

# DAIMLER

---

## Commerzbank AG Sustainability Conference

Dr. Christian Mohrdieck

Director

Drive Development Fuel Cell System

Group Research & Mercedes-Benz Cars Development

## Our world is changing – Individual mobility is changing, too.

### Globalization

- Global networks
- Worldwide cooperation
- Shifting of markets
- Increasing competition

### Shortage of resources

- Shortage of natural resources
- Demand for alternative energy sources
- ...

### Change of values

- “Green“ awareness
- Individualization
- Additional forms of mobility
- New communication channels



### Legislation

- National emission regulations
- National safety ratings
- Customs & trade restrictions
- Local production

### Technology

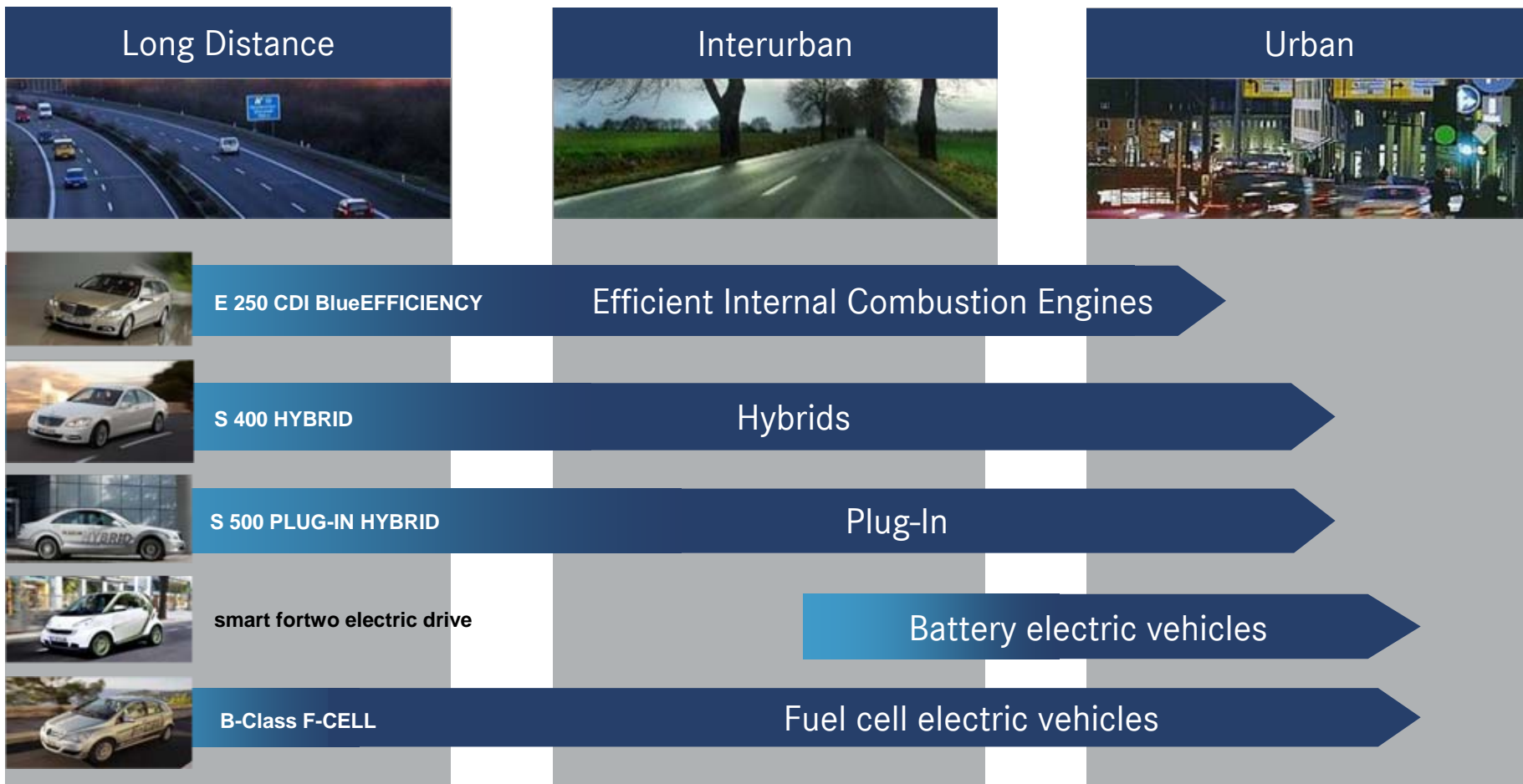
- Powertrain innovations
- New materials and procedures
- ...

### Urbanization

- Mega-Cities
- Shortage of space
- New mobility requirements
- Areas with restricted access



## Drive train portfolio for tomorrows mobility Different use cases and options



## Technology portfolio for sustainable mobility

I.

