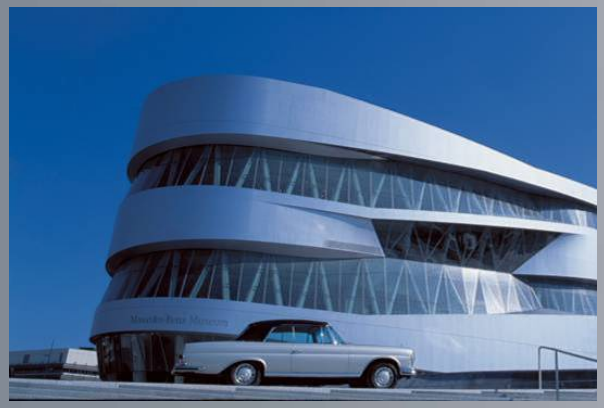
Mercedes-Benz

On the Road to Sustainable Mobility

Fuel Cell Electric Vehicles



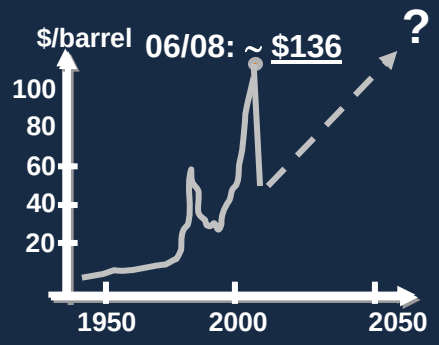
Michael Schweizer
Product Management – Advanced Product Planning
Mercedes-Benz USA

November 4, 2009

Global Trends

Limited Resources

E.g.: Oil Price



Creeping Mobility

Megacities Top 5 Ranking

1950		2015		2015	
London	6,5	Tokio	35,0	Tokio	36,2
New York	5,5	Mexico City	18,7	Bombay	22,6
Tokio	5,2	New York	18,3	Delhi	20,9
Paris	4,0	Sao Paulo	17,9	Mexico City	20,6
Berlin	2,4	Bombay	17,4	Sao Paulo	20,0

Source: Bronger (1996)

Law / Legislation

ZEV

Low Carbon Fuel Standard

CAFE

London City Congestion Charge

Daimler's Technology Portfolio for a Sustainable Mobility

Optimizing our vehicles with modern conventional powertrains

BlueEFFICIENCY

CGI

BlueTec

DIESOTTO

Hybridization for further increase in efficiency

HYBRID

Range Extender *Plug-In*

Emission free driving with fuel cells and battery vehicles

Fuel Cell Veh.

