

# **IPHE Workshop:**

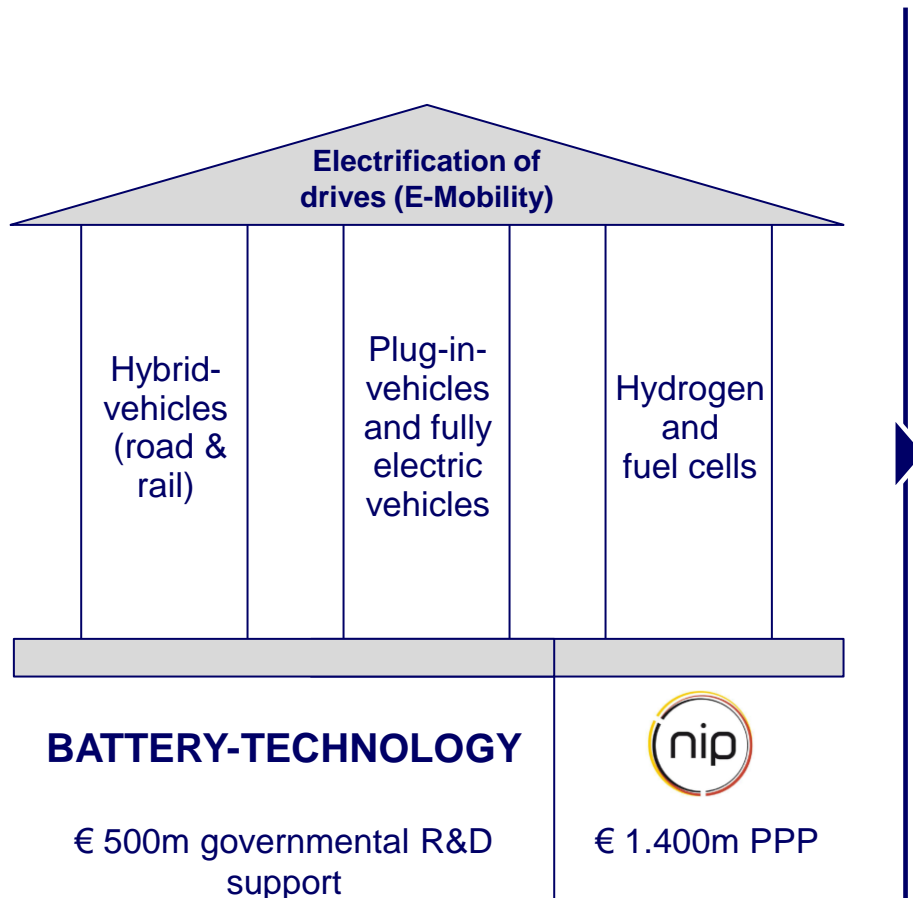
## **Governmental Programmes on E-Mobility**

### **Session 1: Electro Mobility Programmes in selected IPHE countries**

Dr. Klaus Bonhoff  
NOW GmbH | Managing Director (Chair)