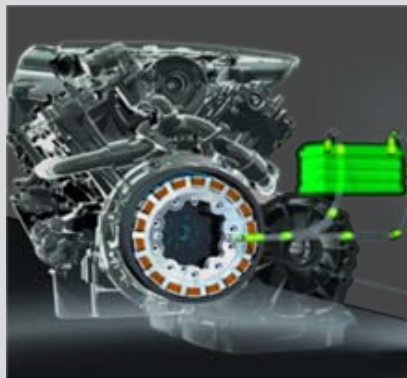
### High-tech combustion engines

*CDI, CGI, BlueTEC*



### Combustion engines with hybridization

*HYBRID, BlueTEC HYBRID,  
Plug-in HYBRID*

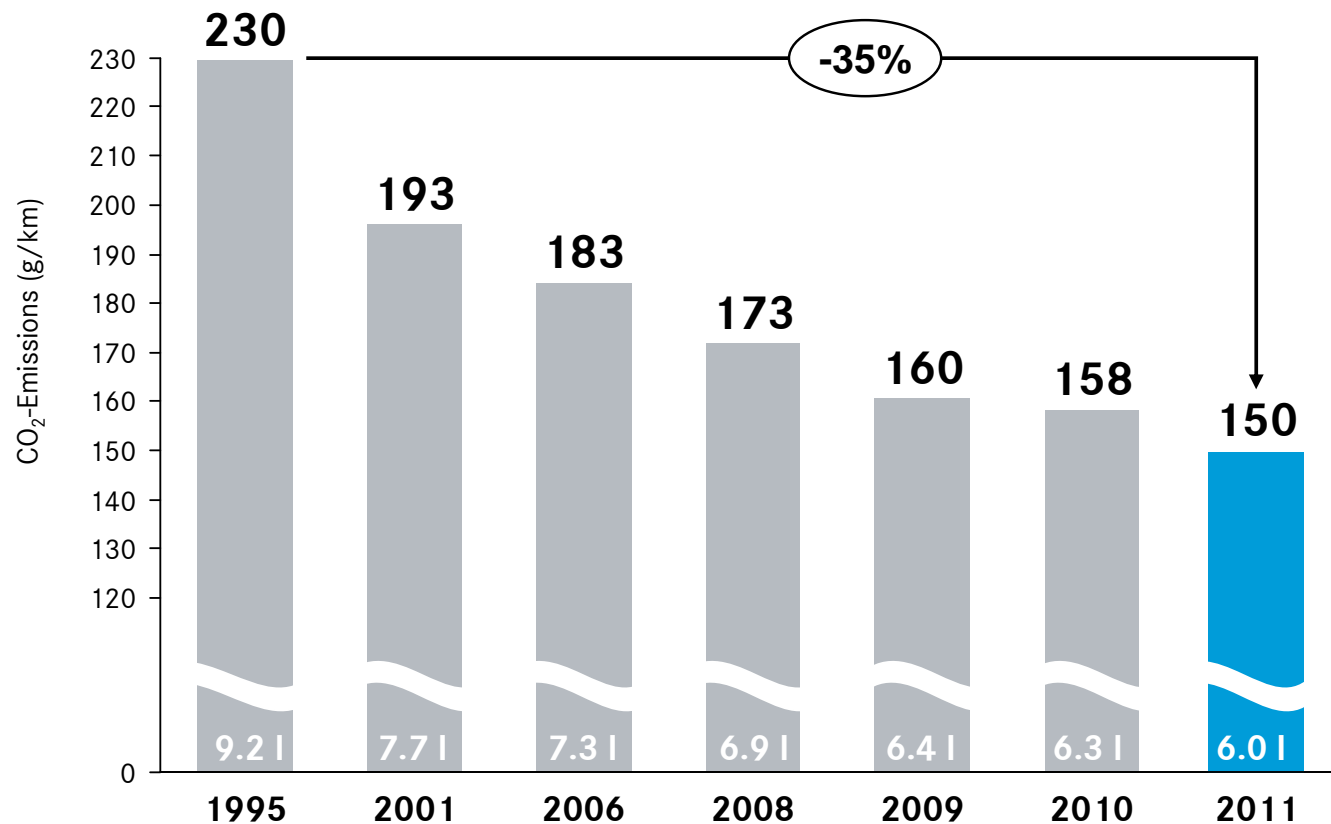


### Electric vehicles with battery and fuel cell

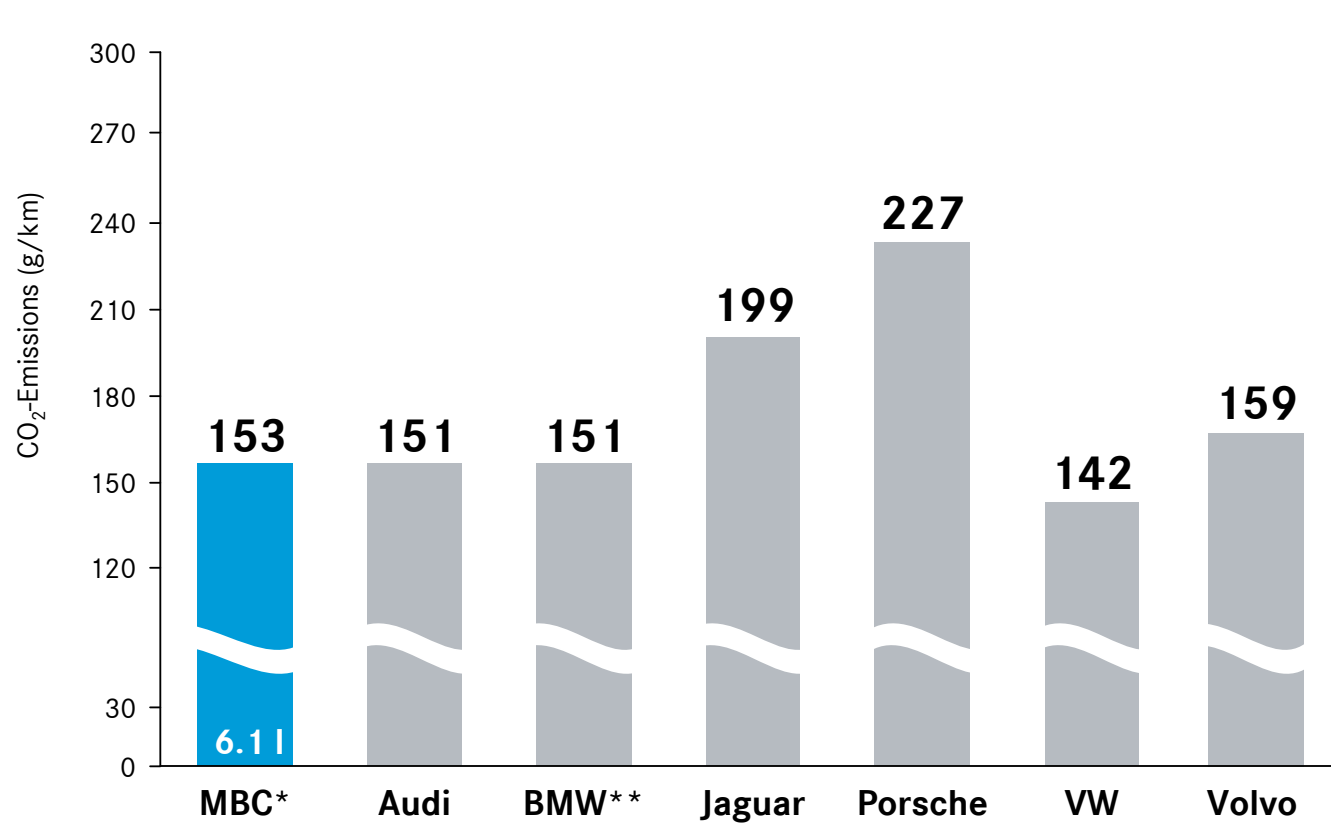
*E-CELL, F-CELL*