Battery-/E-Drive

Energy for future mobility

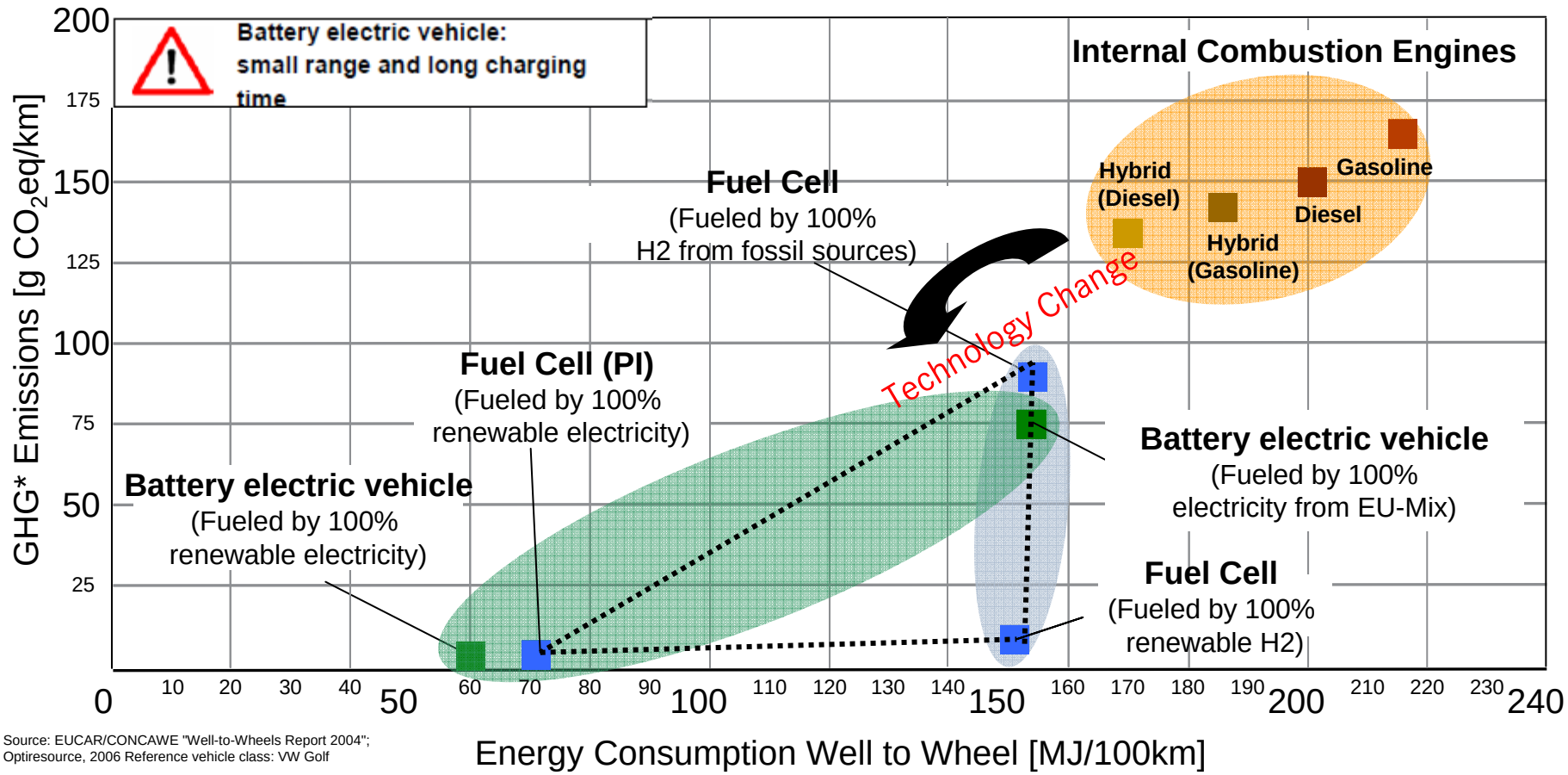
Clean fuels for combustion engines

Emission free driving

Total Energy Balance – Well-to-wheel Classification

Fuel Cell: long range (> 250 mi), short refueling time (3 min), cars/vans/trucks

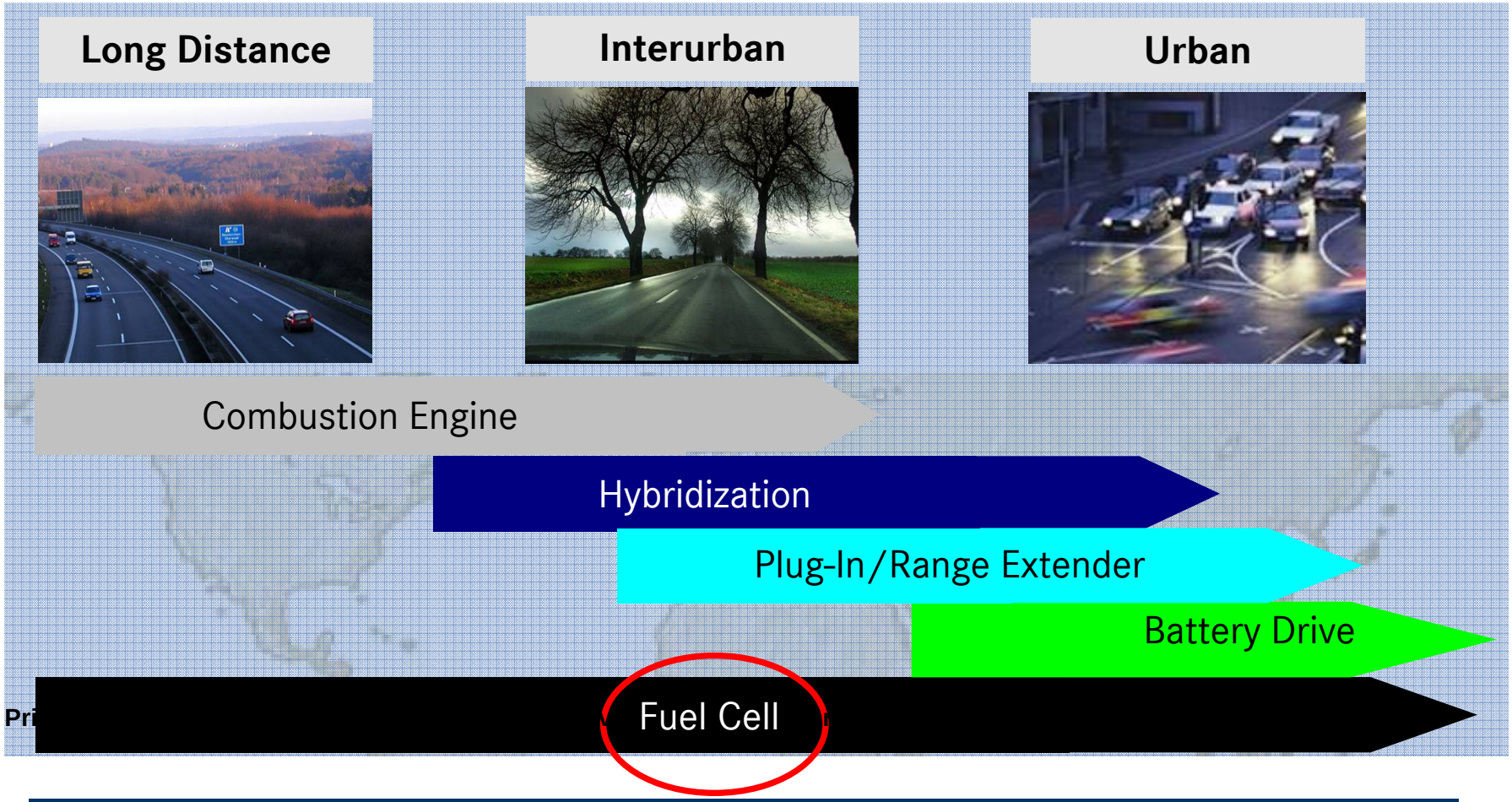
Battery: ideal in small cars for city traffic (50 – 100 mi), overnight recharging



Source: EUCAR/CONCAWE "Well-to-Wheels Report 2004"; Optiresource, 2006 Reference vehicle class: VW Golf

***GHG: Green House Gas**

Optimal Mobility Scenarios –
Call for an Innovative Powertrain Portfolio



- **Only fuel cell technology is suited equally for both, short and long distance mobility.**