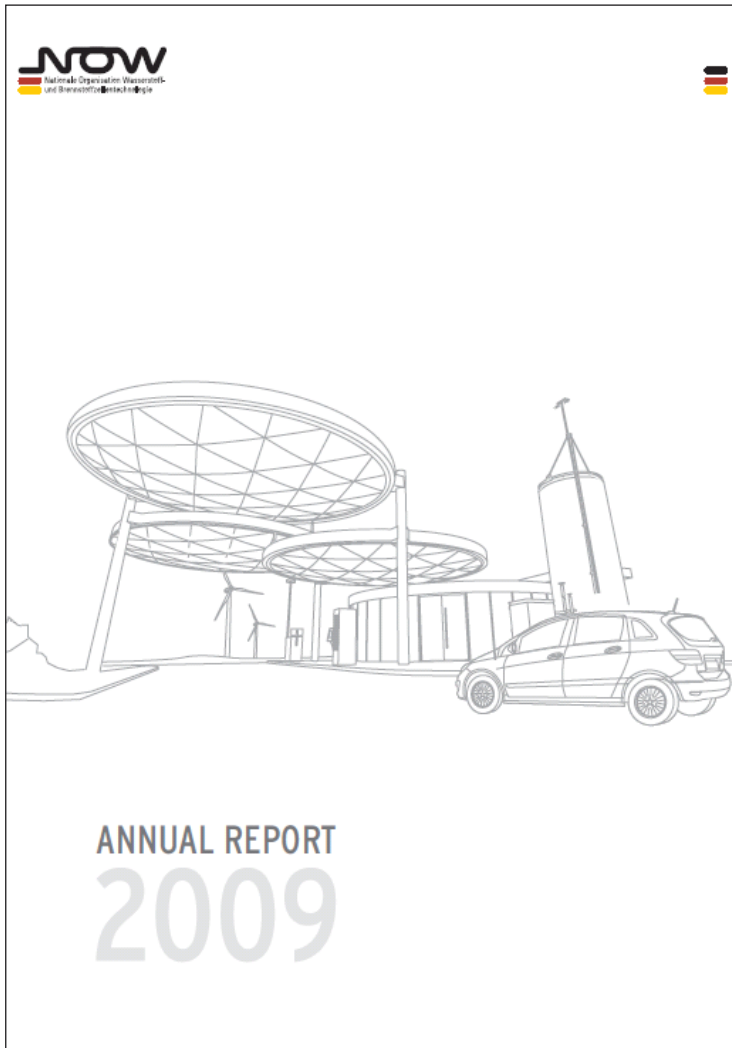
IPHE Workshop  
Ulm, Germany  
June 15<sup>th</sup>, 2010

# The governmental E-Mobility activities strive for the electrification of drivetrains based on three major pillars



**The overall E-Mobility activities are divided into the fields of battery technology and hydrogen / fuel cells**

# Annual Report 2009



National Innovation  
Programme Hydrogen and  
Fuel Cell Technologies

- Transport and Infrastructure
- Stationary Energy Supply
- Special Markets



Battery-Electric Mobility

- Modellregions



# The German government allocates € 500 m in the course of the 2nd economic recovery package to accelerate to goal Germany as lead market for E-Mobility

## Short overview 2nd recovery package

### GOALS 2nd recovery package

- Overall goal: Alignment of short-term economic effects (focus on 2009/2010) with secured long-term sustainability
- Sub-goal E-Mobility: To make Germany a **lead market for E-Mobility** within the next 10 years
- Total financial support of € 500m for E-Mobility activities from 2009 to 2011 with 4 governmental departments being in charge of the sub-projects – **whole value chain covered**

