

DAIMLER

Research & Development

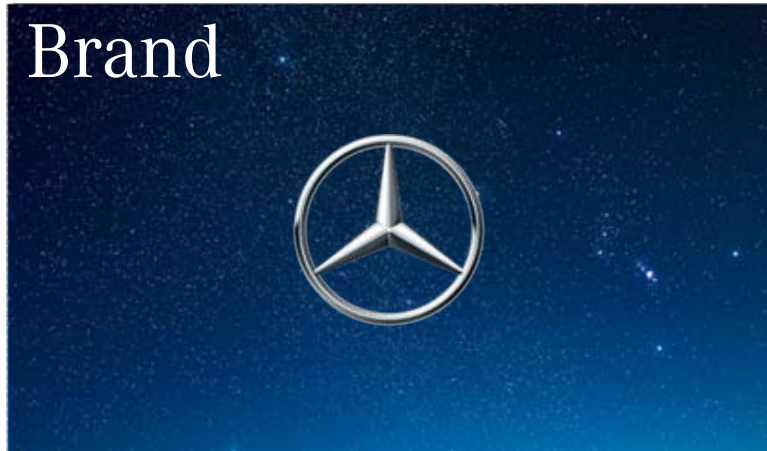
MBC Division Day 2012

Prof. Thomas Weber

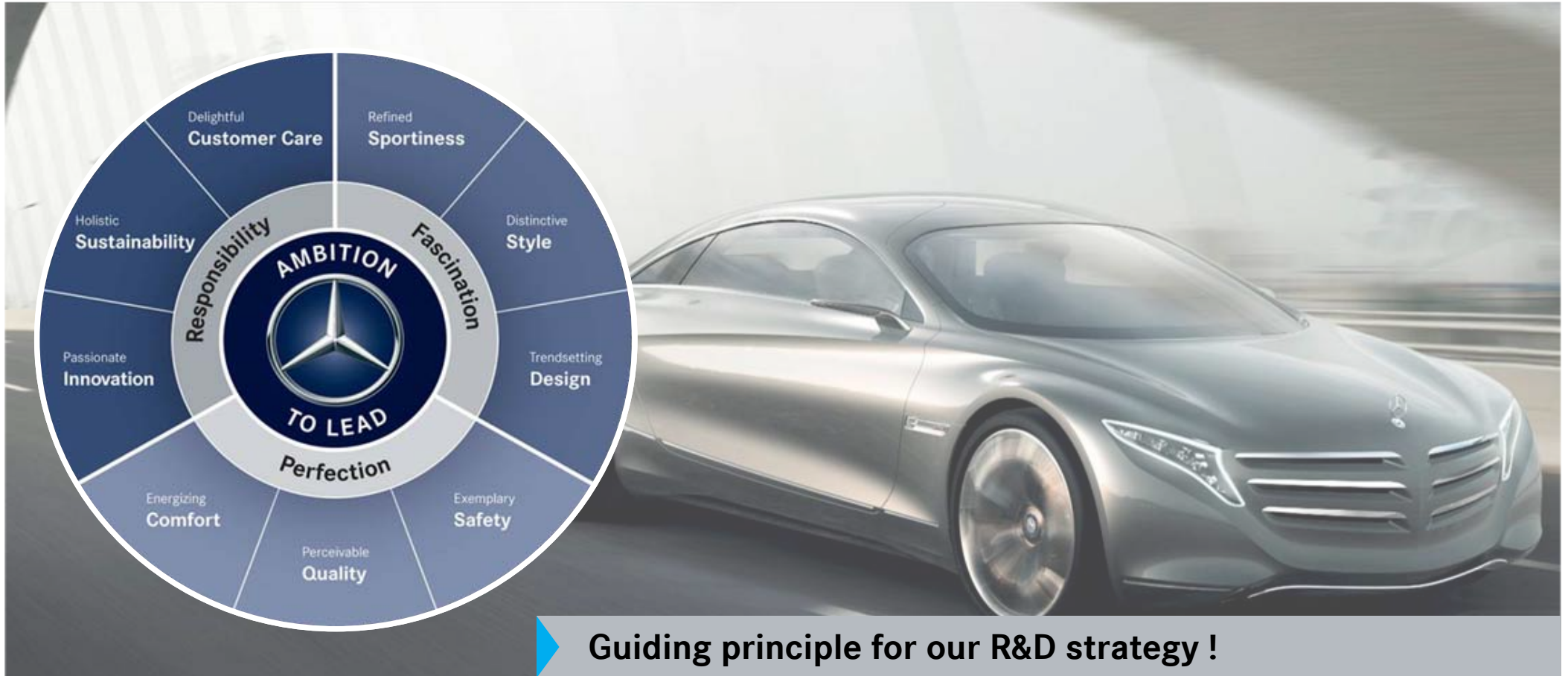
Member of the Board of Management Daimler AG

Group Research & Mercedes-Benz Cars Development

Four levers of Mercedes-Benz 2020



Mercedes-Benz: “The best or nothing”



Guiding principle for our R&D strategy !

Technology portfolio for sustainable mobility

I.

