

# DAIMLER

## **Our Commitment to Commercialization of Fuel Cell Vehicles and Hydrogen Infrastructure**

**Fuel Cells and Hydrogen, Joint Technology Initiative,  
3rd Stakeholders General Assembly**

**November 9, 2010**

**Prof. Dr. Herbert Kohler**

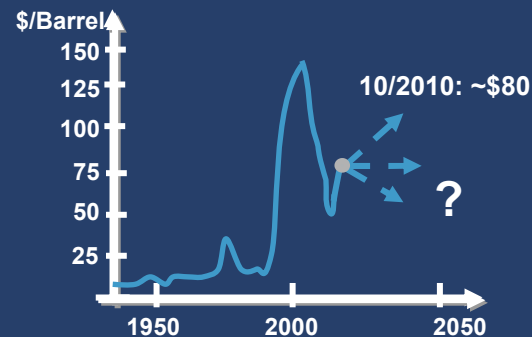
**Vice President, e-drive & Future Mobility, Group Research**

**Chief Environment Officer**

**Daimler AG**

## Challenges for the Future Mobility

### Limited Resources



### Growing Population and Urbanization



### Megacities Top 5 Ranking

	1900		2003		2010
London	6,5	Tokyo	35,0	Tokyo	40,0
New York	5,5	Mexico City	18,7	Seoul	30,0
Tokyo	5,2	New York	18,3	Mumbai	25,0
Paris	4,0	Sao Paulo	17,9	Mexico City	25,0
Berlin	2,4	Bombay	17,4	Sao Paulo	25,0

Source: Bronger (1996), UN Habitat Report (2009)

