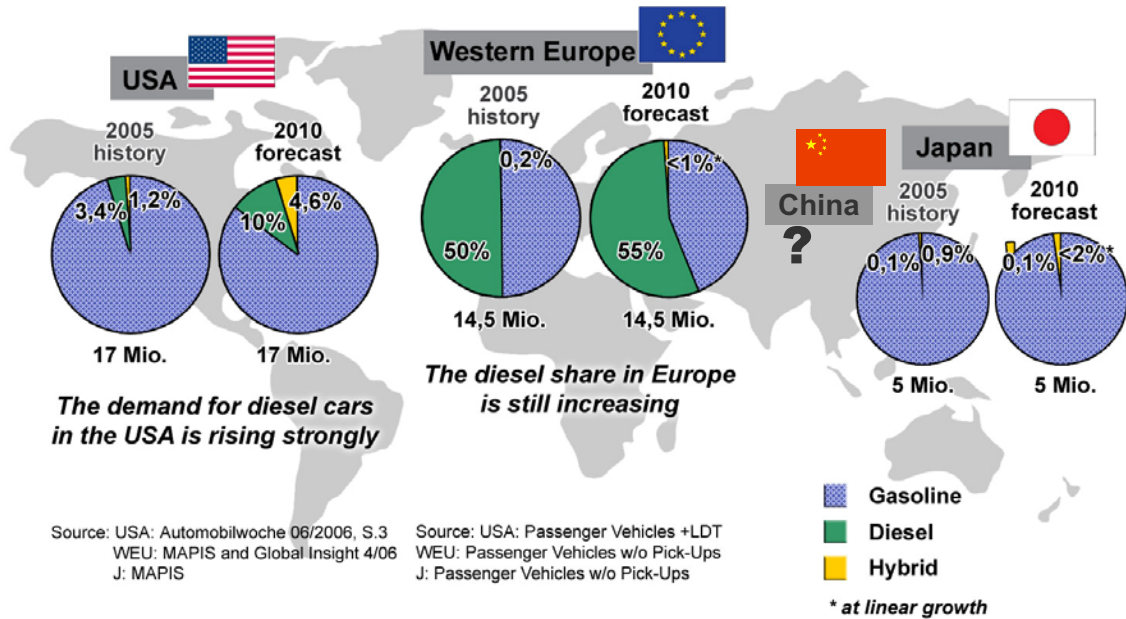
E-Class Challenge with V6 Diesel Engine – Paris – Beijing (2006)



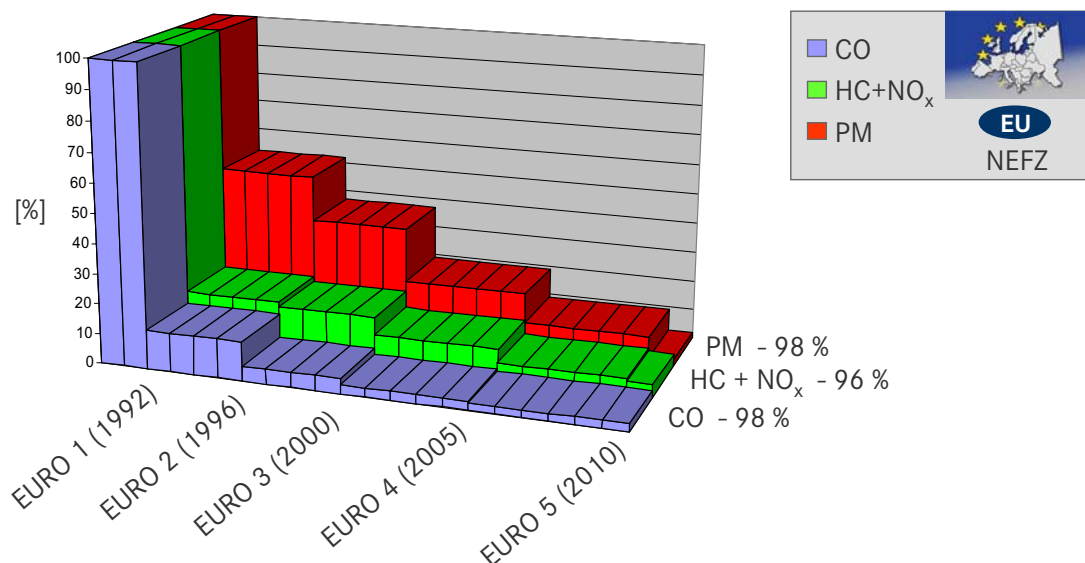
E-Class Challenge with V6 Diesel Engine – Paris – Beijing: 450 000 Kilometers in 26 Days (2006)