Daimler's Fuel Cell Technology Roadmap

Bus

Generation 1
Technology Demonstration

Generation 2
Customer Acceptance

Future Generations

Passenger Cars
Lead Application

2004 — **Generation 1**
Technology Demonstration
F-Cell

2010 — **Generation 2**
Customer Acceptance
B-Class F-Cell

Generation 3
Cost Reduction I

Generation 4
Market Introduction
Cost Reduction II

Generation 5
Mass Production

Sprinter

Generation 1
Technology Demonstration

Generation 2
Customer Acceptance

Future Generations

➢ **Daimler is dedicated to commercialize Fuel Cell Vehicles**

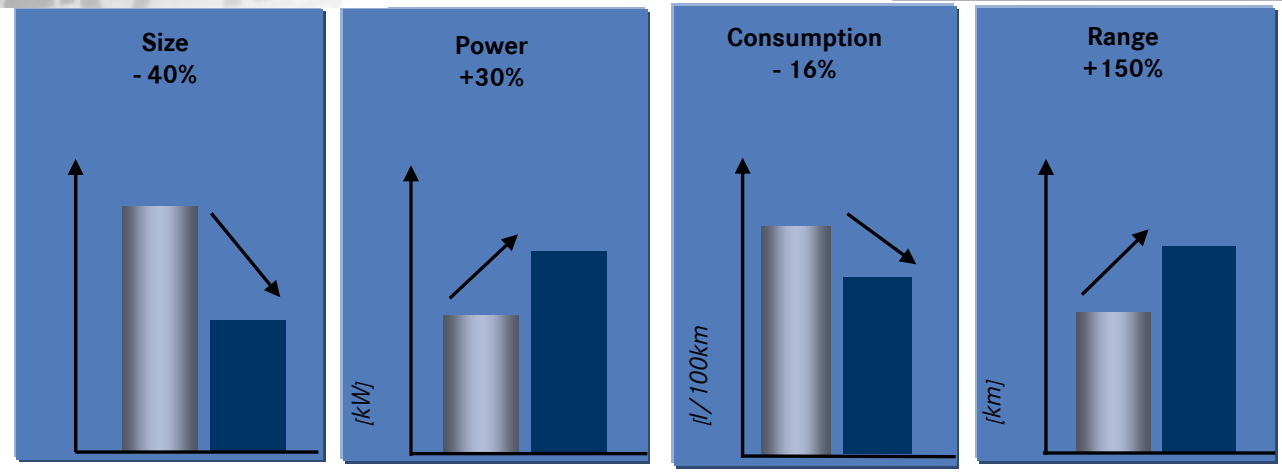
Progress Fuel Cell Technology - Next Generation FCVs