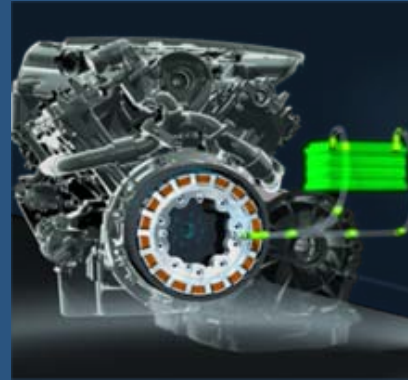
High-tech combustion engines

CDI, CGI, BlueTEC



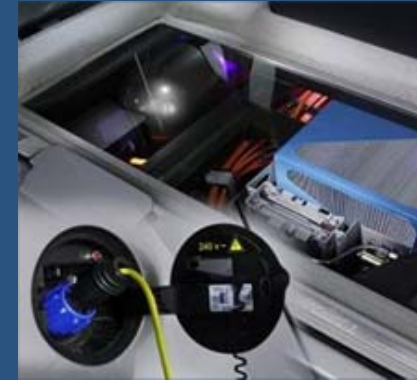
Combustion engines with hybridization

HYBRID, BlueTEC HYBRID, Plug-in HYBRID

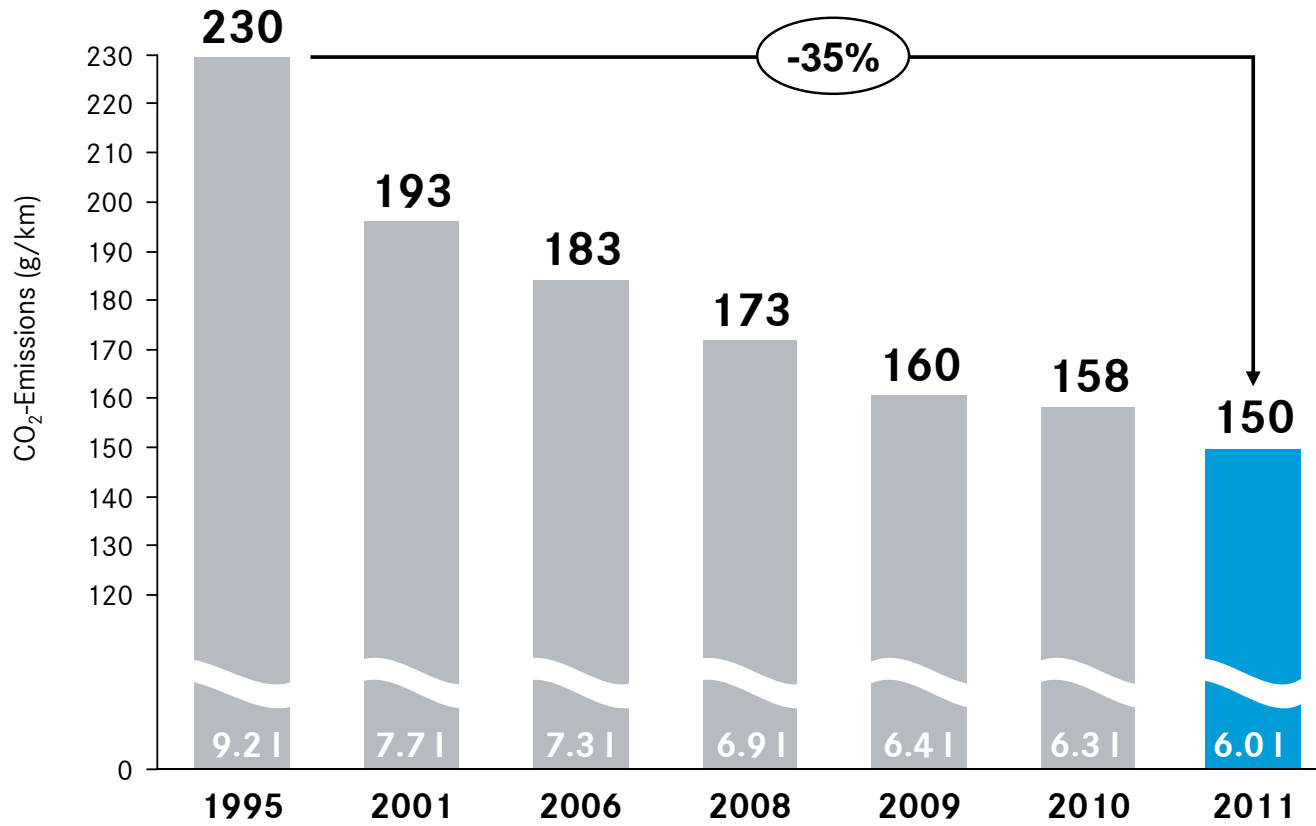


Electric vehicles with battery and fuel cell

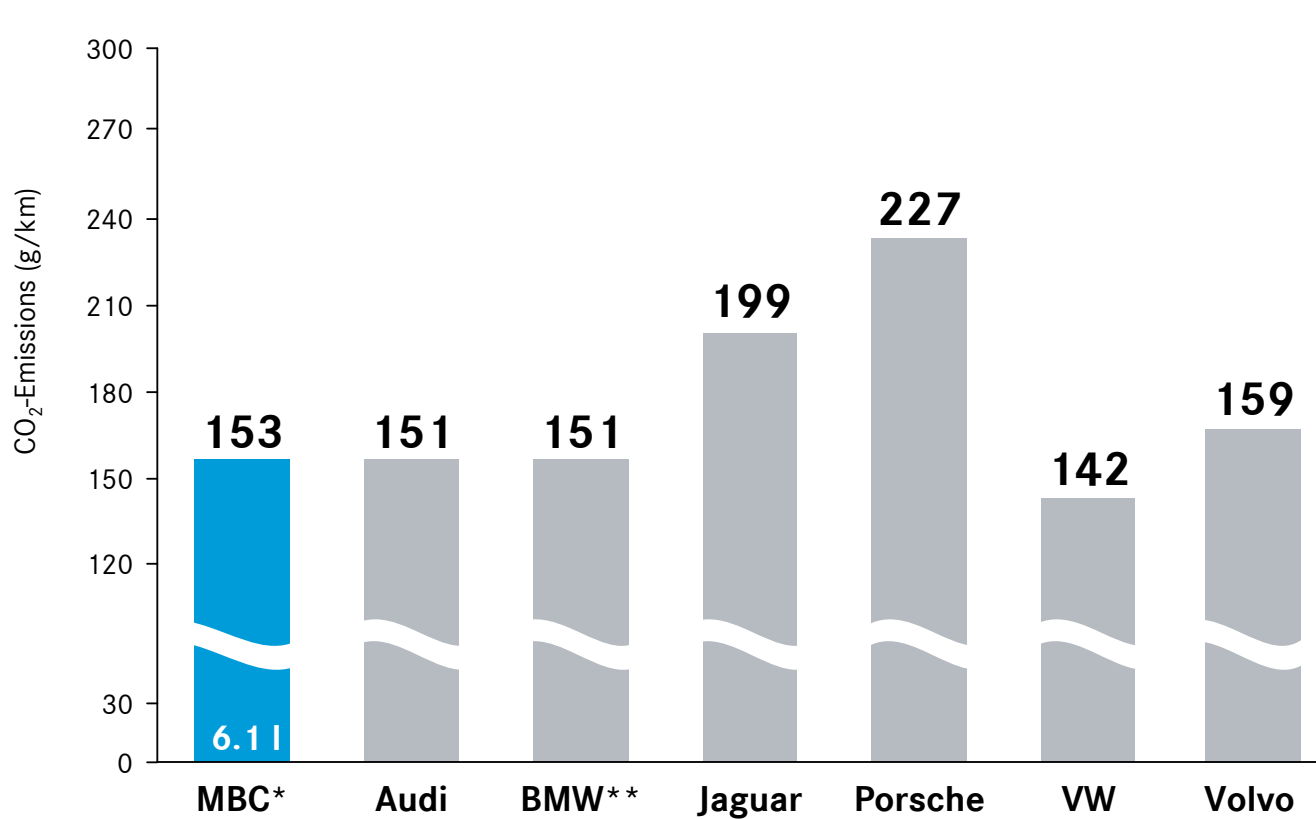
E-CELL, F-CELL, E-CELL PLUS



CO₂-Emissions: Biggest improvements of all OEMs in 2011



CO₂-Emissions of new cars registered in Germany in 2011



* Mercedes-Benz Cars incl. smart and excl. Vans

** BMW incl. Mini

Source: Federal Motor Transport Authority (KBA);
auto, motor und sport 5/2012

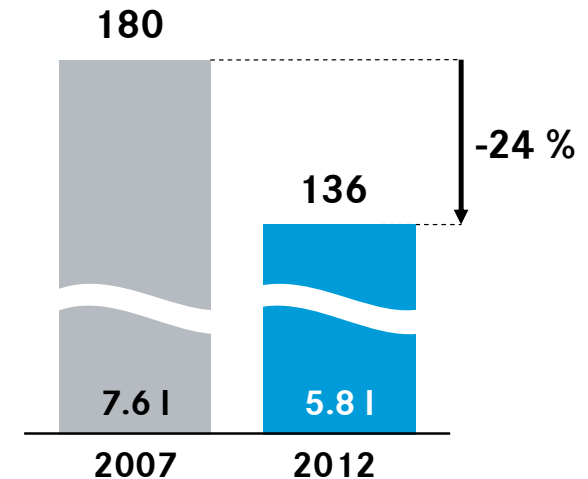
Mercedes-Benz C180

115 kW

5.8 l/100 km (41mpg, NEDC)

136 g CO₂

- 24 % versus market launch in 2007



Mercedes-Benz E220 CDI

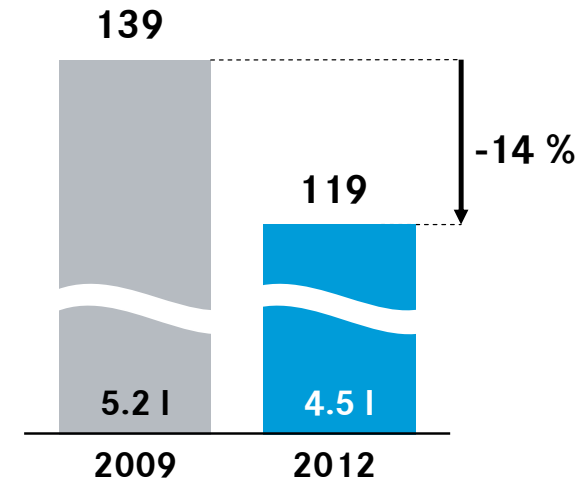


125 kW

4.5 l/100 km (52mpg, NEDC)

119 g CO₂

- 14 % versus market launch in 2009



Mercedes-Benz S250 CDI

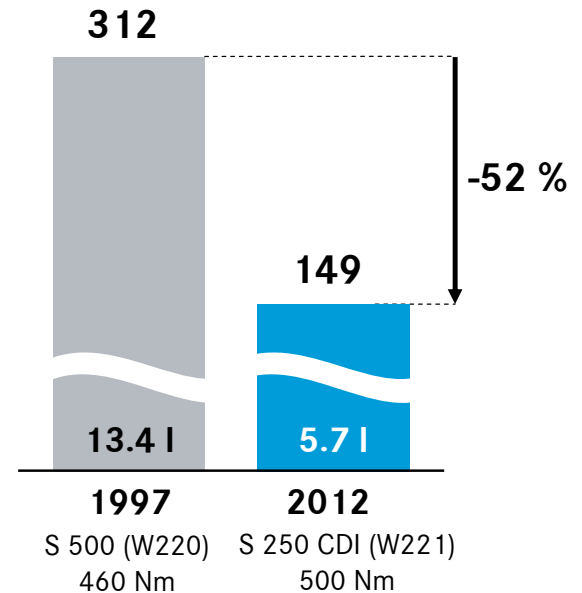


150 kW

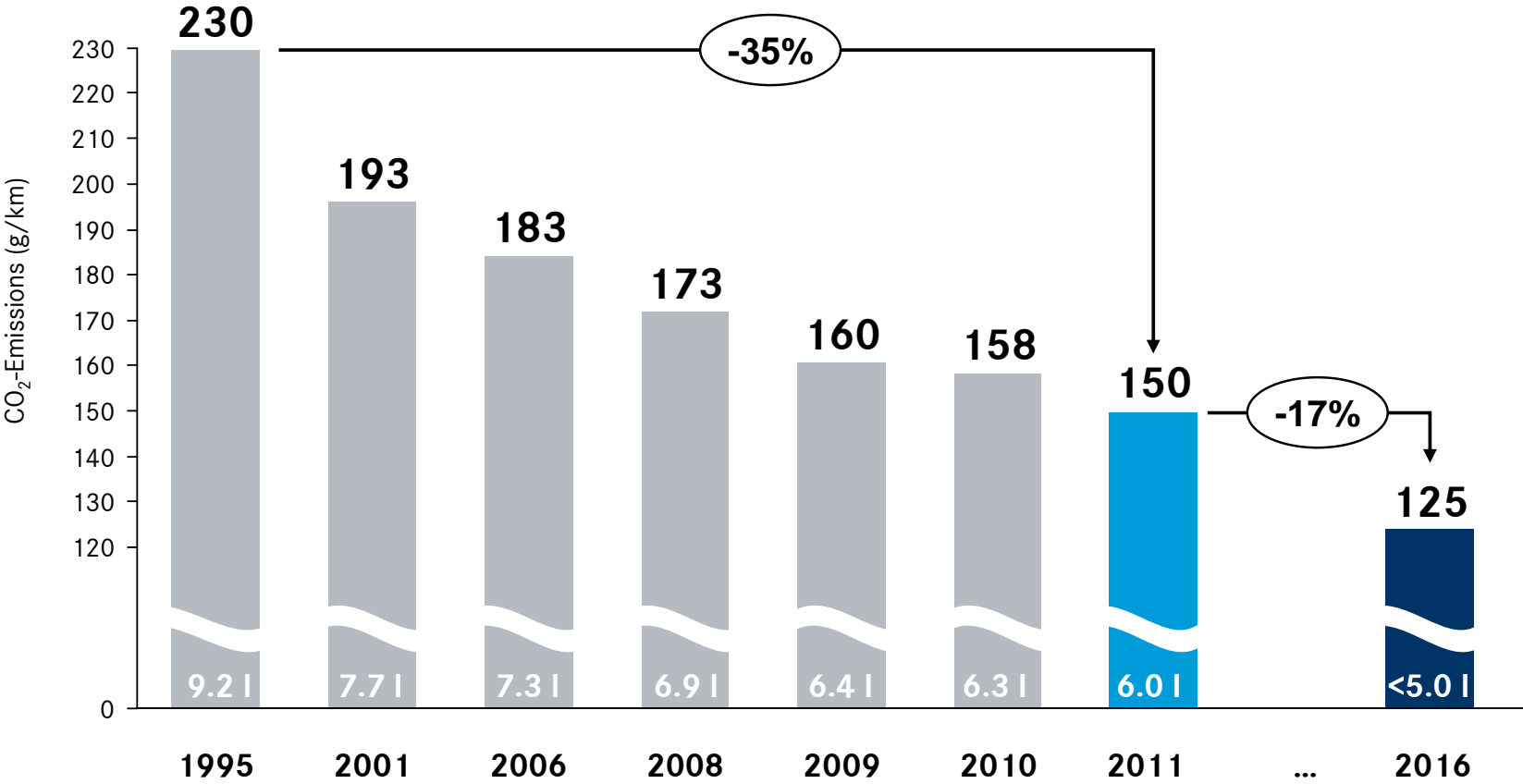
5.7 l/100km (41mpg, NEDC)

149 g CO₂

The world's most economical luxury saloon



We are on track to achieve the 2016 EU target



Technology portfolio for sustainable mobility

II.

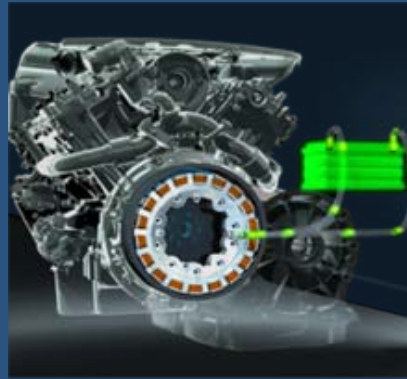
High-tech combustion engines

CDI, CGI, BlueTEC



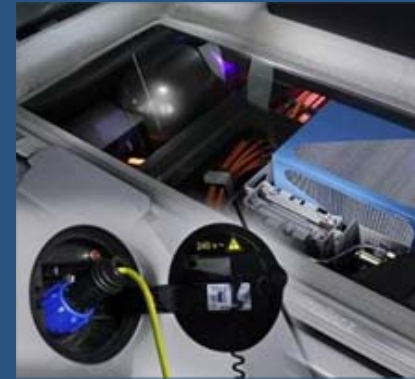
Combustion engines with hybridization

HYBRID, BlueTEC HYBRID, Plug-in HYBRID



Electric vehicles with battery and fuel cell

E-CELL, F-CELL, E-CELL PLUS



Hybrid vehicles of Mercedes-Benz



2009

S400 HYBRID:
7.9 l/100km (186 g/km)



2009

ML450 HYBRID:
7.7 l/100km (182 g/km)



2012

E300 BlueTEC HYBRID:
4.2 l/100km (109 g/km)



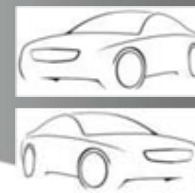
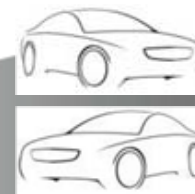
2012

E400 HYBRID:
37 mpg (adjusted)



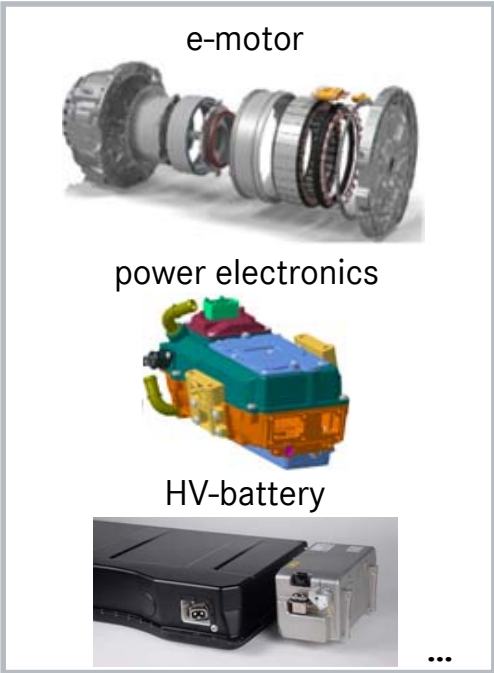
Next Gen. S-Class

S500 Plug-In- HYBRID:
3.2 l/100km (74 g/km)



Scalable module hybrid system allows for maximum customer benefits and minimizes costs


Standardized hybrid **modules**can be **combined** with various vehicle/powertrain configurations to meet world-wide **customer** expectations!





Wide **model range**...

S ... E ... C

Different **body types**...