### RESULTS

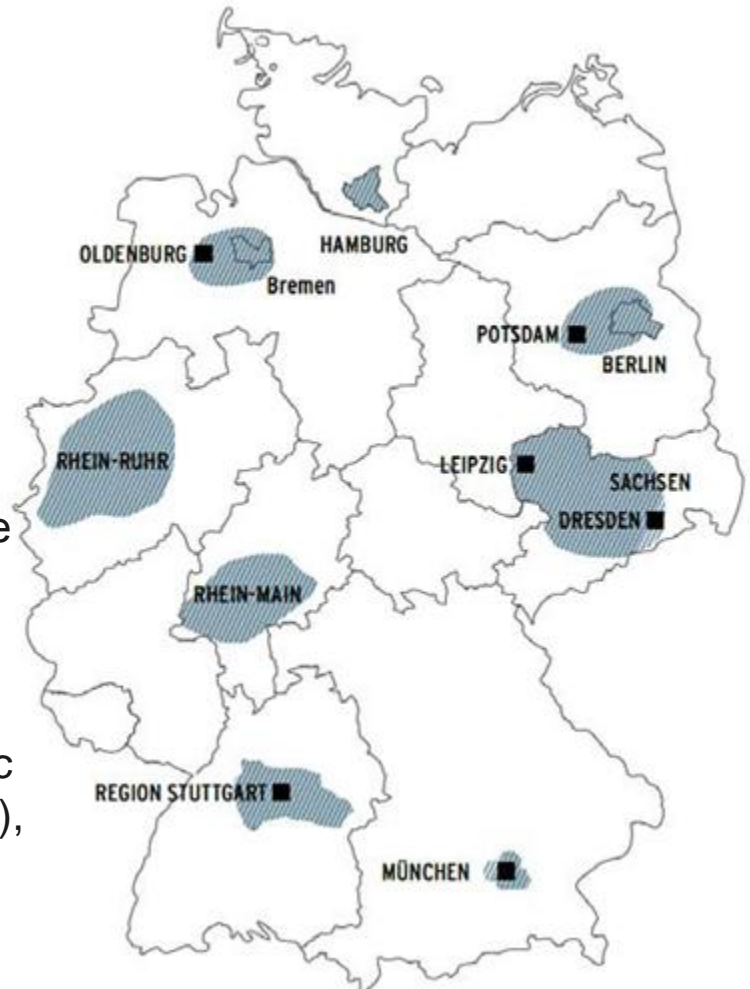
- **Definition of 15 focus projects** in order to support major investments and R&D activities (hybrid drives, fuel cells, batteries)
- Focal point of supportive measures on **"E-Mobility model regions"** with funds of € 115m



Bundesministerium  
für Verkehr, Bau  
und Stadtentwicklung

# 8 Pilot Regions: Goal, Background, Focus and Modules

- Goals: combine applied research and development centering on day-to-day and user-focused demonstration and the intention of the stimulus package to boost the economy.
- Background: electric mobility is to be developed adopting a holistic and integrated approach, with a different focus in each region
- Cluster: Motivated regional stakeholders, different requirements are to be taken into account (“subsidiarity”), creativity of regional initiatives is to be exploited.
- Major elements: R&D to prepare demonstration, demonstration projects in 8 regions, evaluation
- Modules: Individual transport (cars, bikes etc.), Public transport (Buses, Rail), Commercial transport (trucks), infrastructure (charging spots)





# Model Region Rhein-Ruhr

## Overview

Düsseldorf, 15.04.2010



Gefördert durch:



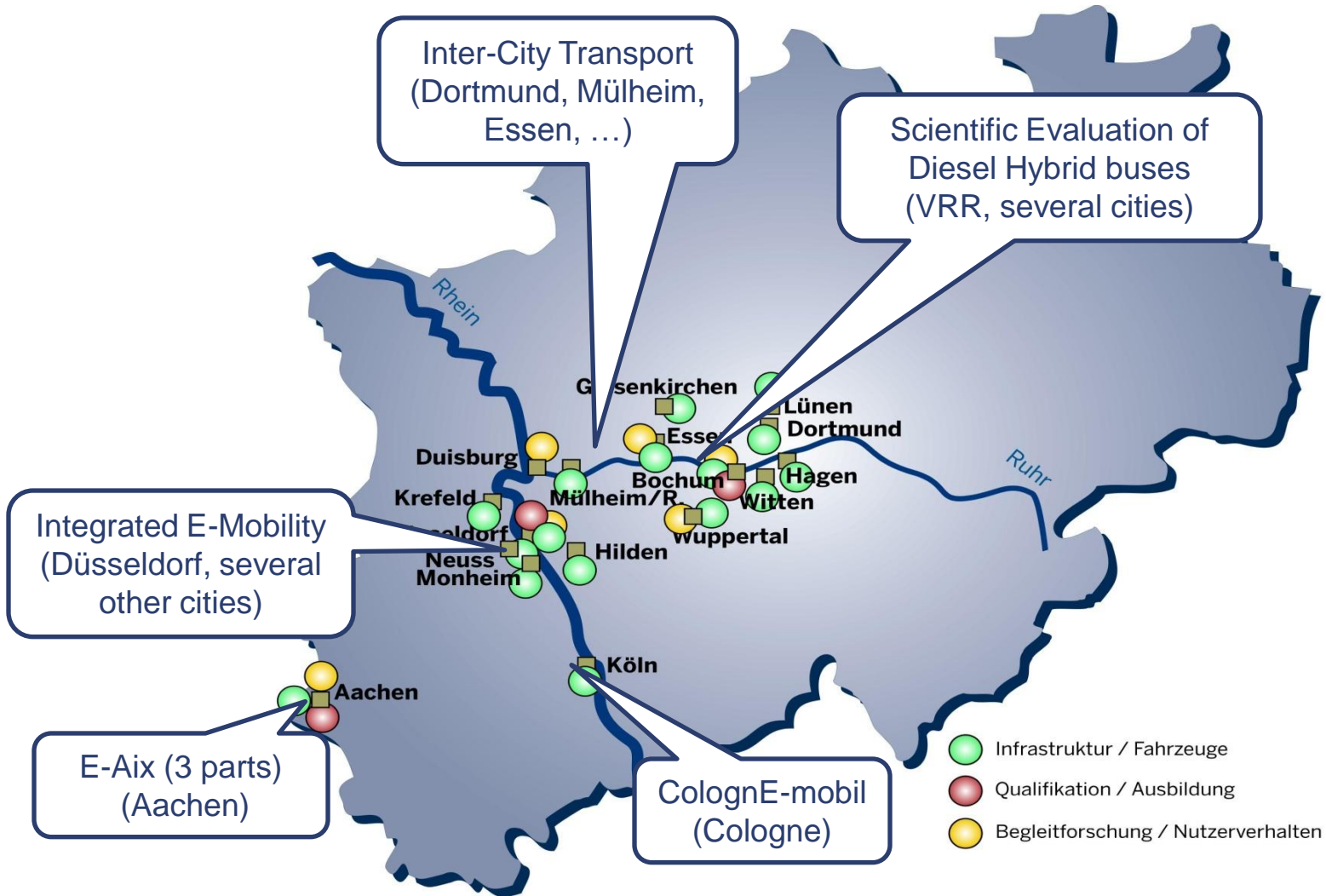
Bundesministerium  
für Verkehr, Bau  
und Stadtentwicklung

aufgrund eines Beschlusses  
des Deutschen Bundestages





# Model Region – Overview (1/2)





## Facts

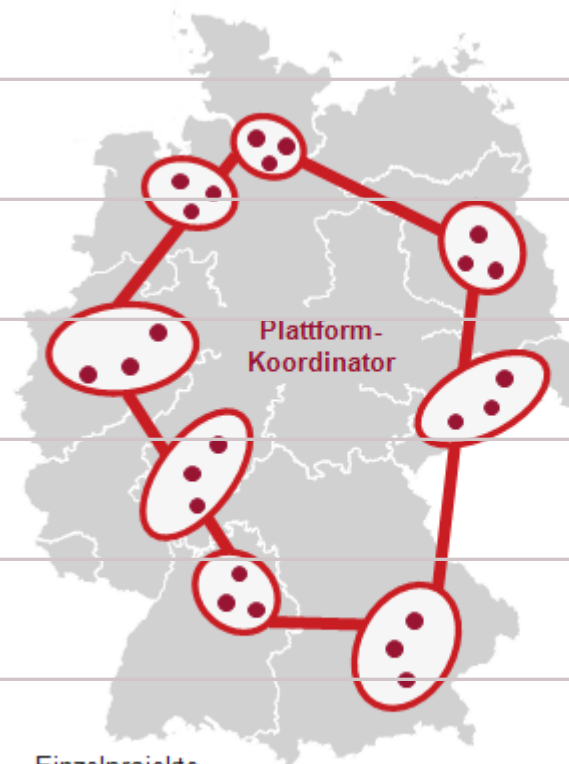
- five Starter projects
- Funding ~22,3 Mio. Euro by total costs of approx. 40 Mio. Euro
- Projected operation of approx. 400 vehicles including:
  - 190 Cars
  - 150 E-Scooter and Bikes
  - 23 Utility Vehicles
  - 25 Hybrid Busses
- Projected infrastructure: Installation of approx. 480 charging stations
- In total more than 25 locations



# Platforms to connect regional activities

1. Communications and expectations management
2. Legal framework
3. Social science and acceptance
4. Environment and Safety
5. Buses
6. Passenger cars and LT
7. Infrastructure

## Plattformen



- Einzelprojekte
- Koordinationsbereich der regionalen Projektleitstellen.
- Koordinationsbereich der übergreifenden Plattformen.