A-Class F-Cell

Next generation of the fuel cell-power train:

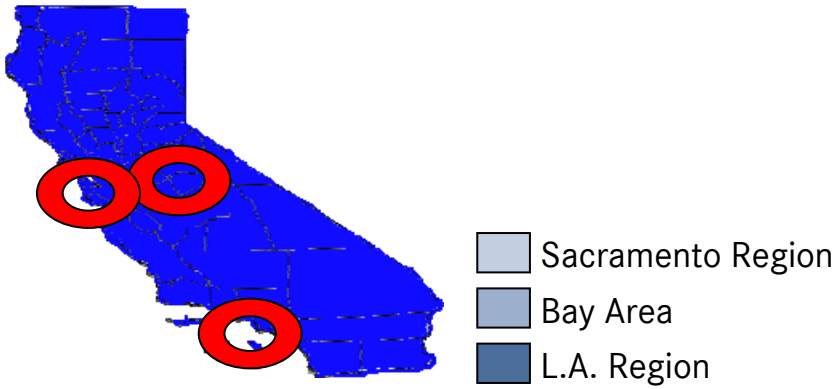
- Higher stack lifetime (>2000h)
- Increased power
- Higher reliability
- Freeze start ability
- Li-Ion Battery

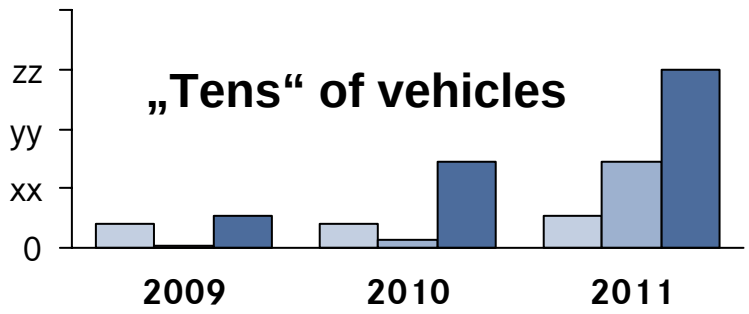
B-Class F-Cell

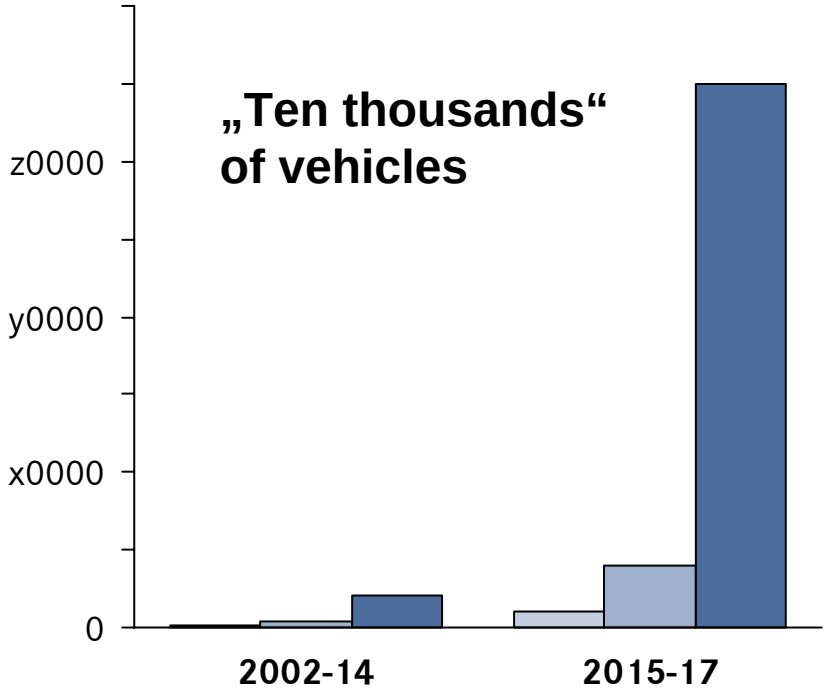


Preliminary Vehicle Deployment Planning

B-Class F-Cell and Subsequent Models







- **The order of magnitude presented above is in line with our product strategy**

- All relevant **OEMs** (engaged in Fuel Cell technology) signed the LoU: a few hundred thousand (100.000) units over life cycle on a worldwide basis
  Initiative "H_2 Mobility" for Germany as lead market in Europe
- The infrastructure partner pursue a step by step approach to build-up an area-wide H_2 infrastructure

DAIMLER Ford GM OPEL HONDA KIA RENAULT NISSAN TOYOTA

DAIMLER EnBW THE LINDE GROUP OMV TOTAL VATTENFALL NOW Nationale Organisation Wasserstoff-

The signing of the "OEM-LoU" by several OEMs was one basic prerequisite for the Oil and Energy companies to sign the "Infrastructure-MoU"

OEMs: Letter of Understanding (LoU)
„Commitment to the development and market introduction of Fuel Cell vehicles"

Basis for

Infrastructure Partner:
Memorandum of Understanding (MoU) for „H_2 Mobility"