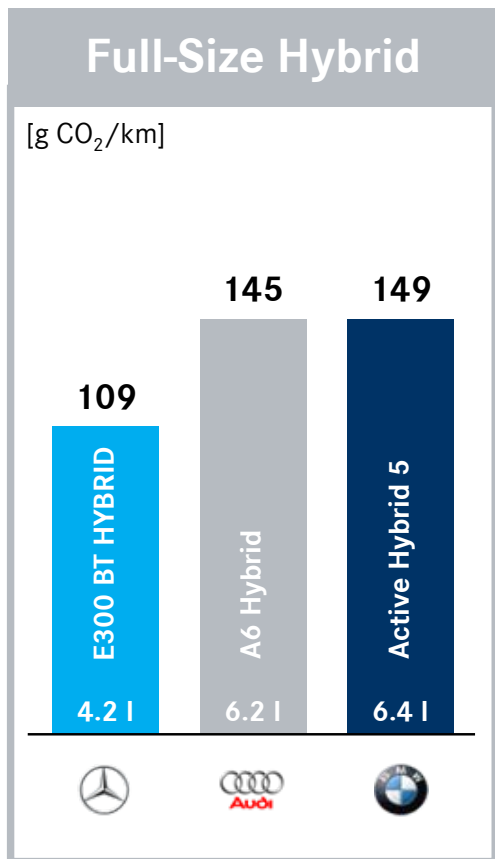
 ... 

Left hand & **right hand** drive... 

Gasoline & **Diesel** engines... 



The world's most economical luxury-class model without any compromises in cargo capacity!

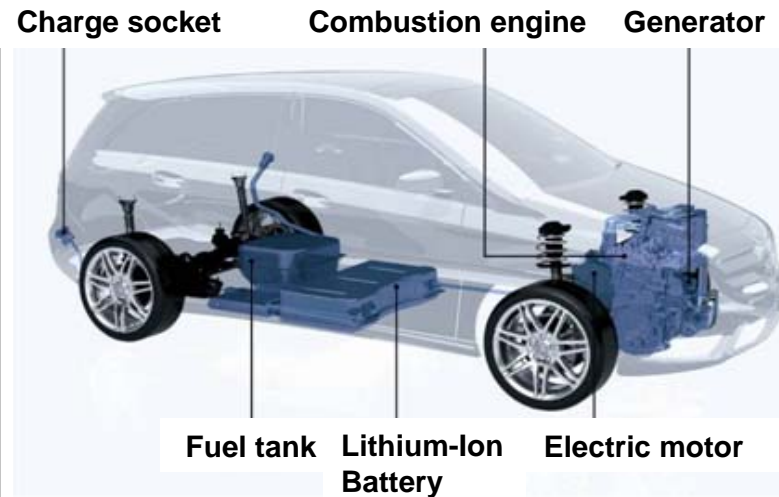


Concept B-Class E-CELL PLUS



32 g CO₂/km

up to 600km range



Technology portfolio for sustainable mobility

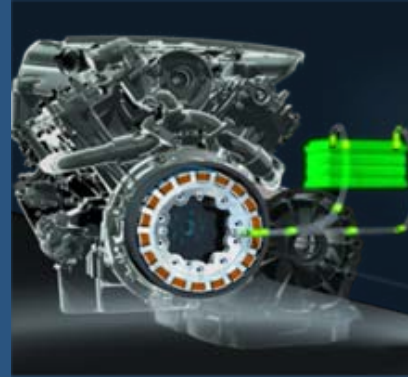
High-tech combustion engines

CDI, CGI, BlueTEC



Combustion engines with hybridization

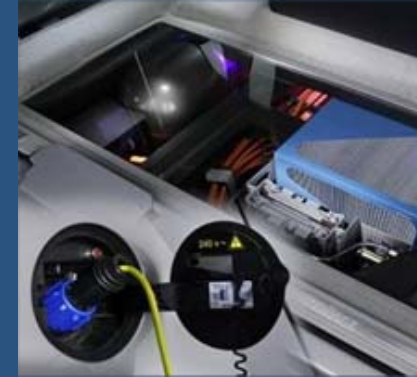
HYBRID, BlueTEC HYBRID, Plug-in HYBRID



III.

Electric vehicles with battery and fuel cell

E-CELL, F-CELL, E-CELL PLUS



More than 3.000 electric vehicles on the road since 2011

<p>Mercedes-Benz A-Class E-CELL</p>	<p>smart fortwo electric drive</p>	<p>Mercedes-Benz SLS AMG E-CELL</p>	<p>Mercedes-Benz B-Class F-CELL</p>	<p>Mercedes-Benz Vito E-CELL</p>
<p>70 kW, 290 Nm In series production</p>	<p>30 kW, 120 Nm In series production</p>	<p>392 kW, 880 Nm Market entry in 2013</p>	<p>100 kW, 290 Nm In series production</p>	<p>60 kW, 280 Nm In series production</p>
<p>250km</p>	<p>140 km</p>	<p>200 km</p>	<p>400 km</p>	<p>130 km</p>

Purely electric driving for everyone - smart fortwo electric drive in “large scale” production



- E-motor: 55kW / 75hp peak
- Top speed: 125 km/h
- Li-Ion battery: 17.6 kWh
- Range: 140km
- Quick charging: 1h

Zero-Emission-Mobility and fascinating driving experience: SLS AMG E-CELL

- E-motor: 392 kW
- Torque: 880 Nm
- Li-Ion battery: 48 kWh
- 0-100 km/h: 4 sec



Mercedes-Benz F-CELL World Drive - maturity proven!



Summary: With our technology portfolio we are prepared for the Future

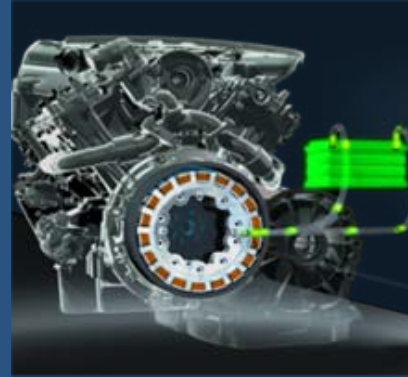
High-tech combustion engines

CDI, CGI, BlueTEC



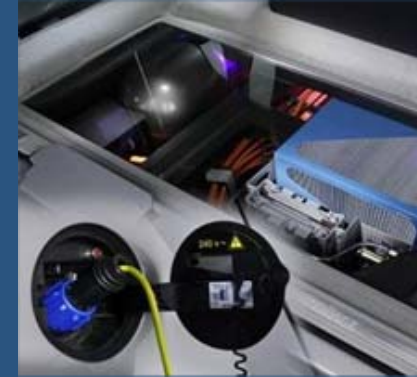
Combustion engines with hybridization

HYBRID, BlueTEC HYBRID, Plug-in HYBRID



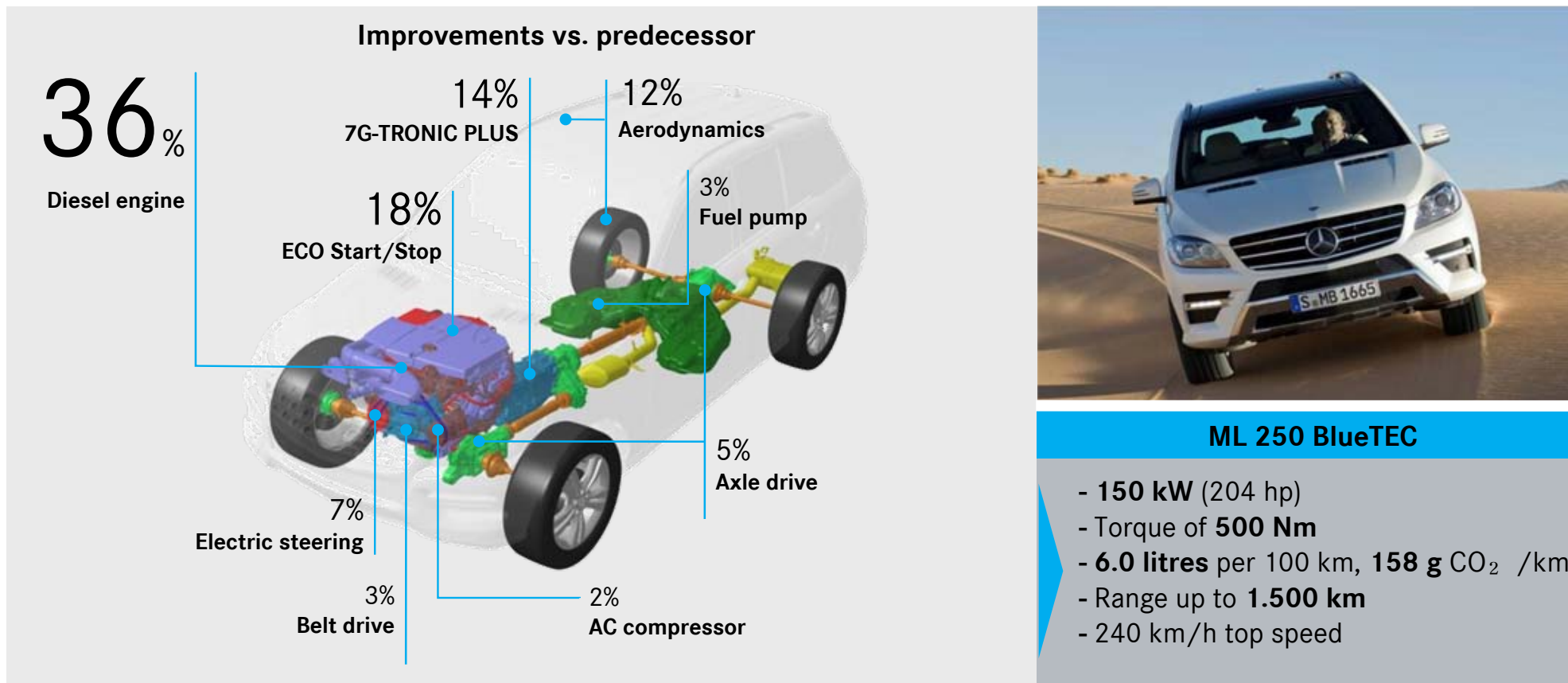
Electric vehicles with battery and fuel cell

E-CELL, F-CELL, E-CELL PLUS





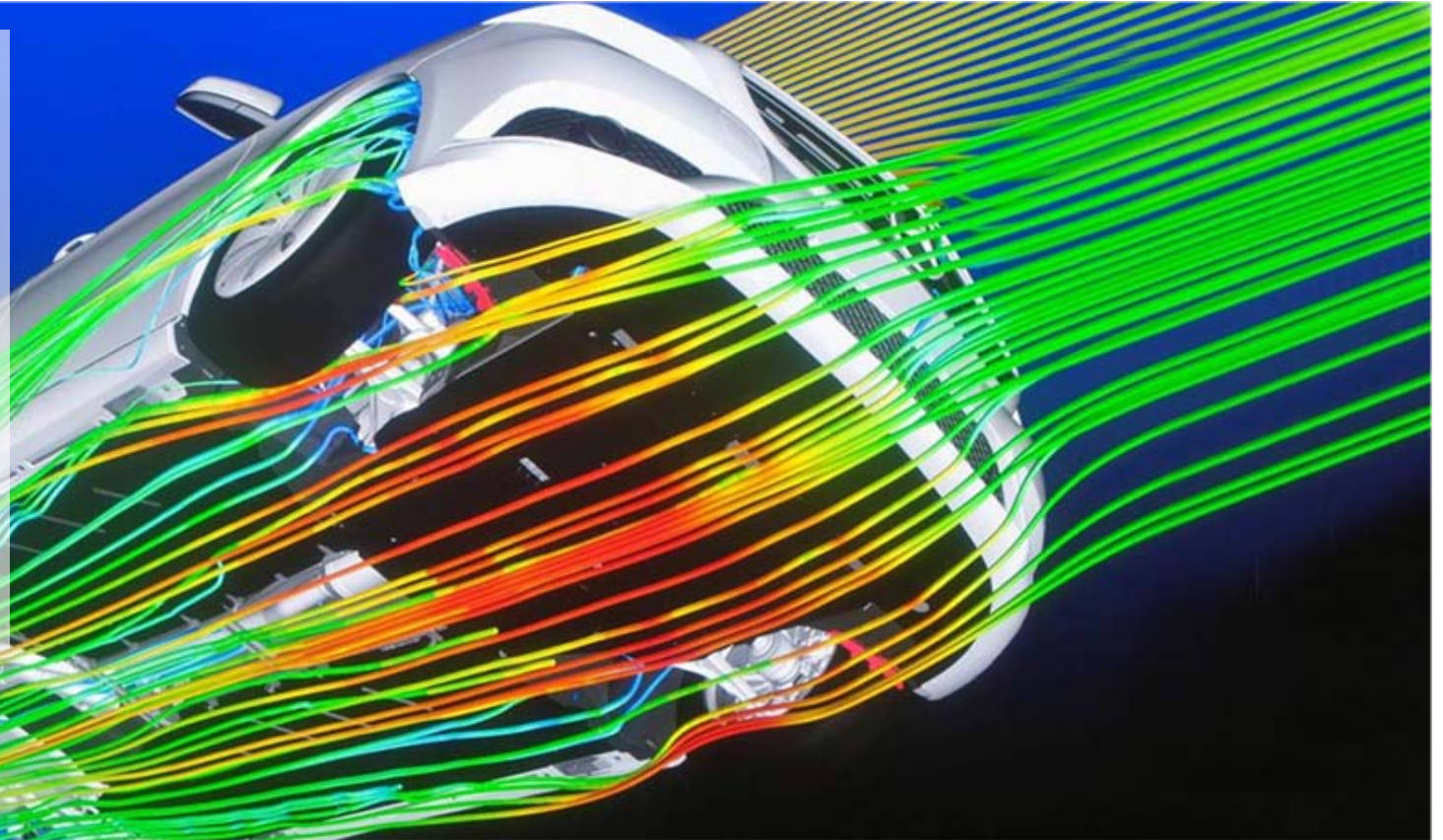
Holistic improvements of our vehicles leads to new benchmarks in fuel efficiency