## CO<sub>2</sub>-Emissions: Biggest improvements of all OEMs in 2011



## CO<sub>2</sub>-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 CGI

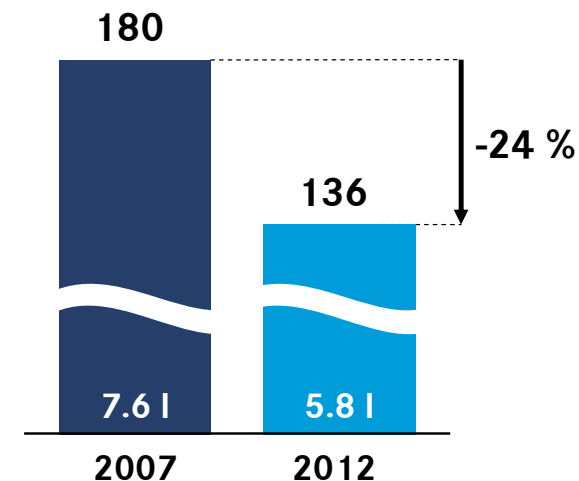


115 kW

5.8 l/100 km (41mpg, NEDC)

136 g CO<sub>2</sub>

**- 24 % versus market launch in 2007**



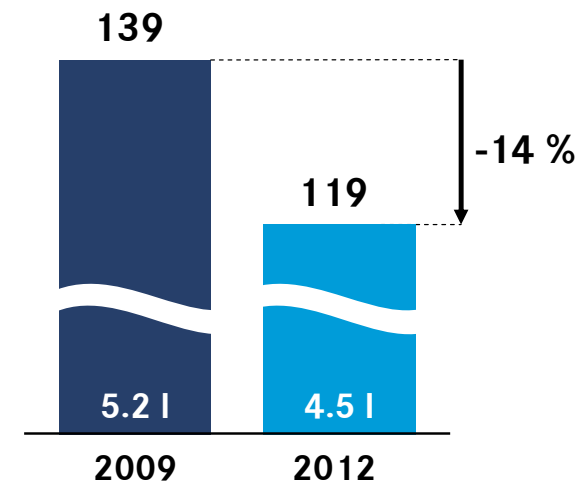
Mercedes-Benz E220 CDI 

125 kW

4.5 l/100 km (52mpg, NEDC)