- From **2015 onwards a quite significant number of fuel cell vehicles** could be commercialized. This number is aimed at a **few hundred thousand** (100.000) units over life cycle on a worldwide basis.
- In order to ensure a successful market introduction of fuel cell vehicles, this market introduction has to be aligned with the **build-up of the necessary hydrogen infrastructure by 2015.**
- The network should be built-up from metropolitan areas via corridors into area-wide coverage.

Involved OEMs

Daimler, Ford, GM/Opel, Honda, Hyundai/KIA, the Alliance Renault/Nissan and Toyota

- In Germany **10-25 public fueling stations** should be build-up **until 2011** by the involved companies within the stimulus package II.
- **The build-up of the H2-infrastructure in Germany**, as starting point in Europe, will be carried out in 2 steps:

1. Step:

Development of a common Business Plan for the build-up of an area-wide infrastructure. The Business plan is the basis for the foundation of a consortium

2. Step:

Foundation of a consortium (from approx. 2012 build-up of an area-wide H2 fuelling station network)

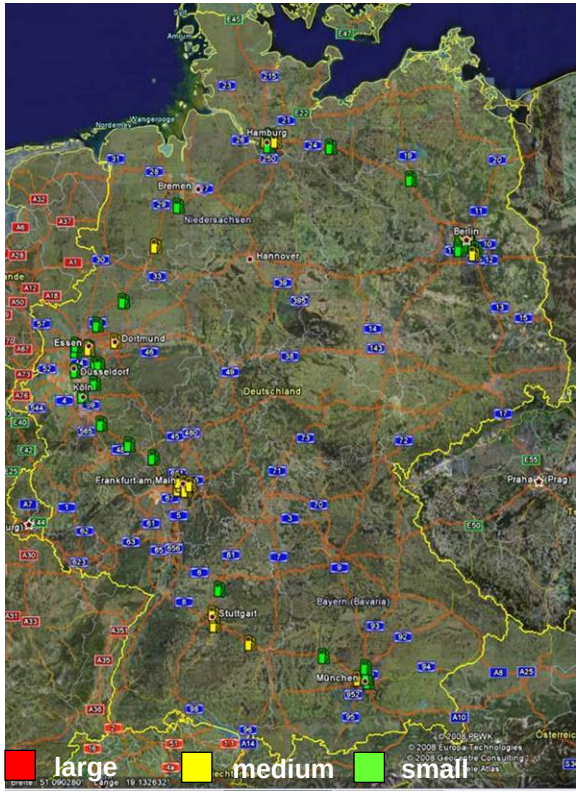
Involved companies

- Daimler, EnBW, Linde, OMV, Shell, Total und Vattenfall
- Neutral facilitator: NOW GmbH