Perspective of Diesel Market Share

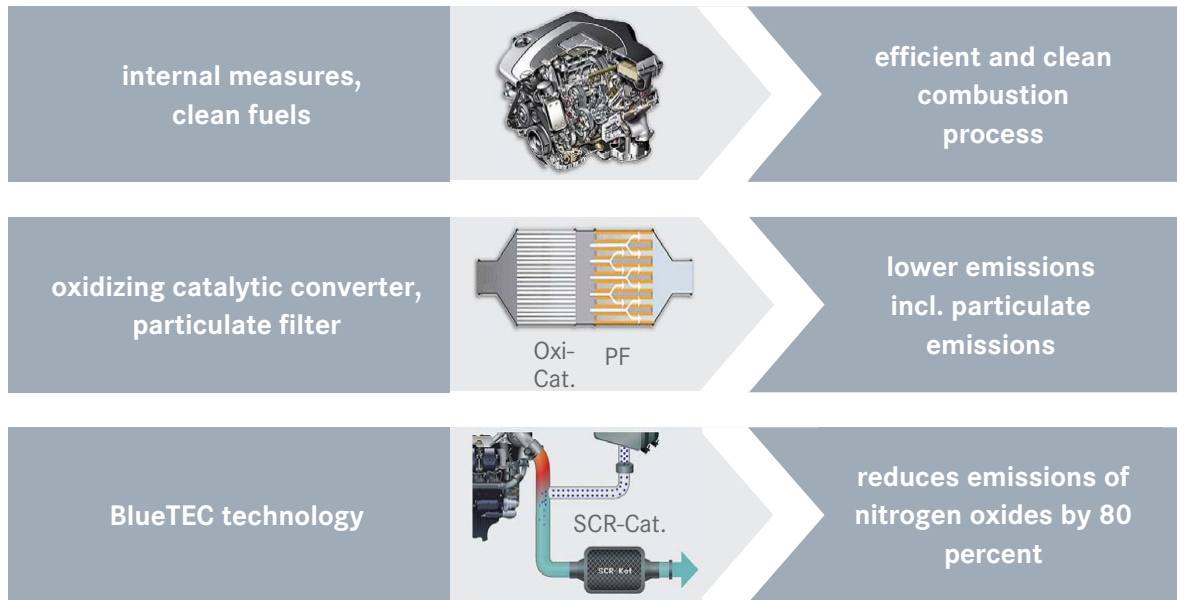


Development of EU Emission Standards



Since the introduction of first emission standards the emissions have been reduced extensively.

In Three Steps – Towards the Cleanest Diesel of the World



BlueTEC: The Key Elements of Clean Diesel Technology Diesel Engines as Clean as Gasoline Engines

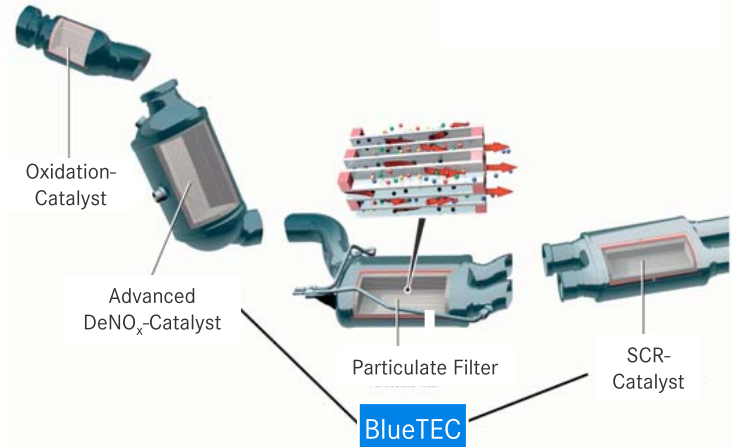


Goal: Diesel engines as clean as gasoline engines thanks to **BlueTEC**
Showing the way to the most stringent emission standards **EU5 and EU6**