119 g CO<sub>2</sub>

**- 14 % versus market launch in 2009**





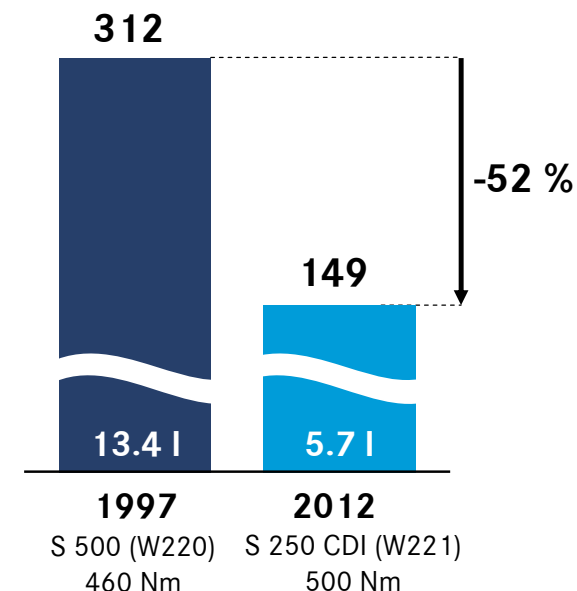
Mercedes-Benz S250 CDI 

150 kW

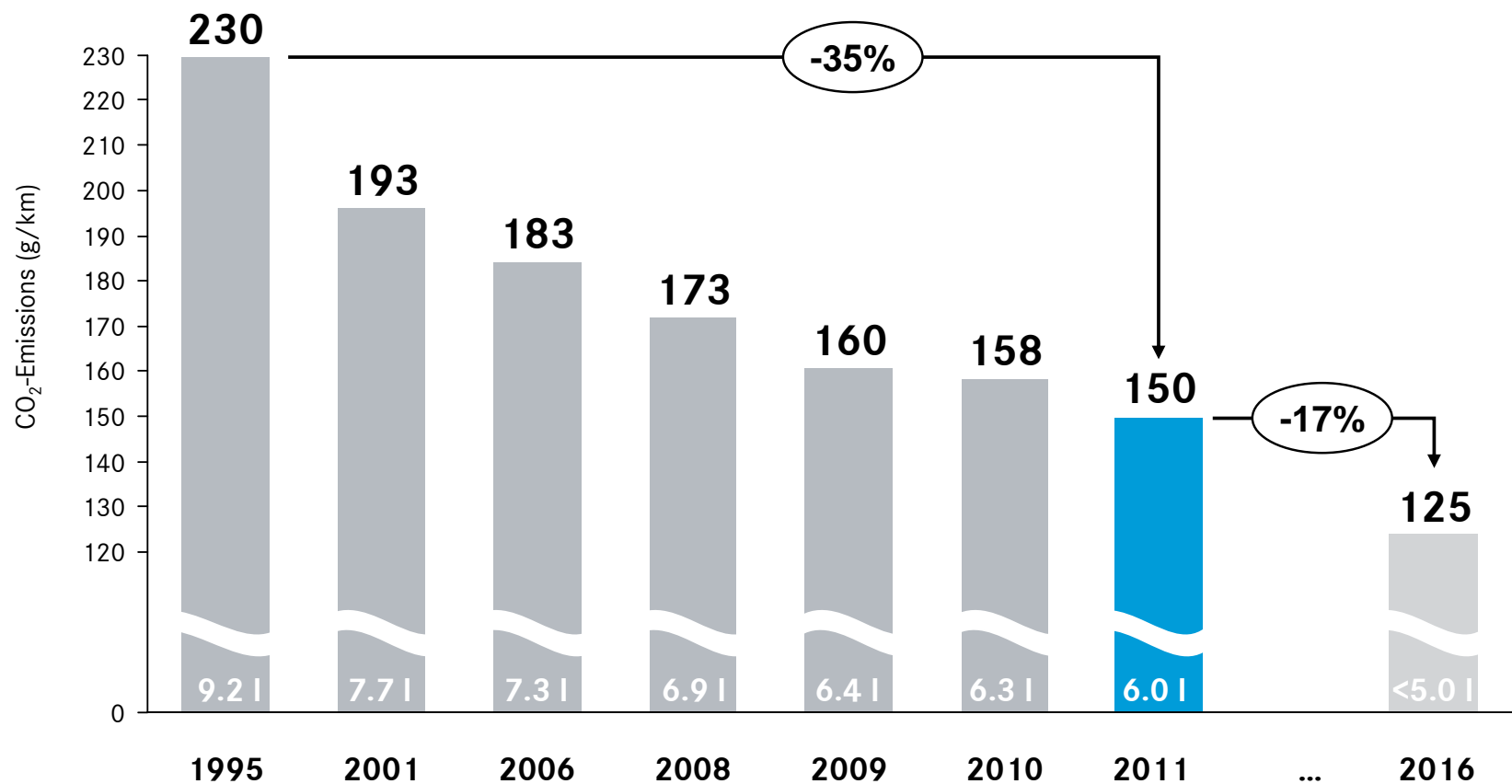
5.7 l/100km (41mpg, NEDC)

149 g CO<sub>2</sub>

**The world's most economical luxury saloon**



## We are on track to achieve the 2016 EU target



## The new Actros: We set a fuel efficiency record again!

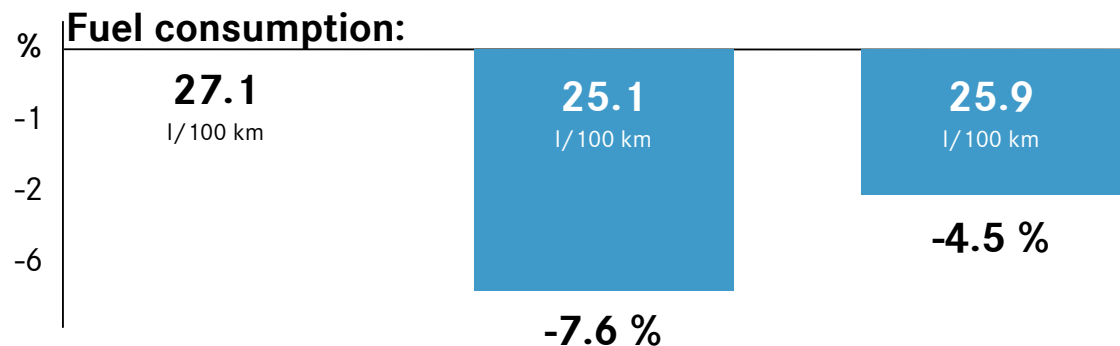
**Actros 1844**  
(Euro V)



**New Actros 1845**  
(Euro V)



**New Actros 1845**  
(Euro VI)



## Technology portfolio for sustainable mobility

### High-tech combustion engines

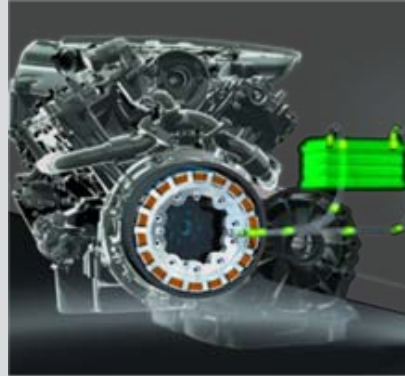
*CDI, CGI, BlueTEC*



### II.

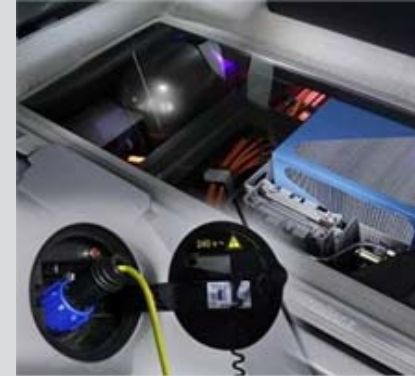
### Combustion engines with hybridization