### CO<sub>2</sub> Legislation, Air Pollution



### City-Charge London

Daily Fee:  
8 £

## Technology Portfolio for Sustainable Mobility

**Optimization of our vehicles with high-tech combustion engines**



*BlueEFFICIENCY*



*CGI*

*BlueTEC*

*DIESOTTO*

**Hybridization for further increase in efficiency**



*HYBRID*

*Range Extender*

*Plug-In*

**Electric vehicles powered by fuel cells or batteries**



*Fuel-Cell*

*Battery-/E-Drive*



*Clean fuels for combustion engines*

**Energy for the future mobility**



*Emission free driving*

## Daimler's Experience with Fuel Cell Fleets (1<sup>st</sup> Generation)

**60 Fuel Cell Vehicles  
Europe, USA, Japan**



**~ 2.202.000 km\***

**36 Busses (Citaro)  
Europe, Australia & China**



**~ 2.240.000 km\***

**3 Transporter  
Europe & USA**



**~ 64.000 km\***

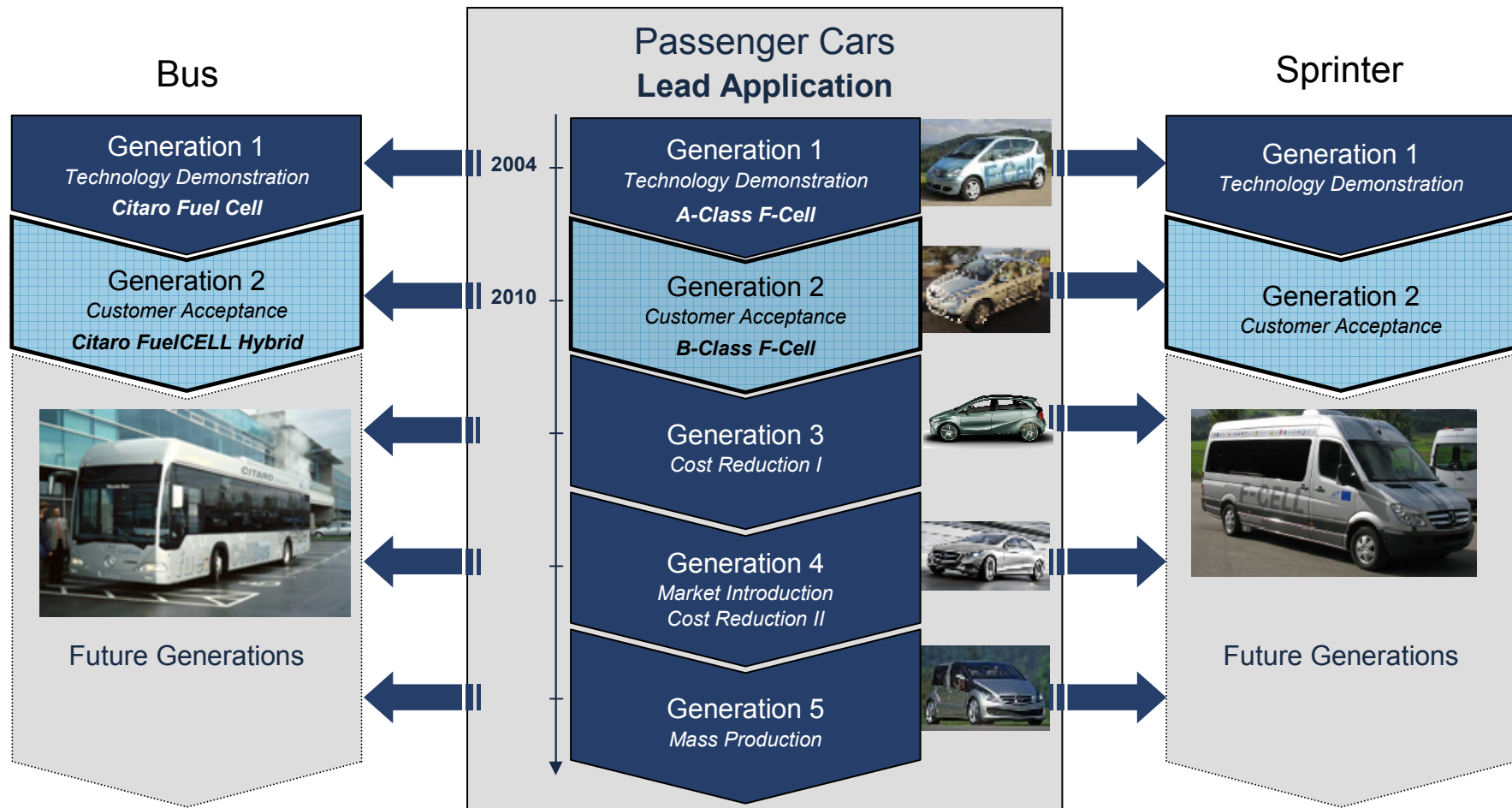
\* As of March 2010

- Daimler as the pioneer of Fuel Cell vehicles (first FCV in 1994)
- More than 100 FCVs throughout the world
- Operation of the FCVs with customers in different climate zones, conditions

**We are ready for the large scale fleet operation of 2<sup>nd</sup> Generation Fuel Cell vehicles.**



## Daimler's Fuel Cell Technology Roadmap

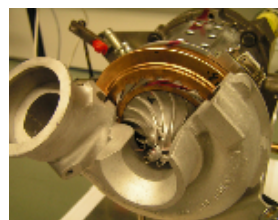


**Passenger Fuel Cell vehicle as the lead application for commercialization.**

## Fuel Cell Vehicle System Component Development: EU Project HySYS (FP6)



Fuel cell vehicle (validator)



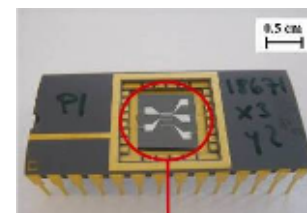
Electrical turbo charger



Integrated air sensor



Humidifier



Hydrogen sensor



Hydrogen metering device

**Coordinator:** Daimler AG

**Total budget:** 22.7 M€

**EC-Funding:** 11.2 M€

**Partners:** 28 (6 OEMs, 13 Suppliers,  
4 Institutes, 5 Universities)

**Countries:** 8 EC Member States  
and Switzerland

**Duration:** 01.12.2005 – 30.11.2010



DC/DC converter



Electric motor



Li-Ion battery

Vehicle Data	
Vehicle Type	Mercedes-Benz Sprinter
Fuel Cell System	PEM, 80 kW
Engine	IPT Engine Output (Continuous/ Peak) 70kW / 100kW (136hp) Max. Torque: 290 Nm
Fuel	Compressed Hydrogen (70 MPa / 10,000 psi)
Range	> 300 km
Top Speed	130 km/h
Battery	Li-Ion, Output:40 kW ; Capacity 6.8 Ah, 1.9 kWh