# Overview partners infrastructure

Model regions	Actors / partners	Number of charging spots
<b>Hamburg</b>	Hamburg Energie, Vattenfall Europe, DB AG, Stadt Hamburg (Behörde für Stadtentwicklung und Umwelt sowie Landesbetrieb Straßen, Brücken und Gewässer)	100 public 150 semi-public
<b>Nord West (Bremen/ Oldenburg)</b>	BREPARK GmbH, die Städtische Parkgesellschaft Bremerhaven mbH, EWE, Airport Bremen und die Bremer Straßenbahn Aktiengesellschaft	10 public 40 private
<b>Berlin/Potsdam</b>	RWE, APCOA, Siemens, Vattenfall, ADAC, IHK Berlin, Elektroinnung Berlin, REWE, Contipark, IAV, Total, Messe Berlin und Gravis, Deutschen Bahn AG	600 total 500 public and semi-public (76 in operation)
<b>Rhein-Ruhr</b>	RheinEnergie, Stadtwerke Düsseldorf, Stadtwerke Aachen-STAWAG und RWE Effizienz GmbH	500 public, semi-public and private
<b>Rhein-Main</b>	u.a. Stadtwerke Offenbach, Mainova AG, UPS, Offenbacher Verkehrsbetriebe, Rhein-Main Verkehrsverbund, Energieversorgung Offenbach, Städtische Werke AG	115 public, semi-public and private
<b>Sachsen</b>	ENSO Netz GmbH, DREWAG Stadtwerke Dresden GmbH, und die Stadtwerke Leipzig, KEMA-IEV Ingenieurunternehmen für Energieversorgung GmbH und die Hochschule für Telekommunikation Leipzig	8 public, 25 semi-public, 32 private (65 total)
<b>Stuttgart</b>	EnBW AG (Rollout & Betrieb der Ladesäulen in Stuttgart), die Robert Bosch GmbH (Entwicklung der Ladestationen für den öffentl. sowie gewerblichen/privaten Raum), das EIFER Institut (Analyse Ladestationsorte in Stuttgart), die Stadtwerke Ludwigsburg, die Landeshauptstadt Stuttgart, DB Logistics und sonstige Eigentümer der Standorte wie Handwerkskammer, Landkreise und weitere	630 (80 public, 500 semi-public, 50 private)
<b>München</b>	AUDI AG, BMW AG, SIEMENS AG, E.ON Energie AG, Stadtwerke München GmbH, Forschungsstelle für Energiewirtschaft mbH, Technische Universität München, fortiss GmbH, Münchner Verkehrsgesellschaft mbH	260 (16 in operation)