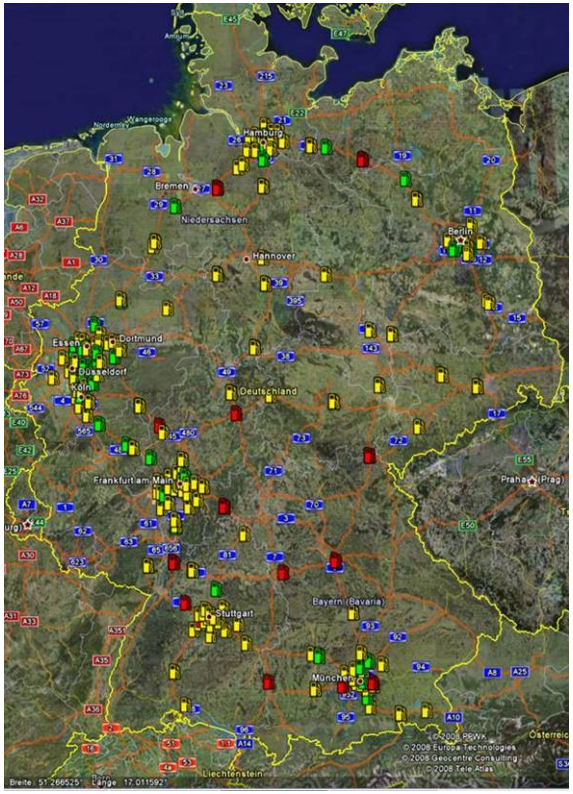
H2-infrastructure build up in Germany

New fuelling station deployment over time (2010 - 2017)

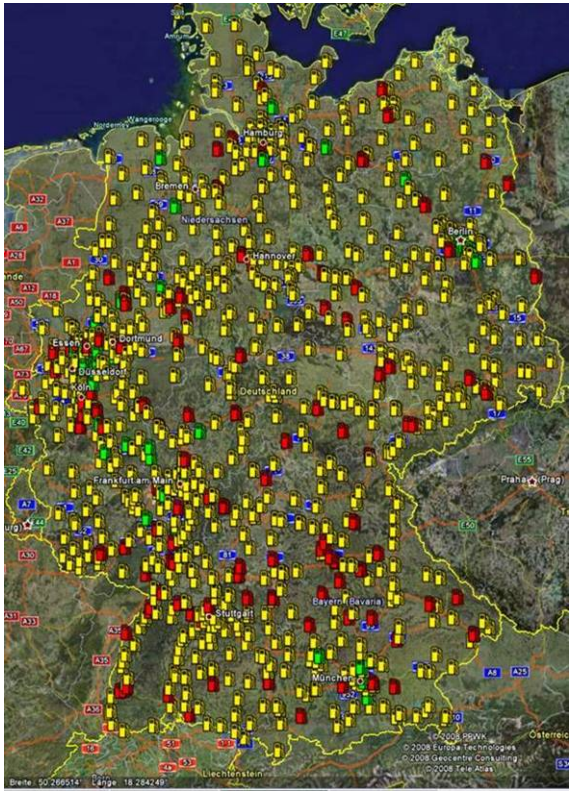
2013



2015



2017



- **A „Banana“ connecting major western German cities will be the starting point for the hydrogen infrastructure**

How to Bridge the Gap from Isolated Demonstration Projects to Mass Market Mobility

- OEMs have made substantial investments in fuel cell technology. Fuel cell vehicles are now close to reaching mass market readiness.
- Daimler is committed to developing a substantial retail fuel cell vehicle fleet in California
- Daimler and other OEMs need a commitment from others to fund hydrogen fueling infrastructure
- Daimler sees California as a global leader in H2 fuel cell vehicle market development
- Without a commitment to funding for a sufficient number of H2 fueling stations in California, Daimler will find it difficult to justify the continuation of its California fuel cell program when resources can be focused on the thriving European H2 program.

- Several hundred thousand fuel cell cars in California are possible until the year 2020 – a step towards environment-friendly mobility!
- However to reach this goal, a sufficient number of fueling stations is essential.

Mercedes-Benz

Thank you