*HYBRID, BlueTEC HYBRID,  
Plug-in HYBRID*



### Electric vehicles with battery and fuel cell

*E-CELL, F-CELL*



## 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)

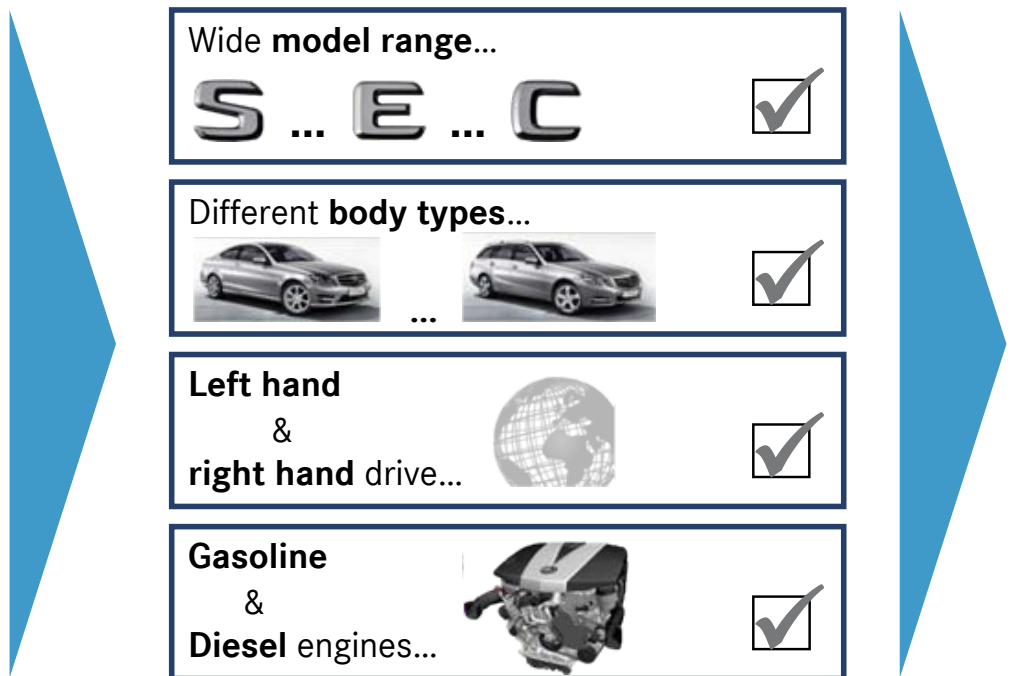
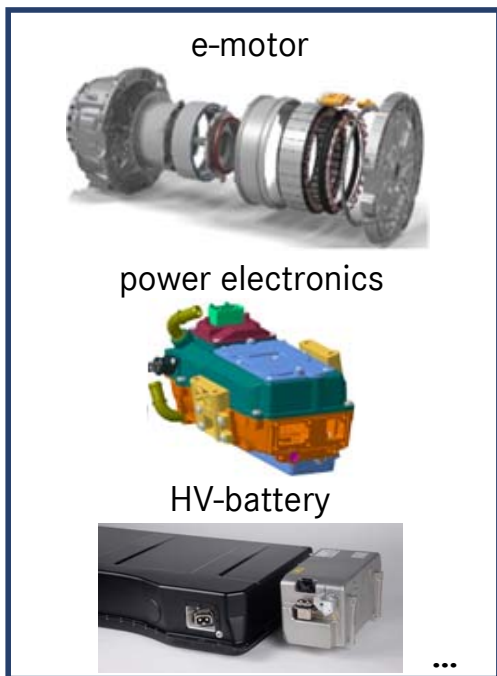


## Scalable module hybrid system allows for maximum customer benefits and minimizes costs

Standardized hybrid **modules** ...

... can be **combined** with various vehicle/powertrain configurations ...

... to meet world-wide **customer** expectations!



## Daimler Product Portfolio Alternative Drivetrains

### Distribution and other Commercial Vehicles



Freightliner M2<sup>e</sup> Hybrid



Mercedes-Benz Atego  
BlueTec Hybrid



Mercedes-Benz Vito E-CELL



Mercedes-Benz Sprinter NGT



Mercedes-Benz NGT Econic

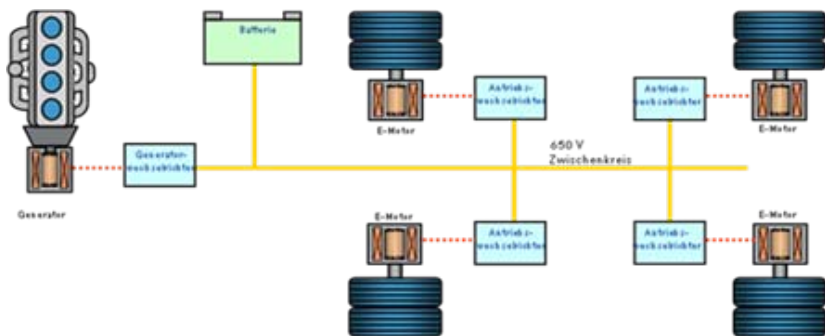


FUSO Canter Eco Hybrid

## Daimler Hybrid-Bus: Mercedes-Benz Citaro G BlueTec Hybrid

### Diesel-Electric Hybrid Concept

- Serial Hybrid power train



- Up until now, the only hybrid bus which can run for some time on electricity only
- Electric wheel hub motor
- World wide largest Lithium-Ion battery in mobile application (max. 240 kW)