Achievements	
Component	Result
Electrical Turbo Charger	Low weight, small size, low noise, high efficiency, high dynamics,
Integrated Air sensor	Automotive sensor combining pressure, temperature and mass flow
Humidification	Lab scale hollow fibre humidifier for air humidification
Hydrogen Sensors	First prototype sensors of a promising new hydrogen sensing principle
Hydrogen Supply	Automotive hydrogen metering device with high maturity for mass production
Power Electronics	Automotive inverters and DC/DC Converters with high efficiency
Electrical Motors	High efficient and dynamic e-motors for electric drive trains
Battery	High power Li-Ion Batteries

## B-Class F-Cell at FCH-JTI, Call 2008(1<sup>st</sup> Call), and Citaro FuelCELL-Hybrid Buses at Call 2009(2<sup>nd</sup> Call)

### “H2movesScandinavia”, 10 B-Class F-CELL 2<sup>nd</sup> generation Fuel Cell Passenger Car



### Clean Hydrogen in European Cities, “CHIC”, 2<sup>nd</sup> generation Fuel Cell Bus



#### Demonstration Project Overview



**Location:** Oslo, Norway

**Duration:** 36 months, 01.01.2010 – 31.12.2012

**Budget:** 19.5 Mio. € Project cost  
7.8 Mio. € Project funding

**Targets:**

- Build-up 700bar filling stations in Oslo
- Demonstration tour through EU (5 cities)
- Mobile hydrogen refueling concept

#### Demonstration Project Overview



**Location:** 5 European cities (26 partners from 9 countries)

**Duration:** 81 months, 01.04.2010 – 31.12.2016

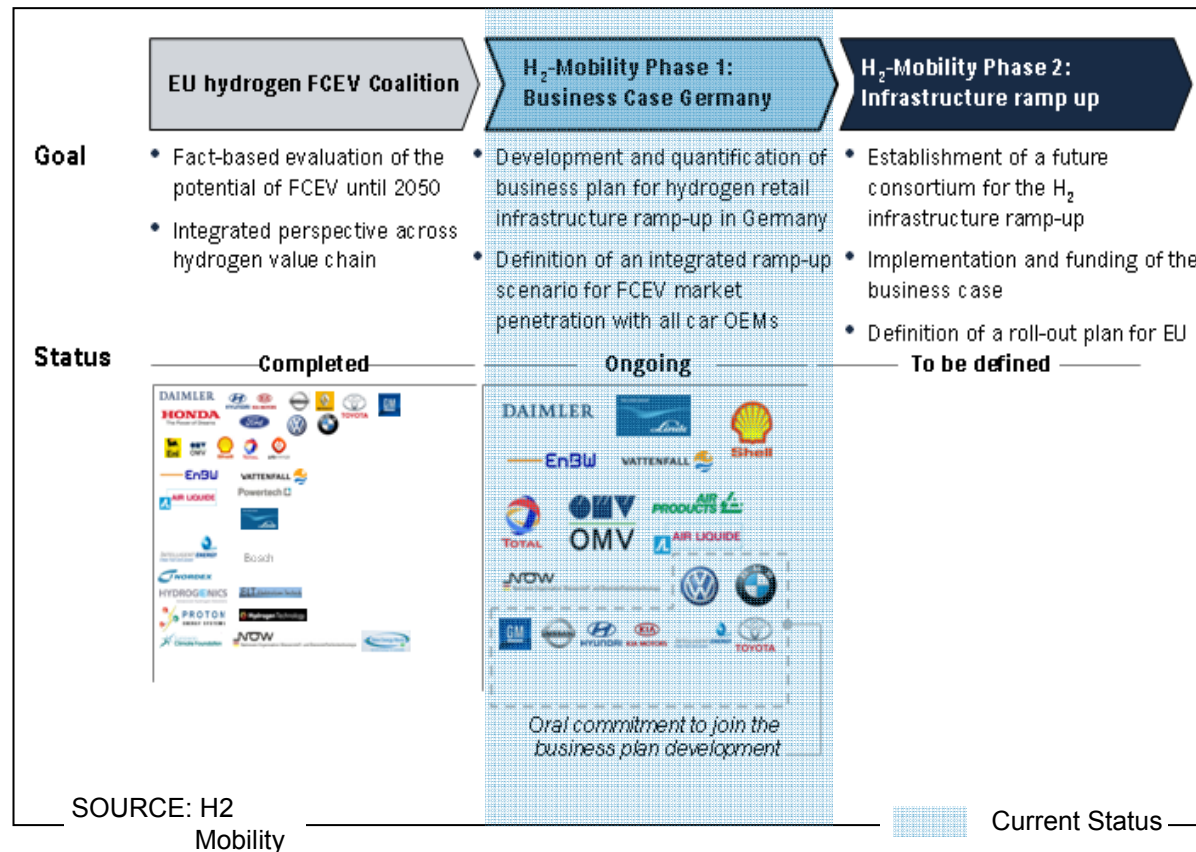
**Budget:** 81.9 Mio. € Project cost  
25.8 Mio. € Project funding