Leading the field in aerodynamic engineering

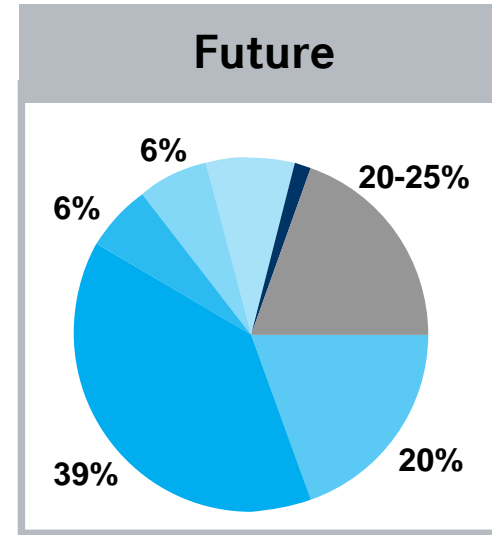
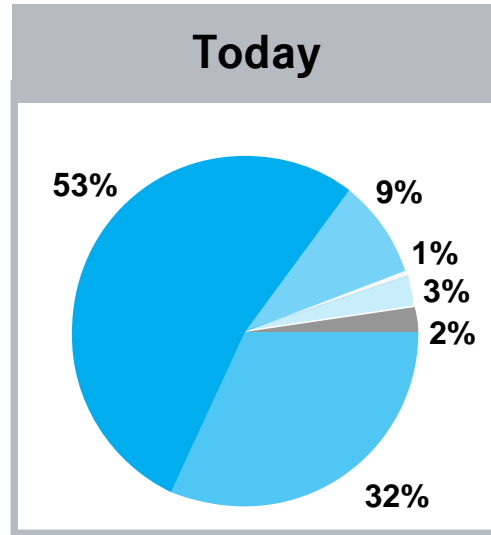
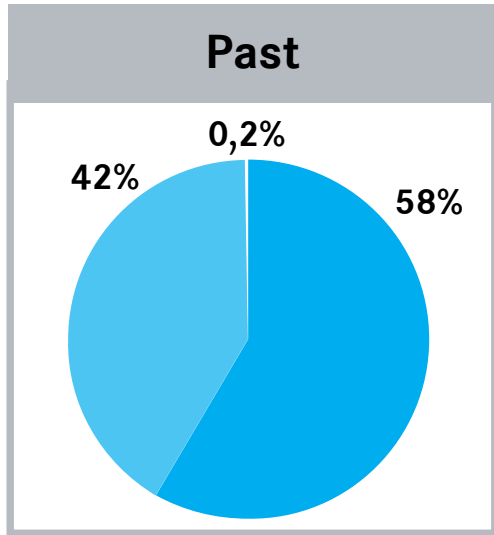
Best in class:

- E-Class Coupe $c_W = 0.24$
- E-Class Sedan $c_W = 0.25$
- B-Class $c_W = 0.26$
- CLS-Class $c_W = 0.26$
- A-Class $c_W = 0.27$
- SL-Class $c_W = 0.27$
- M-Class $c_W = 0.32$



Improvements from previous models up to **15%**, saving up to **8g CO2 /km**.

Hybrid lightweight engineering will be key



- Steel**
 - high strength,
 - advanced strength
 - ultra high strength
 - warm forming
- Aluminum**
- Plastic/Carbon**