## Technology portfolio for sustainable mobility

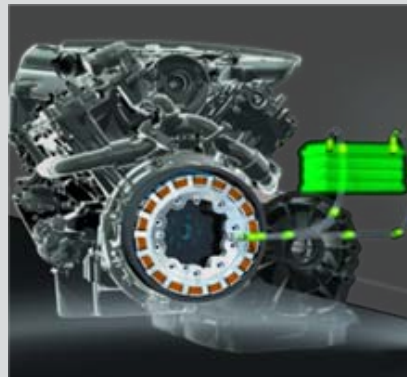
### High-tech combustion engines

*CDI, CGI, BlueTEC*



### Combustion engines with hybridization

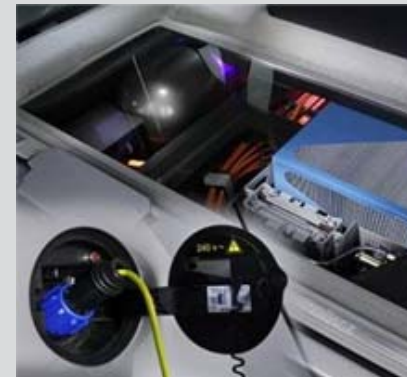
*HYBRID, BlueTEC HYBRID,  
Plug-in HYBRID*



### III.

### Electric vehicles with battery and fuel cell

*E-CELL, F-CELL*



## More than 3.000 electric vehicles on the road since 2011

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

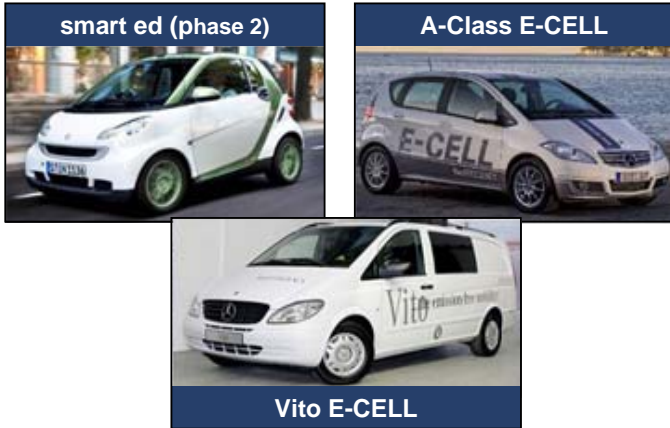
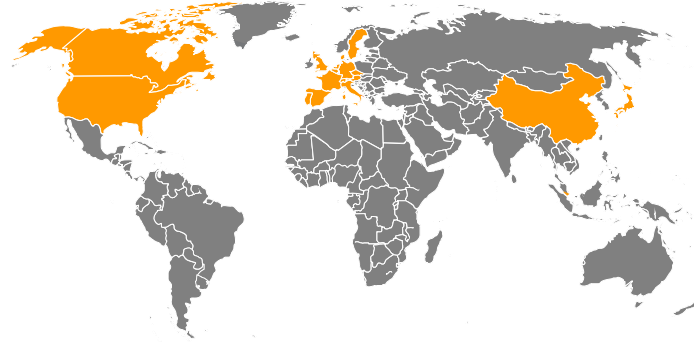
## Zero-Emission-Mobility and fascinating driving experience: SLS AMG E-CELL

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



## Worldwide Fleet Operation with Daimler's Battery Electric Vehicles

- World wide fleet operation in diverse demonstration projects in Northern America, Europe and Asia from 2010
- Operation of 1500 electric smarts, 500 A-Class E-CELLs and 500 Vito E-CELL
- From 2012 the smart electric drive (phase 3) will be the first commercially sold battery electric vehicle from Daimler



Technical Data			
Vehicle	smart fortwo electric drive (phase 2)	A-Class E-CELL	Vito E-CELL
Motor	Output: 30 kW (41 PS) Torque: 120 Nm	Output: 70kW (95 PS) Torque: 290 Nm	Output: 60 kW (80 PS) Torque: 280 Nm
Range (NEFZ)	140 km	200 km	130 km
Top speed	100 km/h (limited)	150 km/h	90 km/h (limited)
Battery	Lithium-Ion-Battery, Capacity: 16,5 kWh	Lithium-Ion-Battery, Capacity: 35,5 kWh	Lithium-Ion-Battery, Capacity: 36 kWh

**Daimler has the target to commercialize battery electric vehicles in the foreseeable future**

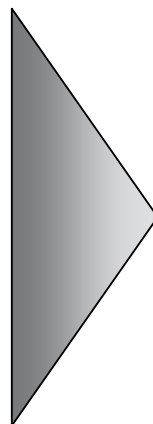
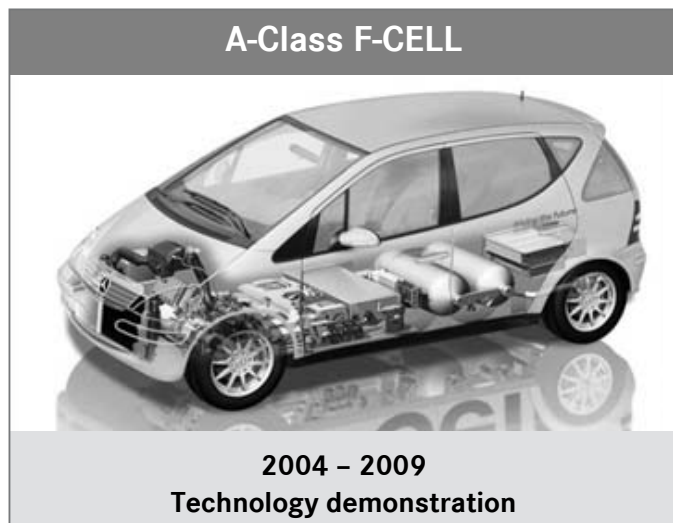
## Worldwide Fleet Operation with Daimler's Fuel Cell Electric Vehicles