# Preparing Hydrogen and Fuel Cell Markets: National Innovation Programme (NIP)



## Politics

BMVBS / BMWi / BMBF / BMU

**500 million €** + **200 million €**  
for demonstration for R&D

## Industry

+ **700 million €**  
Co-payment from industry



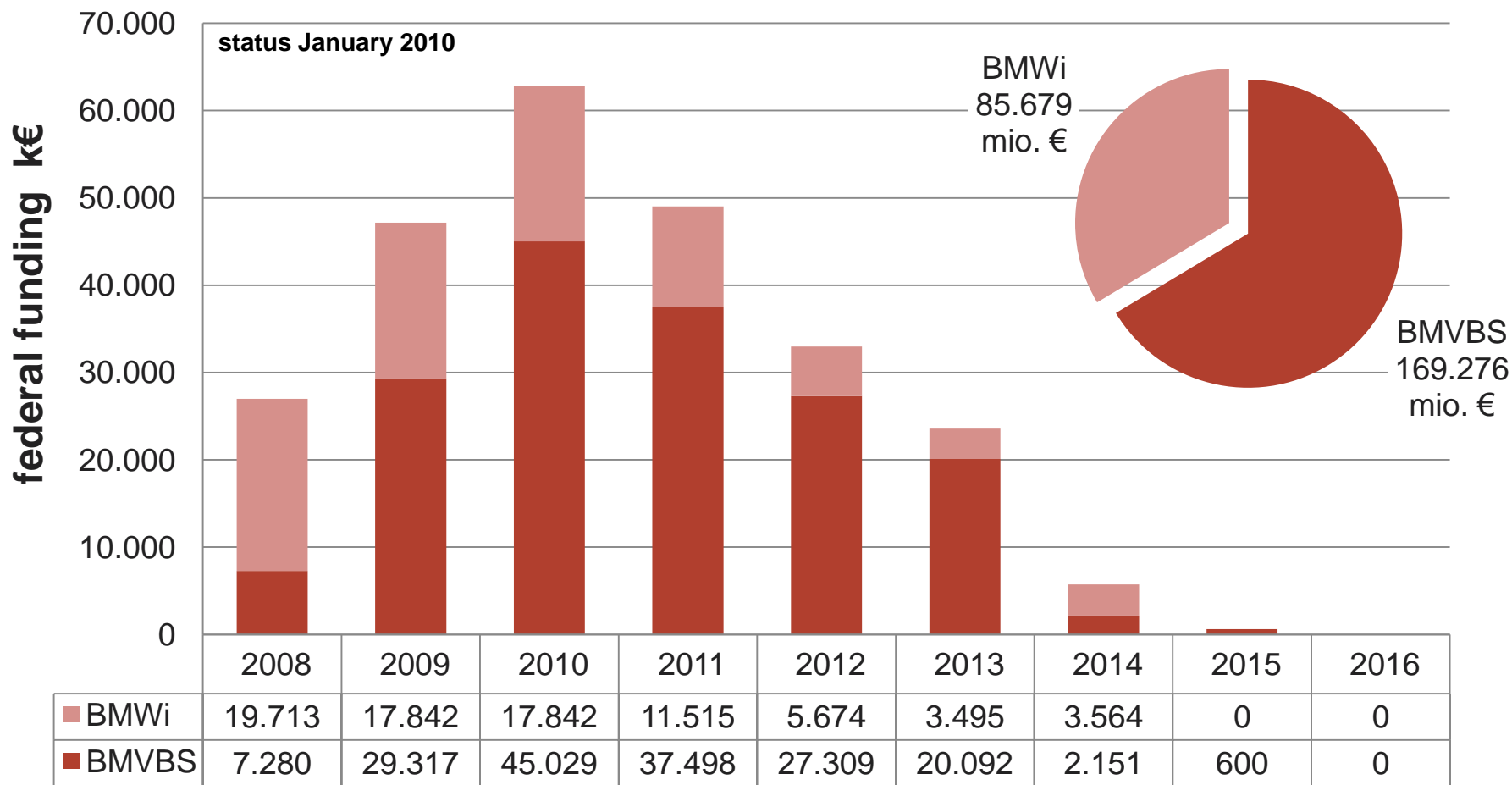
**1,4 billion €**  
2007-2016

- Preparing hydrogen & fuel cell markets
- Focus on R&D combined with everyday demonstration
- Hydrogen & fuel cells driven by applications and markets: transport, stationary energy supply, special markets