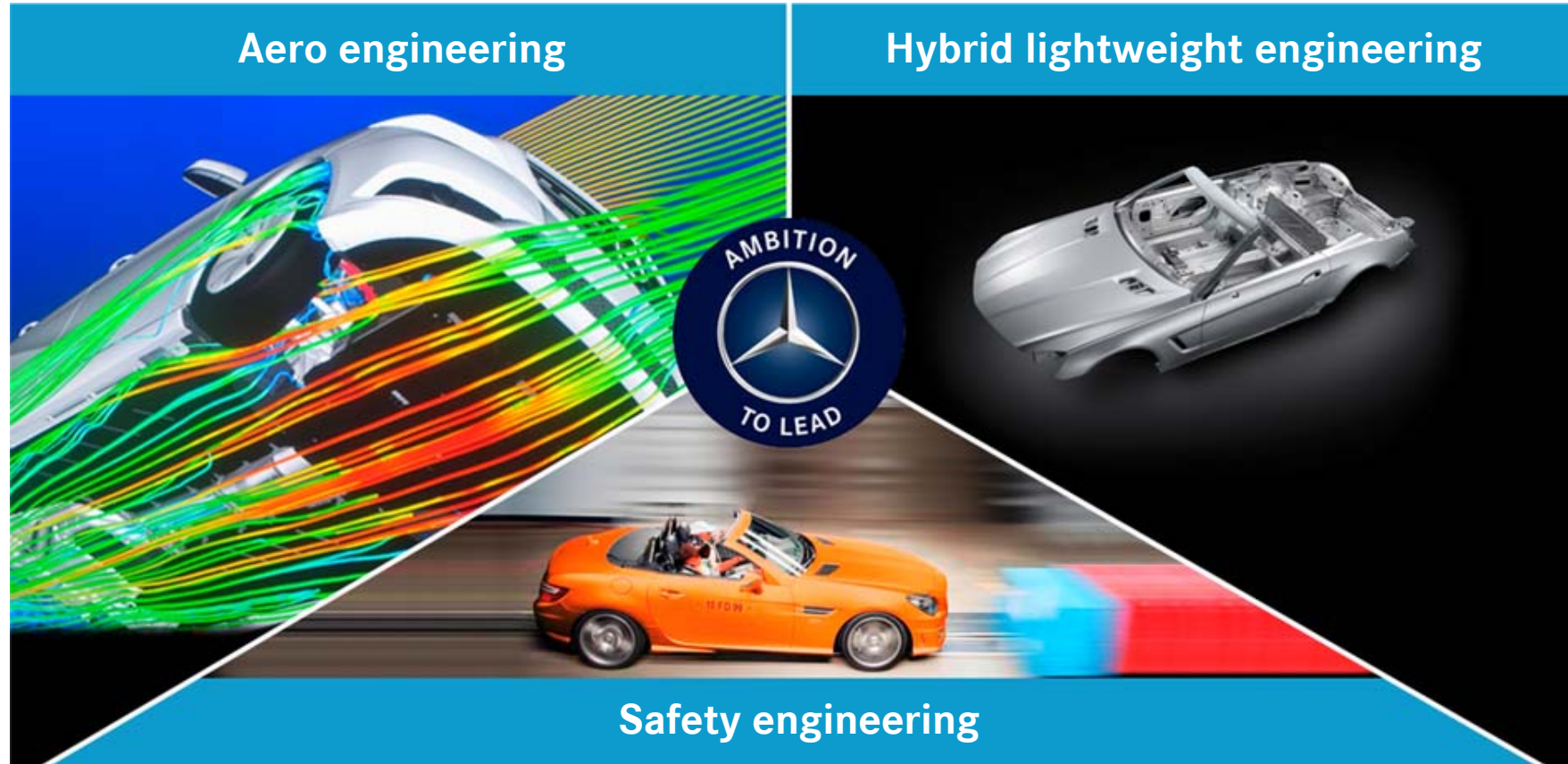


The New Mercedes-Benz SL

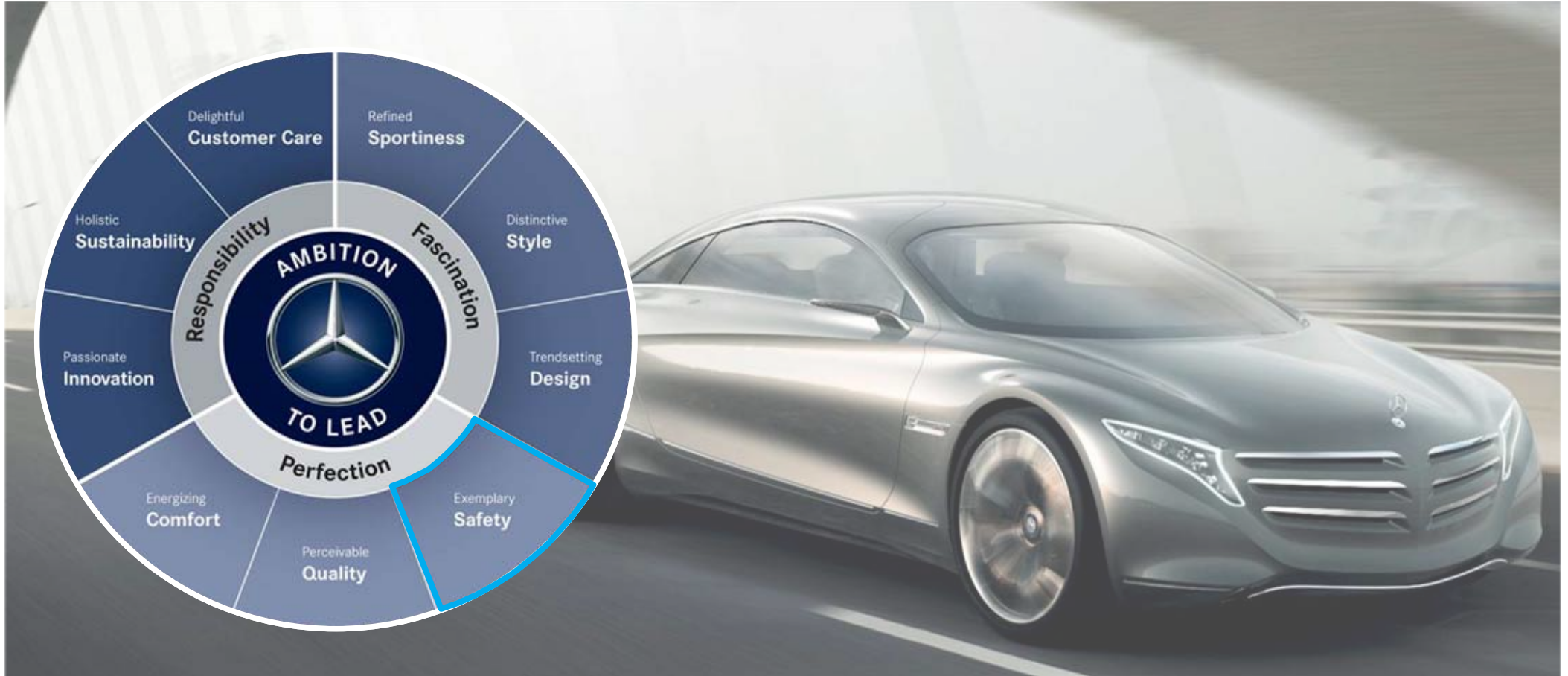
A perfect example – savings of 140 kg



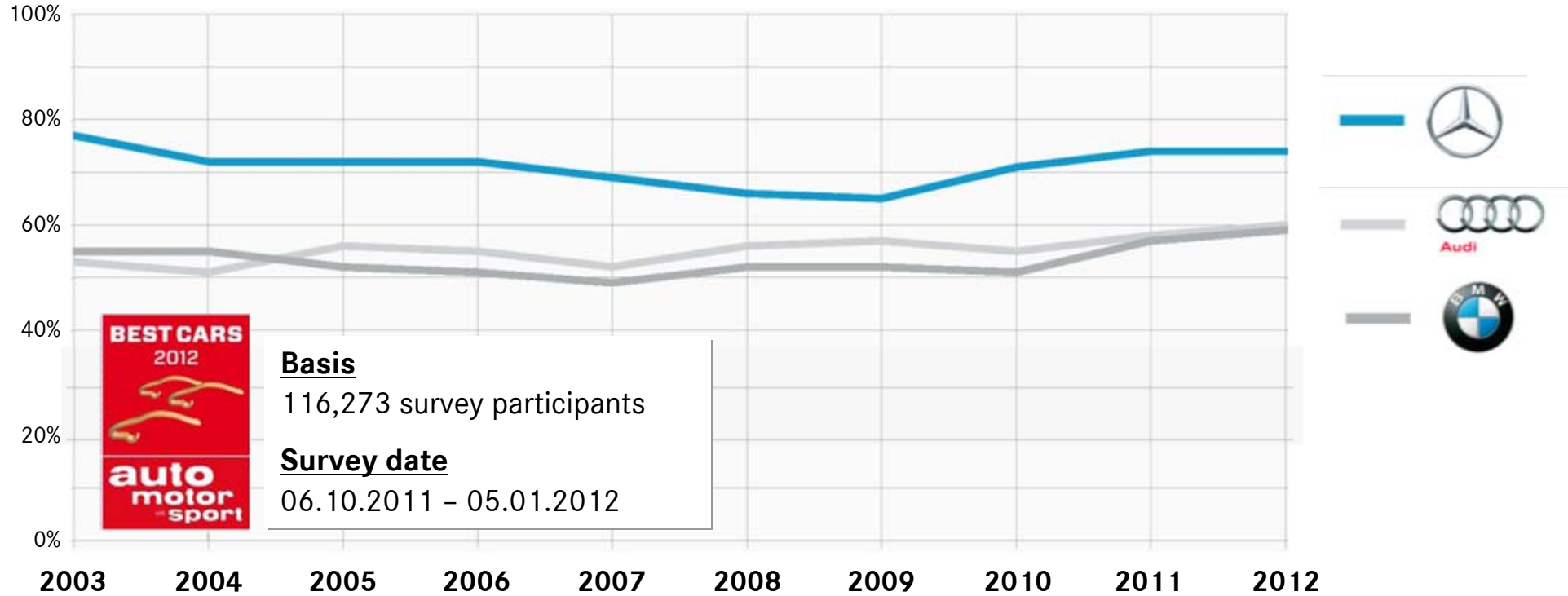
Our innovative “3D-Body Engineering” concept



Mercedes-Benz: “The best or nothing”



Best Cars 2012 – brand profile high safety standards

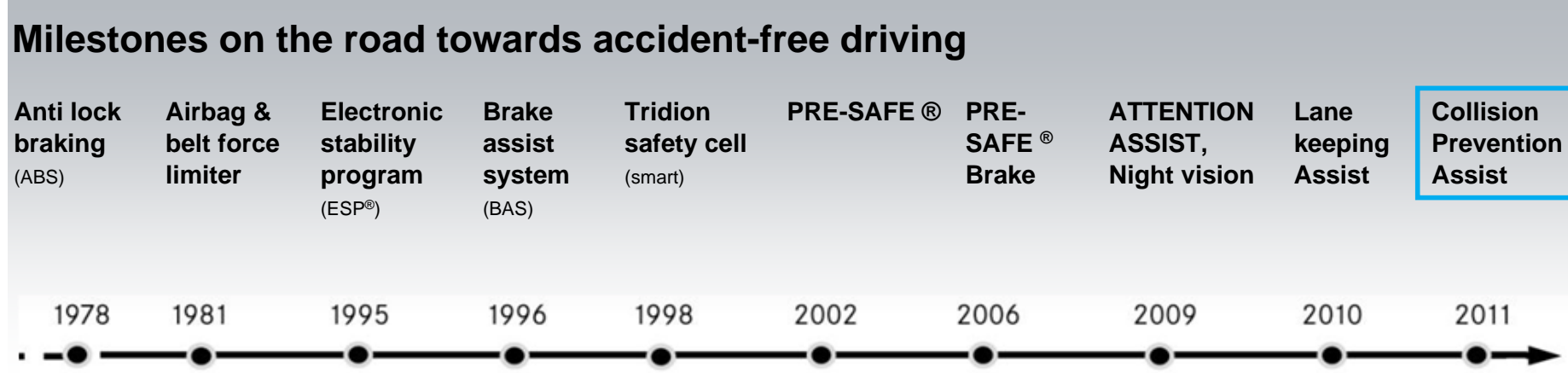


Our road to accident-free driving

Innovative driver assistance systems help avoid accidents



Setting Safety Standards - Collision Prevention Assist as standard feature in the “New Generation Compact Class”



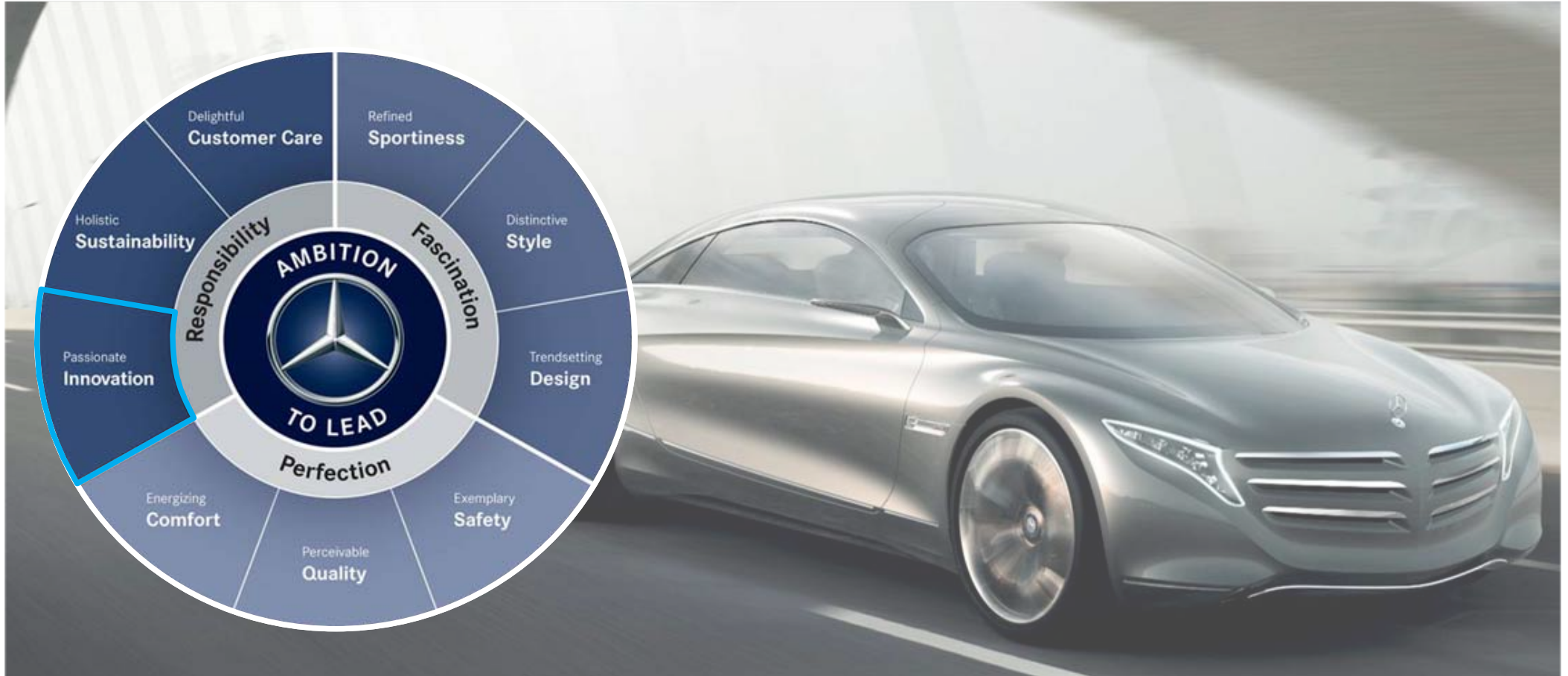
The next step in traffic safety: “6D-Vision” recognizes hazards faster than the human eye



DEUTSCHER ZUKUNFTSPREIS
Preis des Bundespräsidenten
für Technik und Innovation



Mercedes-Benz: “The best or nothing”



COMAND Online – Your Mercedes gets connected



http://



facebook

Google maps

Google Local

Google Street View

Panoramio from Google

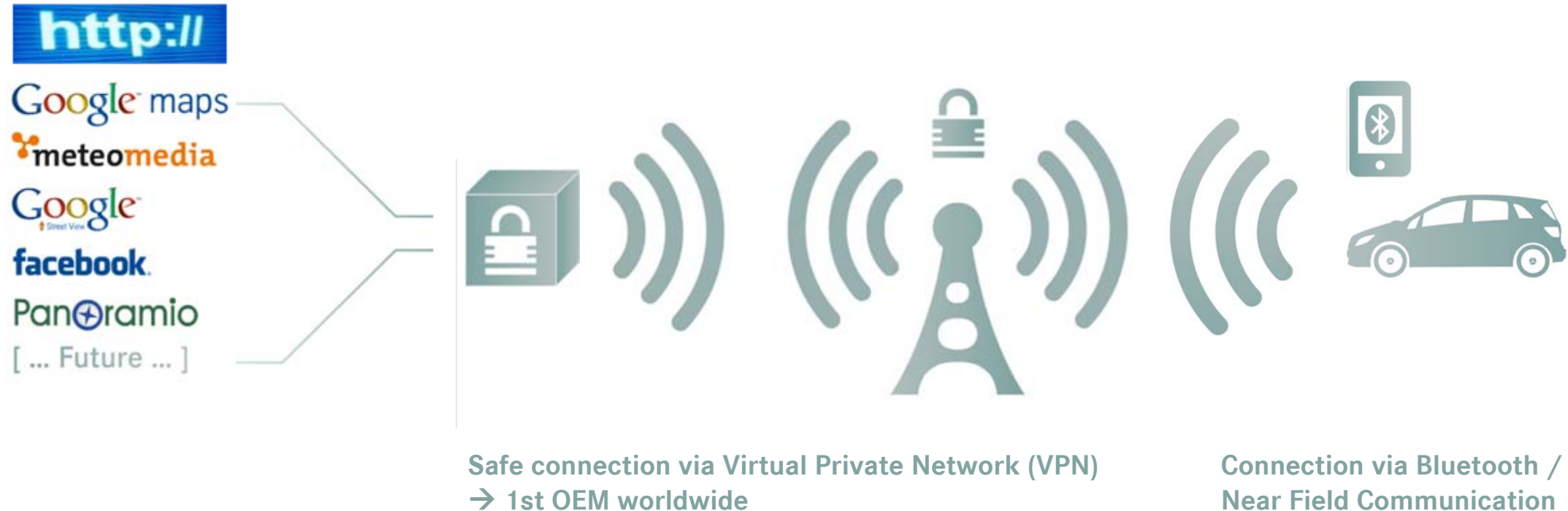
Mercedes-Benz „Cloud based approach“

Detaching product & development cycles of Car- and IT-Industry

Preparing the content ...