Modular BlueTEC Technology BlueTEC1: Advanced DeNO_x-Catalyst



- BlueTEC 1 market launch in passenger car on US market in October 2006 in E 320 sedan
- BlueTEC 1 in passenger cars in Europe since end of 2007



First BlueTEC in the US



*E 320
BlueTEC*

*Market
launch in
October
2006*

*“World Green
Car Of The
Year 2007“*

20 % to 40 % fuel consumption advantage for BlueTEC compared to gasoline vehicles
Diesel market share of about 11 % in US E-Class sales

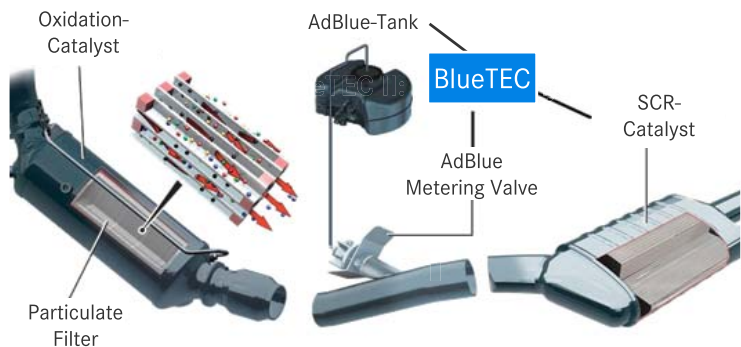
Modular BlueTEC Technology BlueTEC2: AdBlue-Injection



Actros

Vision GL 320 BlueTEC

- BlueTEC is highly efficient and economical
- BlueTEC is applicable worldwide
- BlueTEC in commercial vehicles since 2005
- GL 320 BlueTEC with SCR-AdBlue-aftertreatment is dedicated to comply with US federal BIN 5 and California LEV2.



Next Steps ...

... Mercedes-Benz GL-, R and ML 320 BlueTEC



with ULEV / BIN5 certification for MY2009 in all 50 states of the US

Success Story of BlueTEC Technology



The new four-cylinder Diesel generation from Mercedes-Benz ...



Key Data

	250 CDI	220 CDI	200 CDI
Number of cylinders	4	4	4
Valves per cylinder	4	4	4
Displacement, cc	2143	2143	2143
Bore/stroke, mm	83.0/99.0	83.0/99.0	83.0/99.0
Compression ratio	16.2:1	16.2:1	16.2:1
Output, kW/hp	150/204 at 4200 rpm	125/170 at 3200 -4800 rpm	100/136 at 3000 -4600 rpm
Torque, Nm	500 at 1600 - 1800 rpm	400 at 1400 - 2800 rpm	330 *) at 1600 - 2800 rpm

*) with automatic transmission

The engine will be introduced in the Mercedes-Benz C-Class in autumn 2008

... taking performance, consumption and emissions into a new dimension.

- 20 per cent more power
- 25 per cent more torque
- 13 per cent less CO₂ emissions
- EU5 emissions standard

- Two-stage turbo charging system
- Fourth-generation common-rail technology 2000 bar with a new piezoelectric injector concept featuring direct injector needle control
- Ignition pressure of 200 bar and such a high power-to-displacement ratio
- Both the oil-spray nozzles and the water pump are activated in accordance
- Camshaft drive is positioned at the rear
- Engine block is made from cast iron, the cylinder head from aluminum.
- High vibrational comfort:
 - Forged crankshaft with eight counterweights
 - Two Lanchester balancer shafts in low-friction roller bearings
 - Two-mass flywheel



Summary



- The diesel engine's success story is closely coupled to the technologies developed by Mercedes-Benz.
- BlueTEC technology has the potential of fulfilling the stringiest emission standards all over the world, making the Diesel engine as clean as the gasoline engine.
- With the well known torque and efficiency of the diesel engines BlueTEC is clean, efficient and powerful like no other diesel engine before.
- Mercedes-Benz will continue to offer its customers diesel engines with BlueTEC technology. This comprises advanced internal engine measures and highly sophisticated exhaust gas after treatment.
- The brand new generation of four-cylinder diesel engines from Mercedes-Benz will outstrip all previous benchmarks for performance, torque, emission properties and fuel economy in their segment.