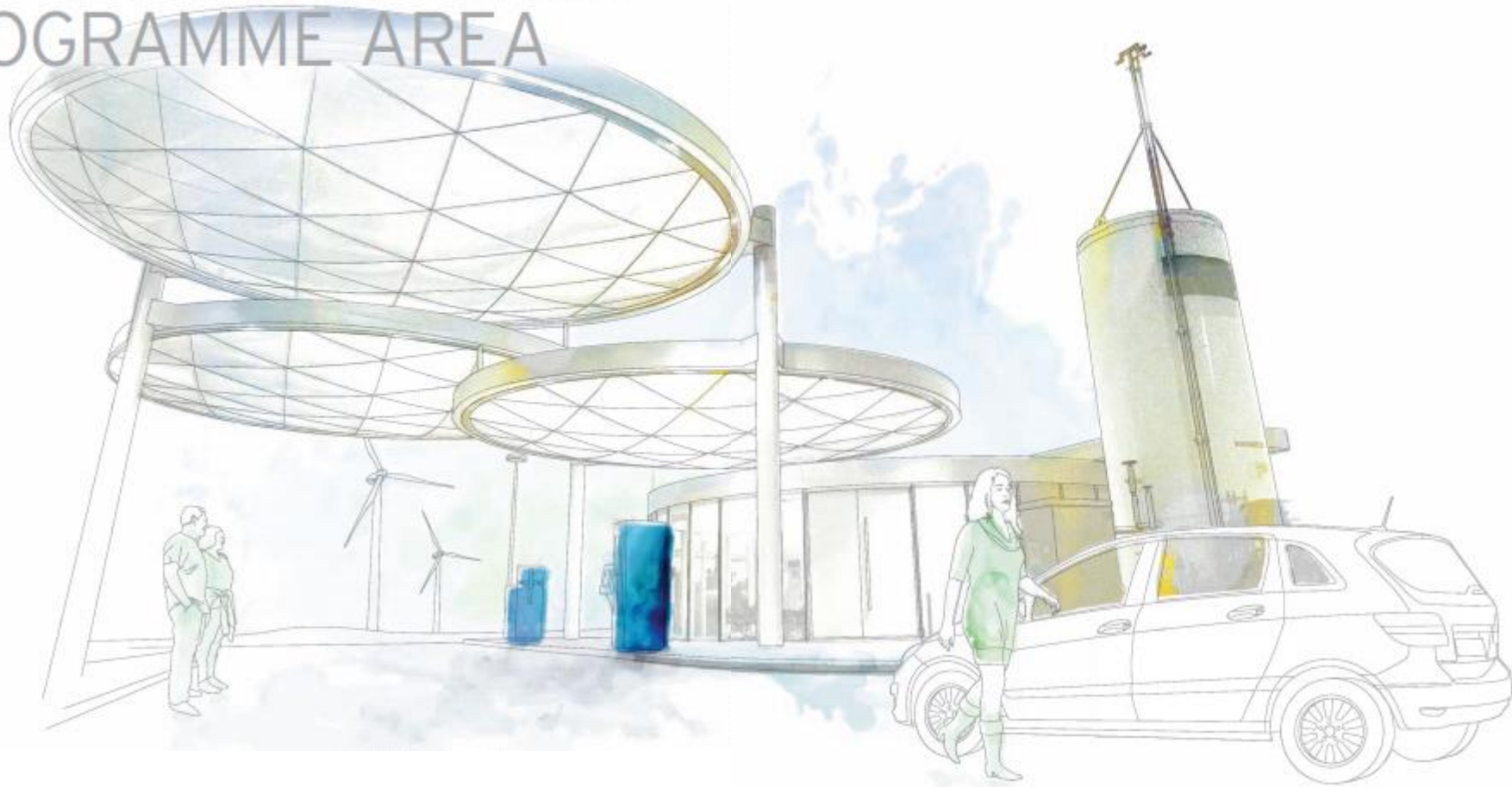


# Approved Projects

## Demonstration (BMVBS) and R&D (BMW i)



# TRANSPORT AND INFRASTRUCTURE PROGRAMME AREA



Clean Energy Partnership

**CEP**

## **A strong partnership for a zero-emissions future**

*This includes*

- *the continuous operation of efficient hydrogen vehicles*
- *their fast and safe refuelling,*
- *the clean and sustainable production of hydrogen,*
- *hydrogen transport and storage in liquid and gaseous states*
- *the increasing integration of renewable energy sources*