... safe transfer to the vehicle

... comfortable & safe use in the vehicle



Mercedes-Benz puts the iPhone® on wheels

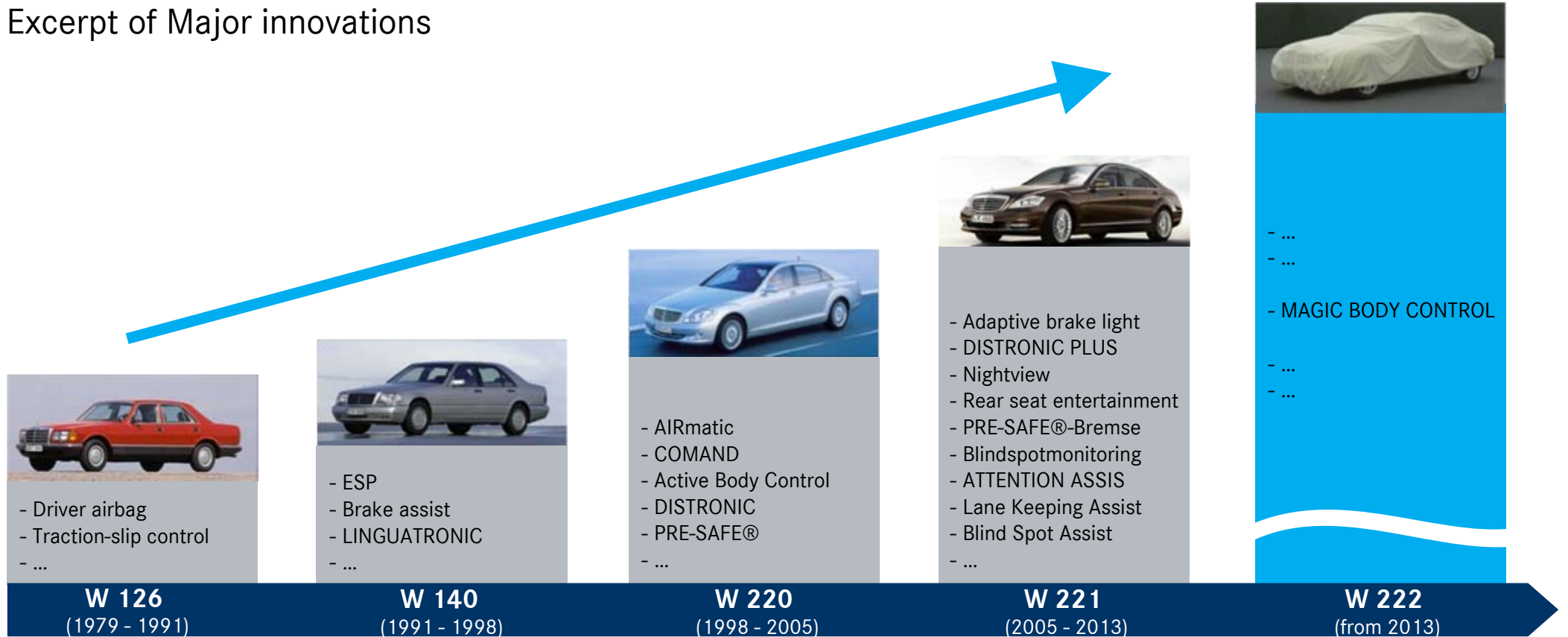


Mercedes-Benz is the first OEM:

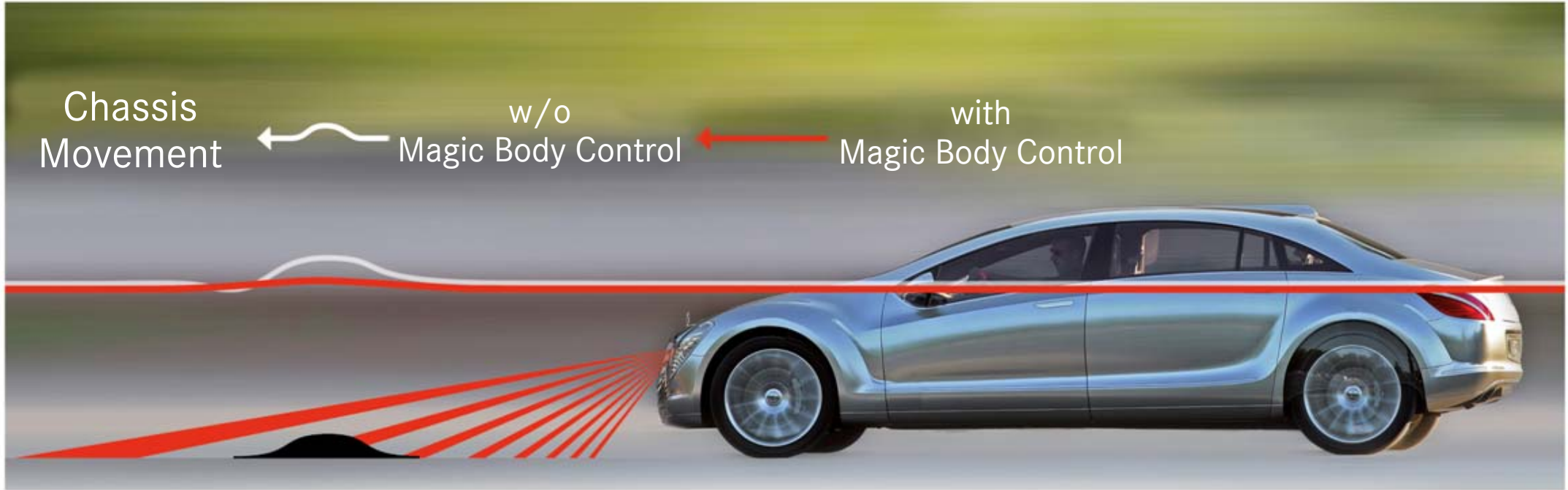
- » to fully integrate the iPhone® into the control and display system
- » And to integrate the voice-based intelligent assistant Siri™

Daimler is increasing the speed of innovation - S-Class launches in the past and tomorrow

Excerpt of Major innovations



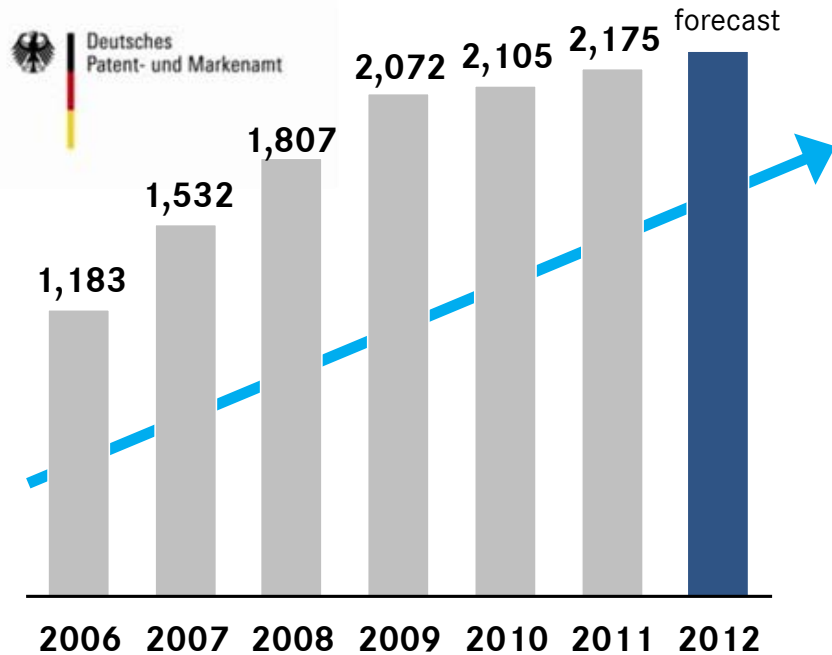
The next Revolution of Ride Comfort: MAGIC BODY CONTROL



Innovation leadership is also reflected in our increased patent activities

of patents filed at German patent office

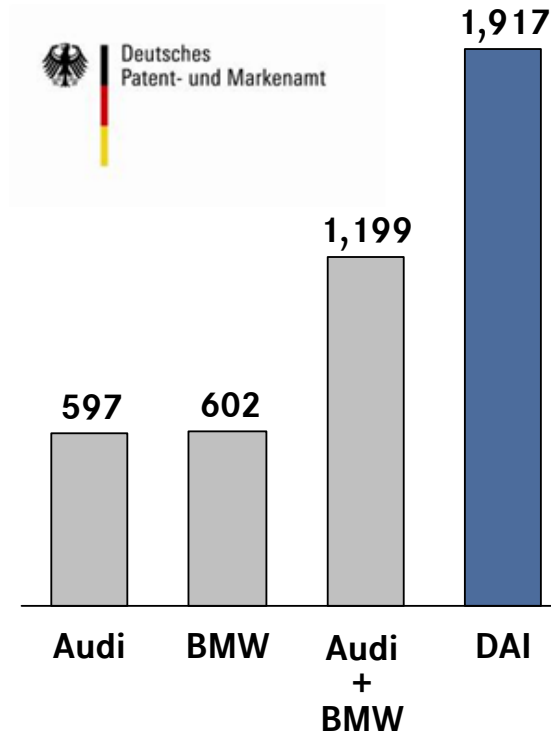
#2 among all companies



Source: German Patent and Trademark Office - Patent Filing Statistics 2010

of patents of premium OEMs in 2010

#1 among OEMS

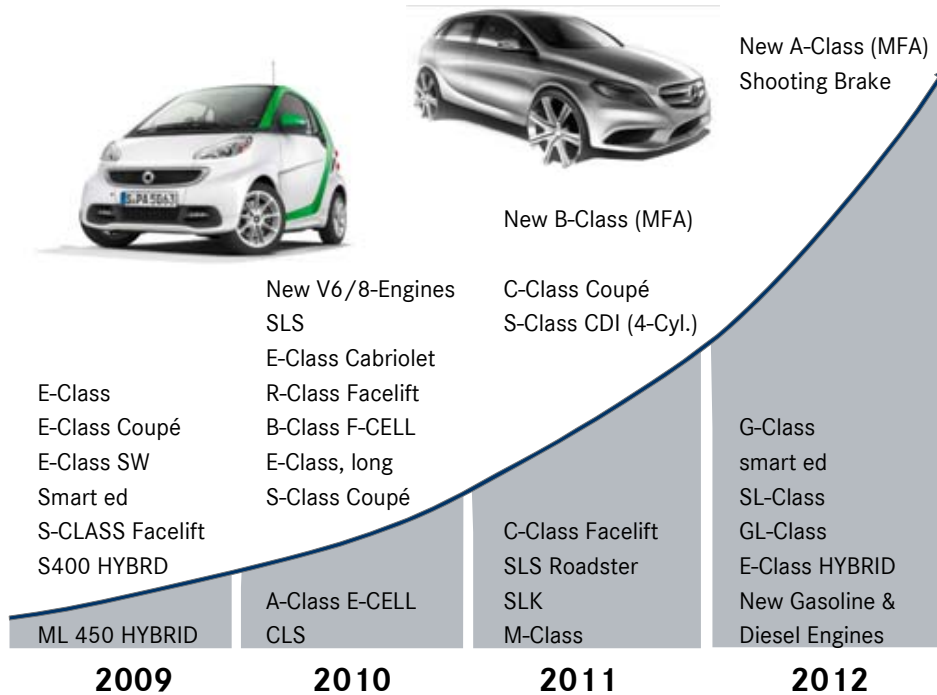


Four levers of Mercedes-Benz 2020

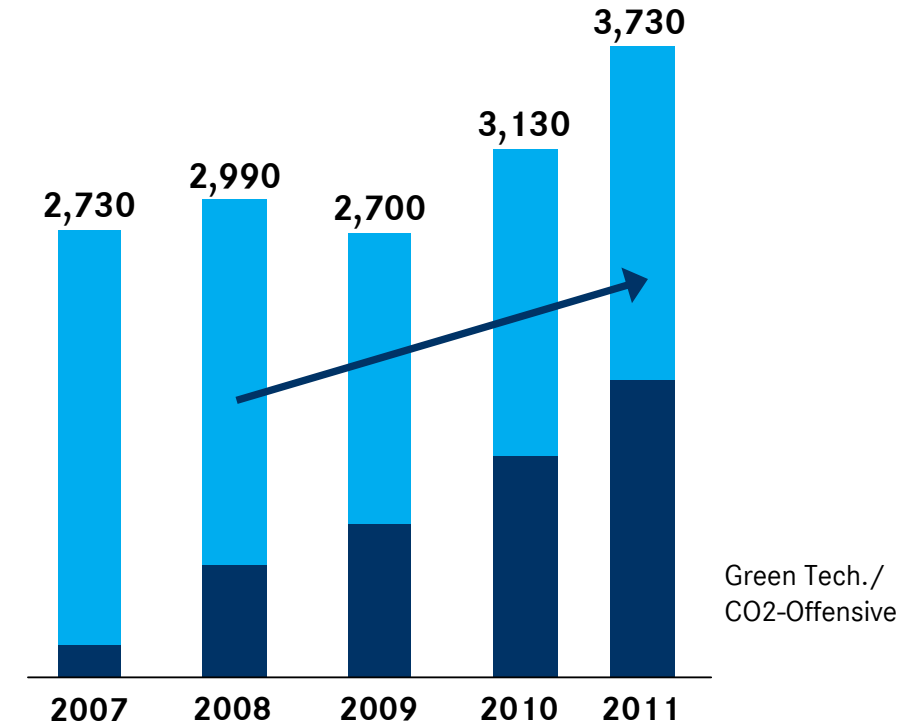


Significant investment in third product offensive has lead to an increase in R&D-expenditures in recent years