- New fleet operations has started in Germany, Europe and USA from 2010
- Operation of 200 Mercedes-Benz B-Class F-CELL, 30 Citaro FuelCELL Hybrid Busses and 3 Mercedes-Benz HySys Sprinter
- Worldwide largest Fuel Cell Fleet, over 4 mio. km operating experience
- All fleet operations / demonstrations have to be recognized as first steps to a later commercialization



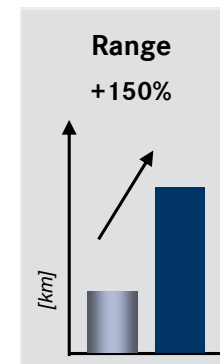
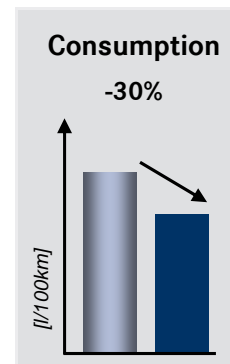
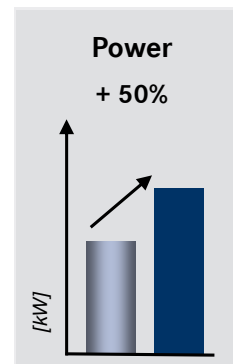
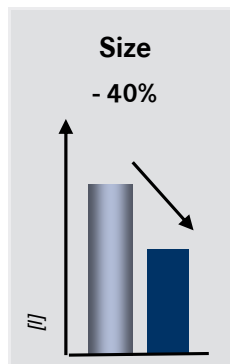
**Daimler has the target to commercialize fuel cell vehicles in the foreseeable future**

## Daimler B-Class F-CELL – Current generation of Fuel Cell vehicles

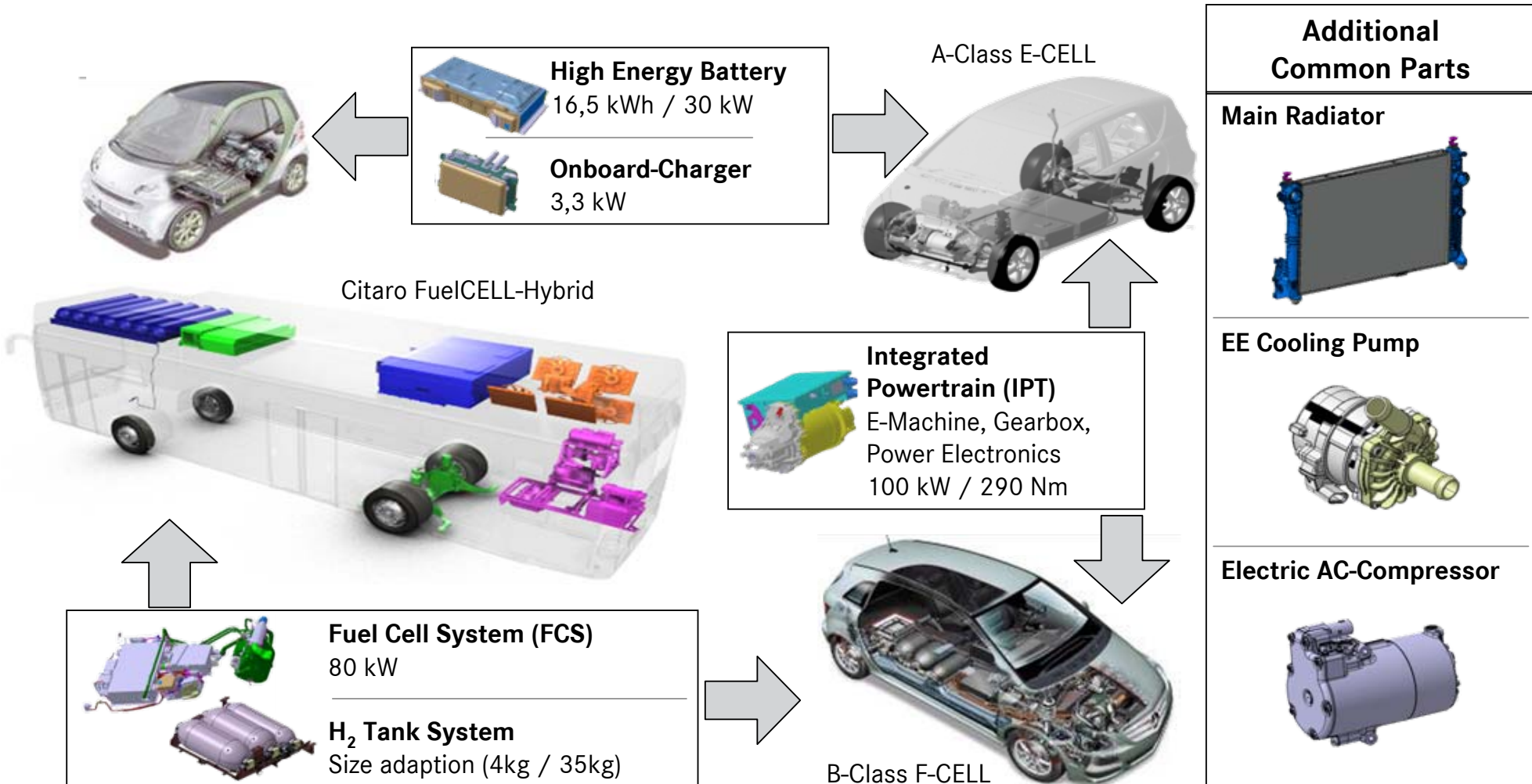


### B-Class F-CELL:

- Higher stack lifetime >2000h
- Improved Performance (65kW → 100kW)
- Improved Reliability
- Higher Range (160km → 400km)
- Improved cold start capability (-25 C°)
- Lithium-Ion Battery