**Targets:**

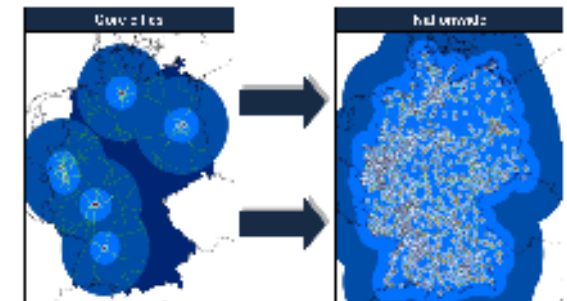
- Demonstration of 26 fuel cell buses
- Buses from Daimler and other manufacturers
- 2 filling stations per city

## Cooperation for H<sub>2</sub> Infrastructure New-work Building-up

- Daimler as a core members of EU hydrogen FCEV Coalition
- H<sub>2</sub>- Mobility Phase 1 is the current focus.
- The target is a build-up plan for a nationwide hydrogen infrastructure by end/2011.



- A strong partnership of motivated stakeholder
- International discussion
- An open platform for everyone





## Our commitments with FCH- JTI and European Programs

- Daimler is committed to Fuel Cell technology and its commercialization.
- FCH- JTI is the core framework for our activities and to build up the necessary H<sub>2</sub> Infrastructure network in European countries.
- Continued strong support by European Commission, open discussion and cooperation among the stakeholders will open the door to the hydrogen based sustainable mobility and competitive economy.



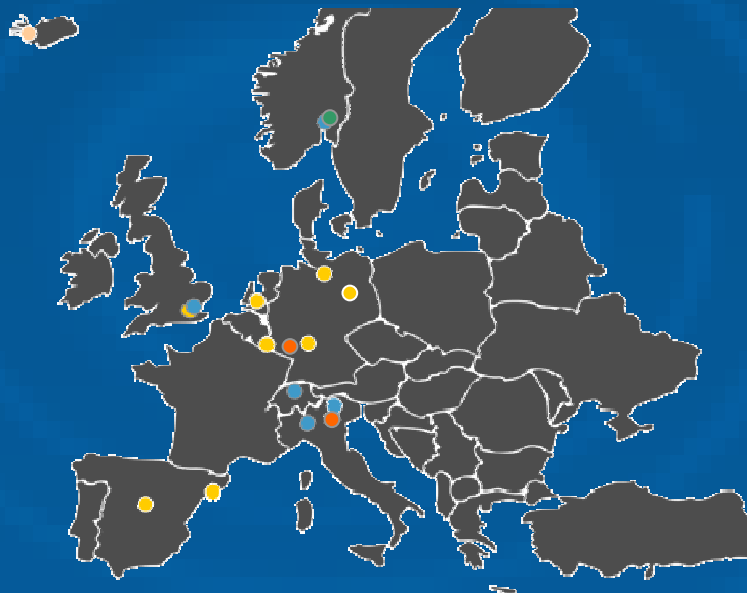
### Current projects

- H2movesScandinavia  
Oslo



- CHIC  
Clean Hydrogen in European Cities

Aargau  
Milano  
Oslo  
Bolzano  
London



### Completed projects

#### HyFLEET:CUTE

Amsterdam  
Barcelona  
Hamburg  
Berlin  
London  
Luxemburg  
Madrid  
Reykjavik



#### Zero Regio

Frankfurt  
Mantova



**Thanks for your attention!**