Market Launches 2009-2012



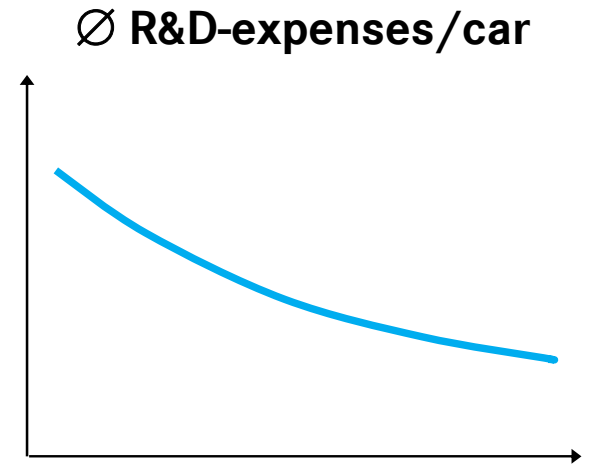
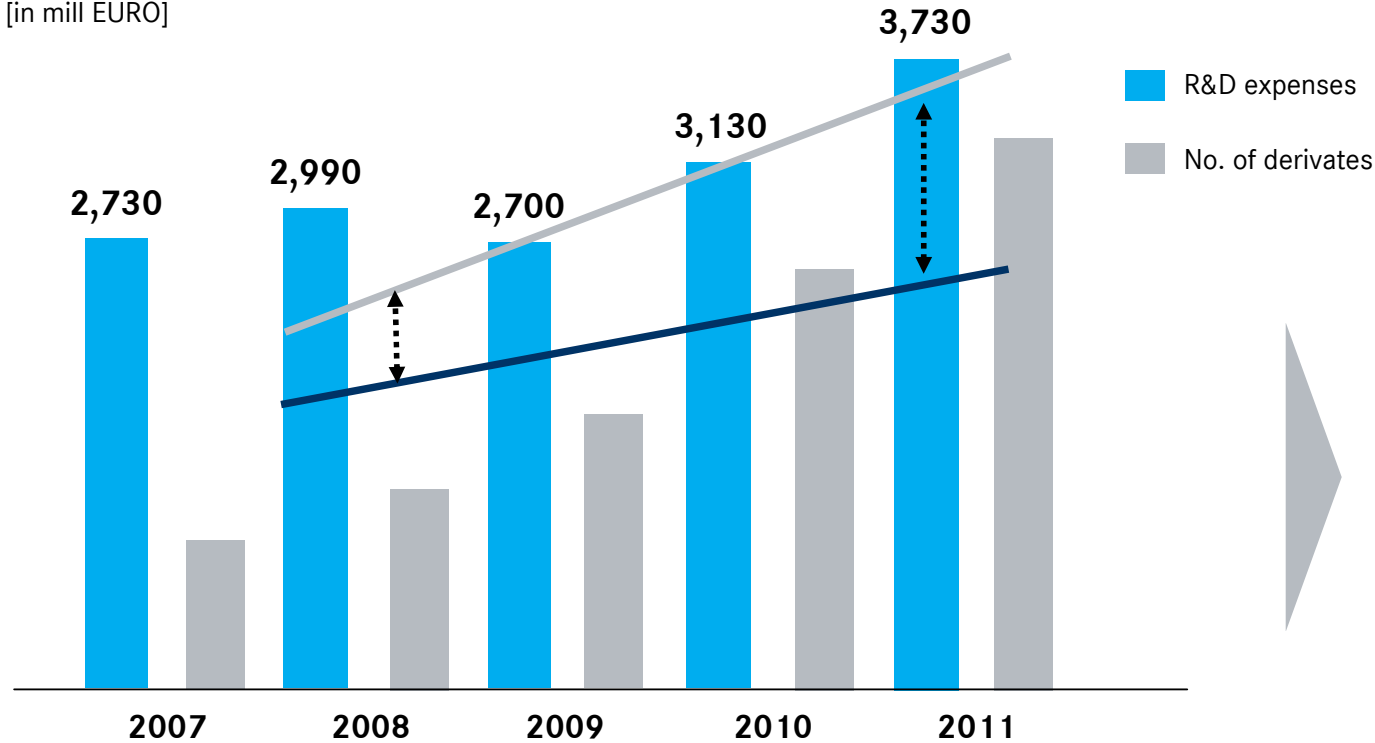
R&D Expenses [in mill EURO]



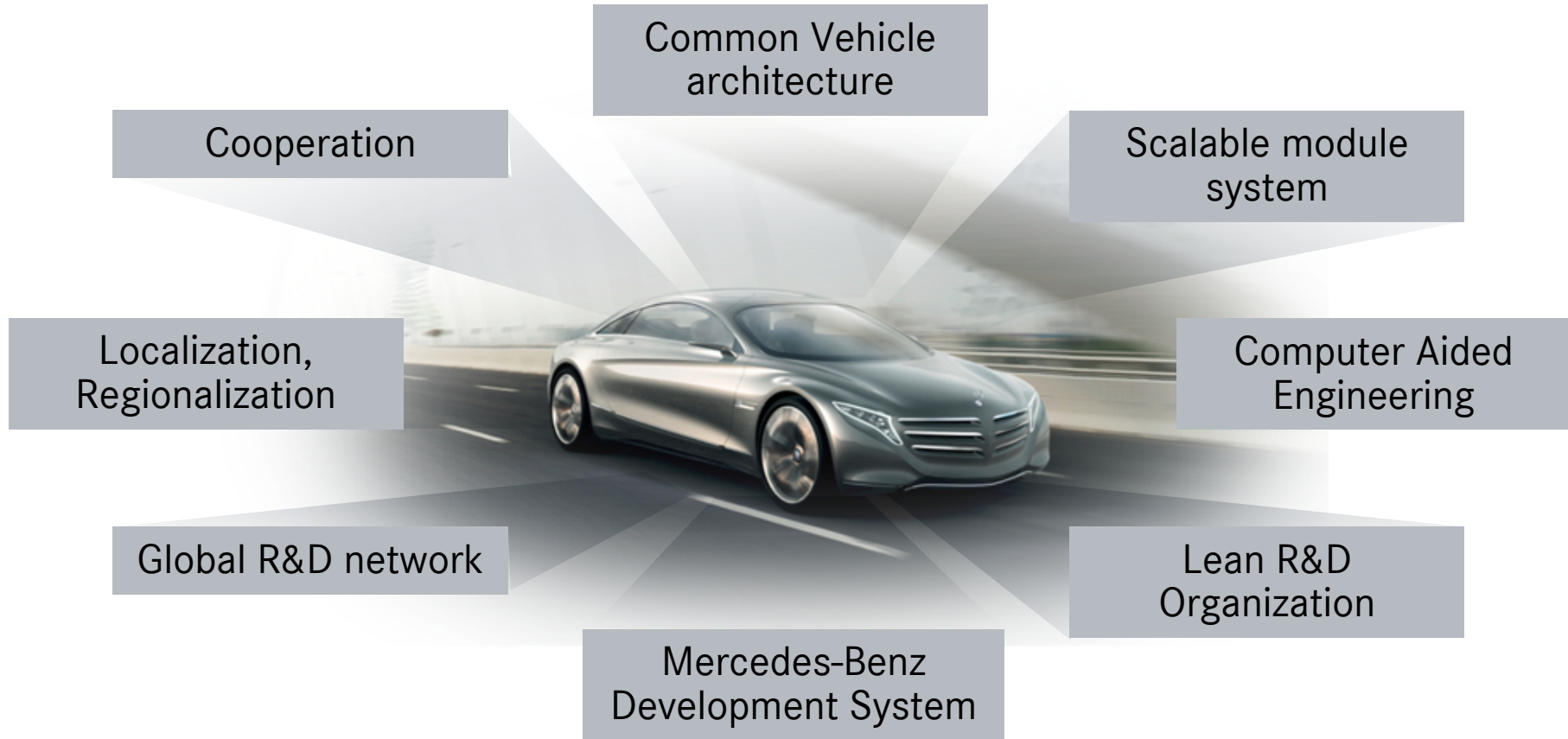
Product offensive is being managed with a decreasing Cost-per-car Ratio

R&D expenses vs. number of derivatives

[in mill EURO]



R&D initiatives for efficient cost structure with top quality

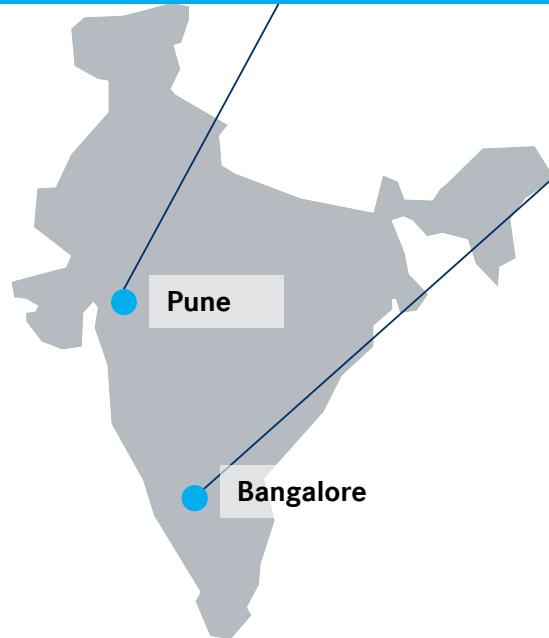


Making headway in India

Utilizing cost potentials and local competencies

Mercedes-Benz RD India, Pune

- Interior and Exterior component design
- Prototyping
- Emerging market office



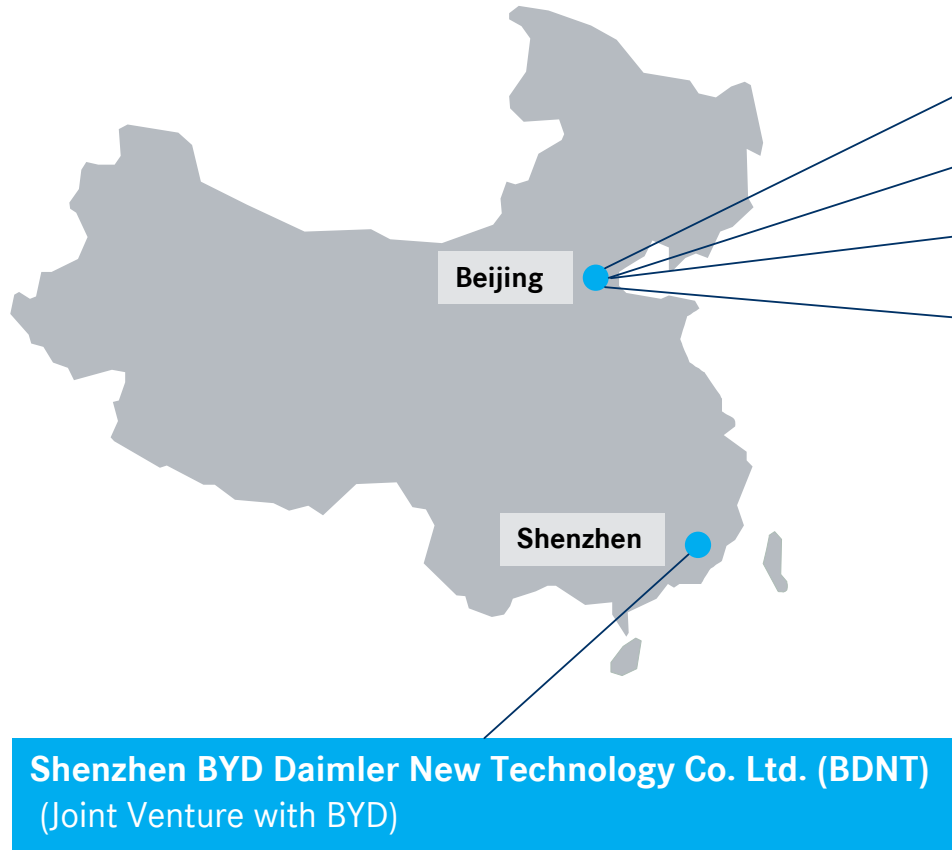
Mercedes-Benz RD India, Bangalore (Headquarters)

- CAD & CAE-simulation
- Embedded systems and telematics
- IT: Development, maintenance and testing of tools



Making headway in China

Increasing localization & regionalization



Engineering Support Office

Research & Advanced Engineering

Advanced Design

**Beijing Benz Automotive Co., Ltd. (Joint Venture with BBAC)
R&D Center**

**Daimler North
East Asia**



Strengthening key know-how and economies of scale



Electric drives

- ▶ Development, production and sale
- ▶ Production start 2012

Carbon-fiber based automobile parts

- ▶ Access to state-of-the-art fibers
- ▶ Development & Manufacturing
- ▶ New production and joining process → enabling large-scale production



Electric drives

- ▶ Next-generation smart fortwo & Renault, incl. electric versions
- ▶ Joint development and cross supply of gasoline & Diesel engines
- ▶ ...