## Vehicle overlapping module strategy as precondition for economic viability





## Challenge of infrastructure – in the past and today



**1888 – Lack of gas stations**



**Lack of public and private charging stations**



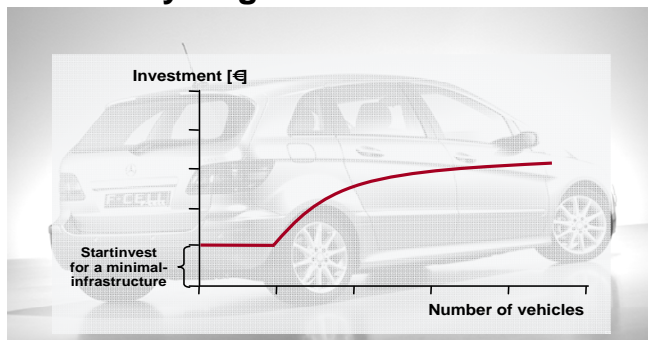
**Lack of H<sub>2</sub>-infrastructure (production and retailing)**

**Today**

## Summary

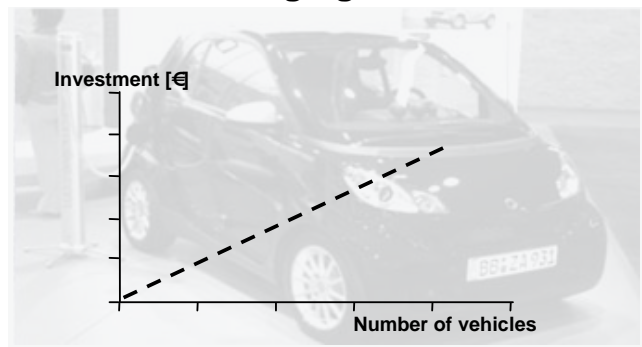
### Financial aspects

#### Hydrogen Infrastructure



- H<sub>2</sub>-infrastructure requires start-up investments
- In long term view the Business Case is positive

#### Public Charging Infrastructure



- The investment for public charging infrastructure is proportional to vehicle sales
- Negative Business Case for Public AC Charging stations expected

### Conclusion

- Battery electric and fuel-cell electric vehicles will both be needed to achieve our CO<sub>2</sub> reduction targets
- Both technologies need supporting infrastructure. FCEVs in particular need a start invest to overcome the initial hurdle.
- Joint efforts by industry and government have to prepare the markets and initiate infrastructure build-up

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



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

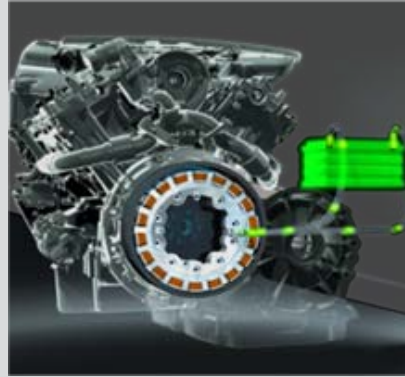
### High-tech combustion engines

*CDI, CGI, BlueTEC*



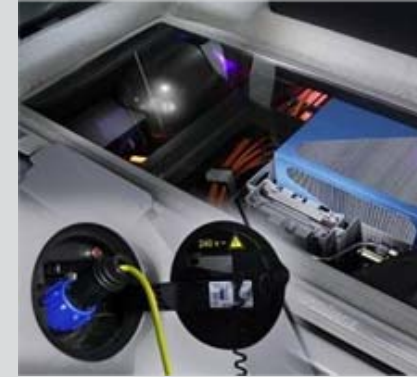
### Combustion engines with hybridization

*HYBRID, BlueTEC HYBRID,  
Plug-in HYBRID*



### Electric vehicles with battery and fuel cell

*E-CELL, F-CELL*





## Disclaimer

This document contains forward-looking statements that reflect our current views about future events. The words “anticipate,” “assume,” “believe,” “estimate,” “expect,” “intend,” “may,” “plan,” “project,” “should” and similar expressions are used to identify forward-looking statements. These statements are subject to many risks and uncertainties, including an adverse development of global economic conditions, in particular a decline of demand in our most important markets; a deterioration of our funding possibilities on the credit and financial markets; events of force majeure including natural disasters, acts of terrorism, political unrest, industrial accidents and their effects on our sales, purchasing, production or financial services activities; changes in currency exchange rates; a shift in consumer preference towards smaller, lower margin vehicles; or a possible lack of acceptance of our products or services which limits our ability to achieve prices as well as to adequately utilize our production capacities; price increases in fuel or raw materials; disruption of production due to shortages of materials, labor strikes, or supplier insolvencies; a decline in resale prices of used vehicles; the effective implementation of cost-reduction and efficiency-optimization measures; the business outlook of companies in which we hold a significant equity interest, most notably EADS; the successful implementation of strategic cooperations and joint ventures; changes in laws, regulations and government policies, particularly those relating to vehicle emissions, fuel economy and safety; the resolution of pending governmental investigations and the conclusion of pending or threatened future legal proceedings; and other risks and uncertainties, some of which we describe under the heading “Risk Report” in Daimler’s most recent Annual Report. If any of these risks and uncertainties materialize, or if the assumptions underlying any of our forward-looking statements prove incorrect, then our actual results may be materially different from those we express or imply by such statements. We do not intend or assume any obligation to update these forward-looking statements. Any forward-looking statement speaks only as of the date on which it is made.