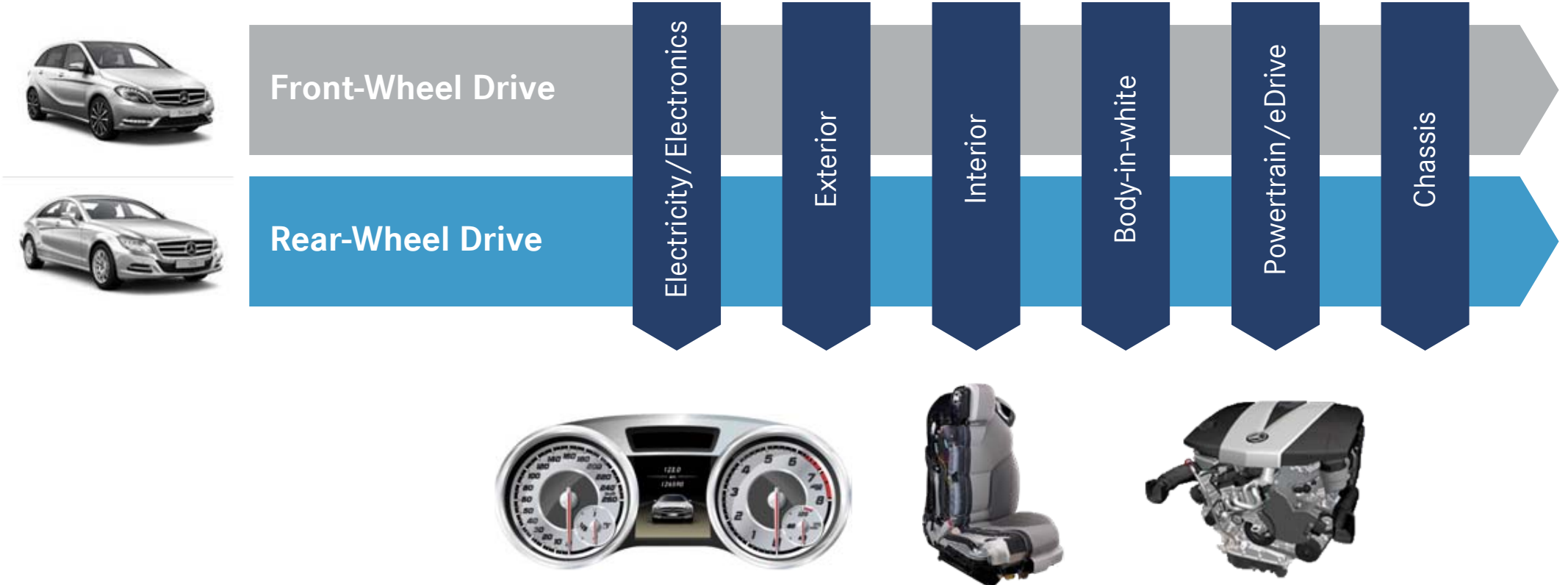
Li-Ion-Battery cells & batteries

- ▶ Joint research, development & production
- ▶ Third party business



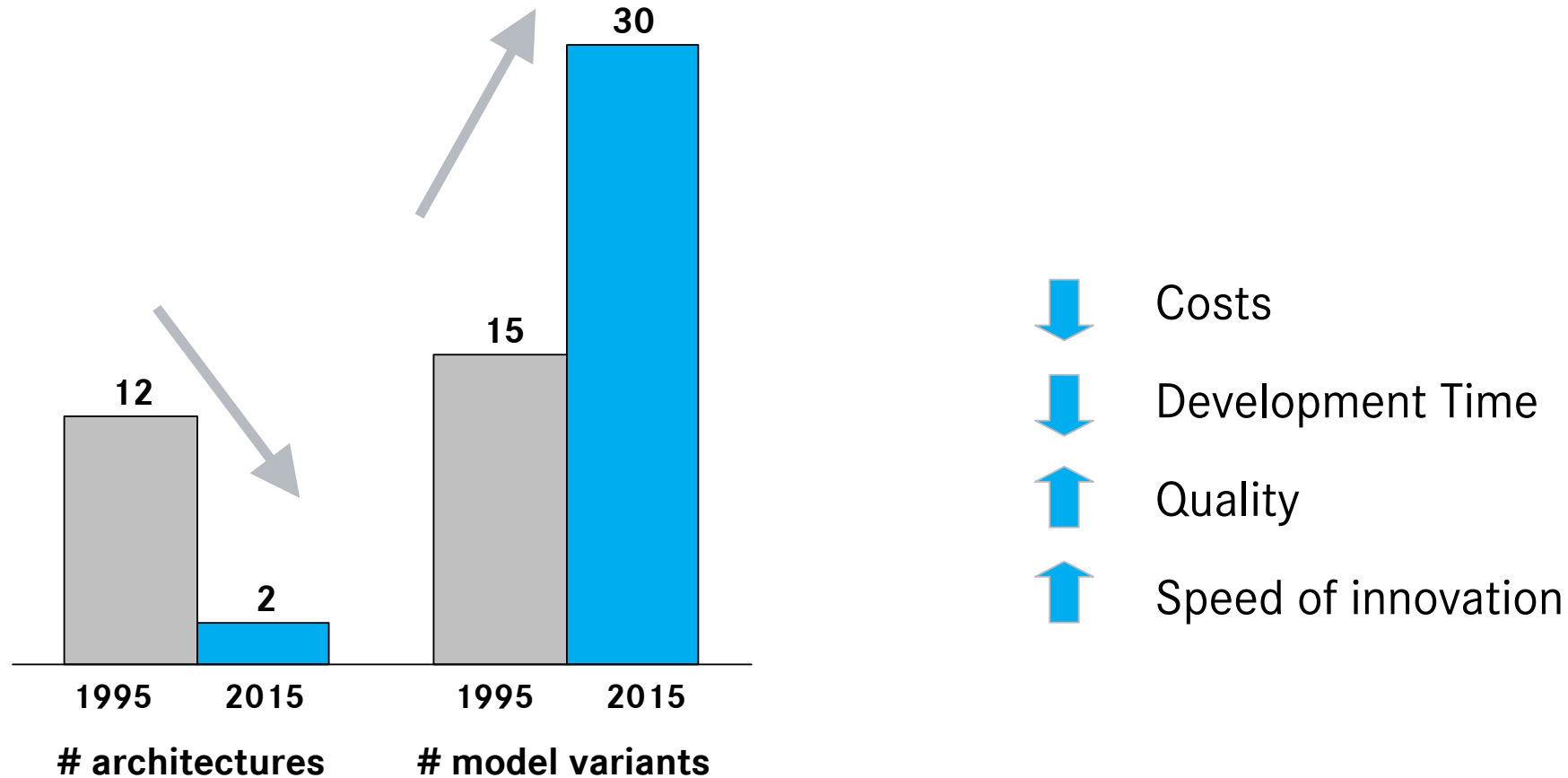
Common vehicle architectures and module strategy

Enabling efficient use of resources & maximizing efficiency in R&D

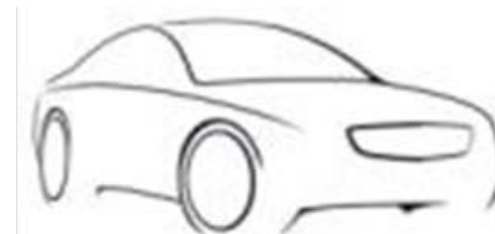


Common vehicle architectures and module strategy

Enabling efficient use of resources & maximizing efficiency in R&D

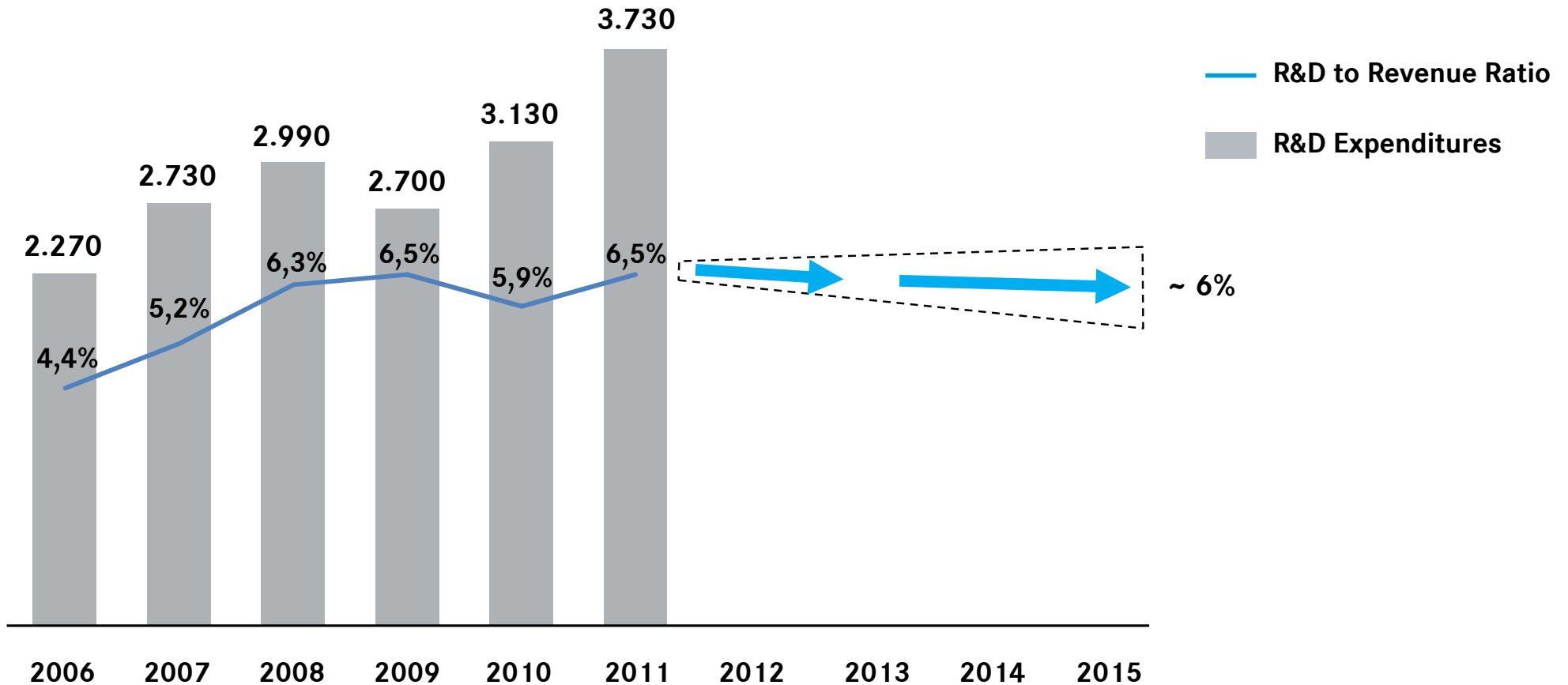


Common architecture within “New Generation Compact Cars” allows for commonality rates of up to 80%



NGCC: Much higher commonality despite much higher differentiation

R&D expenditure ratio peaked in 2011



Summary



▶ Fascinating Product Portfolio

10 new models until 2015

▶ Technology & Innovation Leadership

Leading edge in Safety/Comfort, Connectivity & Sustainability

▶ Intelligent Vehicle Architectures and Module System

30 variants based on two flexible architectures until 2015

▶ Research & Development Efficiency

On track with efficiency program targeting a R&D-Ratio of ~6%