*A lighthouse project within the National Hydrogen Fuel Cell Technology Innovation Program (NIP)*

BMW Group



BVG

DAIMLER



HOCHBAHN



TOYOTA

VATTENFALL



VOLKSWAGEN  
ARTIFICESSELCHAFT



Clean Energy Partnership

**CEP**

## The Partners

BMW Group



**BVG**

DAIMLER



**HOCHBAHN**



Statoil



**TOTAL**

**TOYOTA**

**VATTENFALL**



**VOLKSWAGEN**

AKTIENGESELLSCHAFT

# Assembling a new infrastructure ...

## BERLIN

- Spandau
- Holzmarktstrasse
- Southern Berlin
- Heidestrasse
- Additional sites are in planning



# Opening of the Hydrogen Fuelling Station at Holzmarktstr., Berlin and Rallye from Berlin to Hamburg on May 12, 2010







Hamburg Hafencity



# Ensuring clean mobility ...

## Daimler B-Class F-Cell

- No. of vehicles: up to 60
- Technology: fuel cell
- Fuel: gaseous hydrogen, 700 bar
- Engine power: 100 kW
- Peak speed: 170 km/h
- Reach: approx. 400 km



# ... and even more cars to choose from

## GM Opel HydroGen4

- No. of vehicles: 10
- Technology: fuel cell
- Fuel: gaseous hydrogen, 700 bar
- Engine power: 73 kW
- Peak speed: 160 km/h
- Reach: approx. 320 km

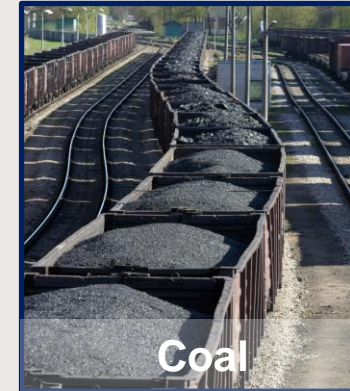
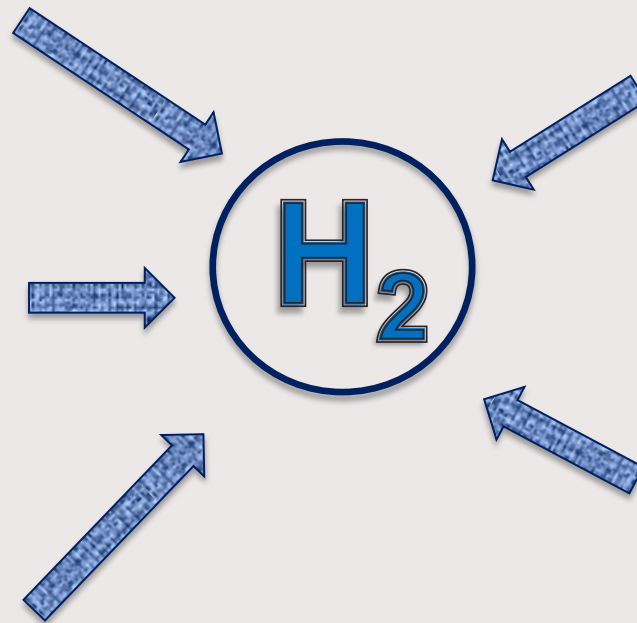
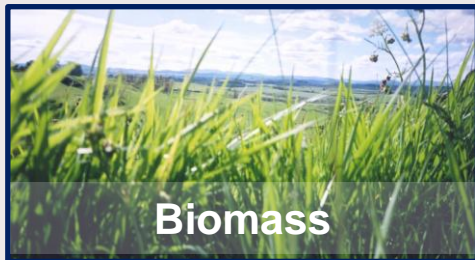






# Hydrogen Production

## A Portfolio of Options





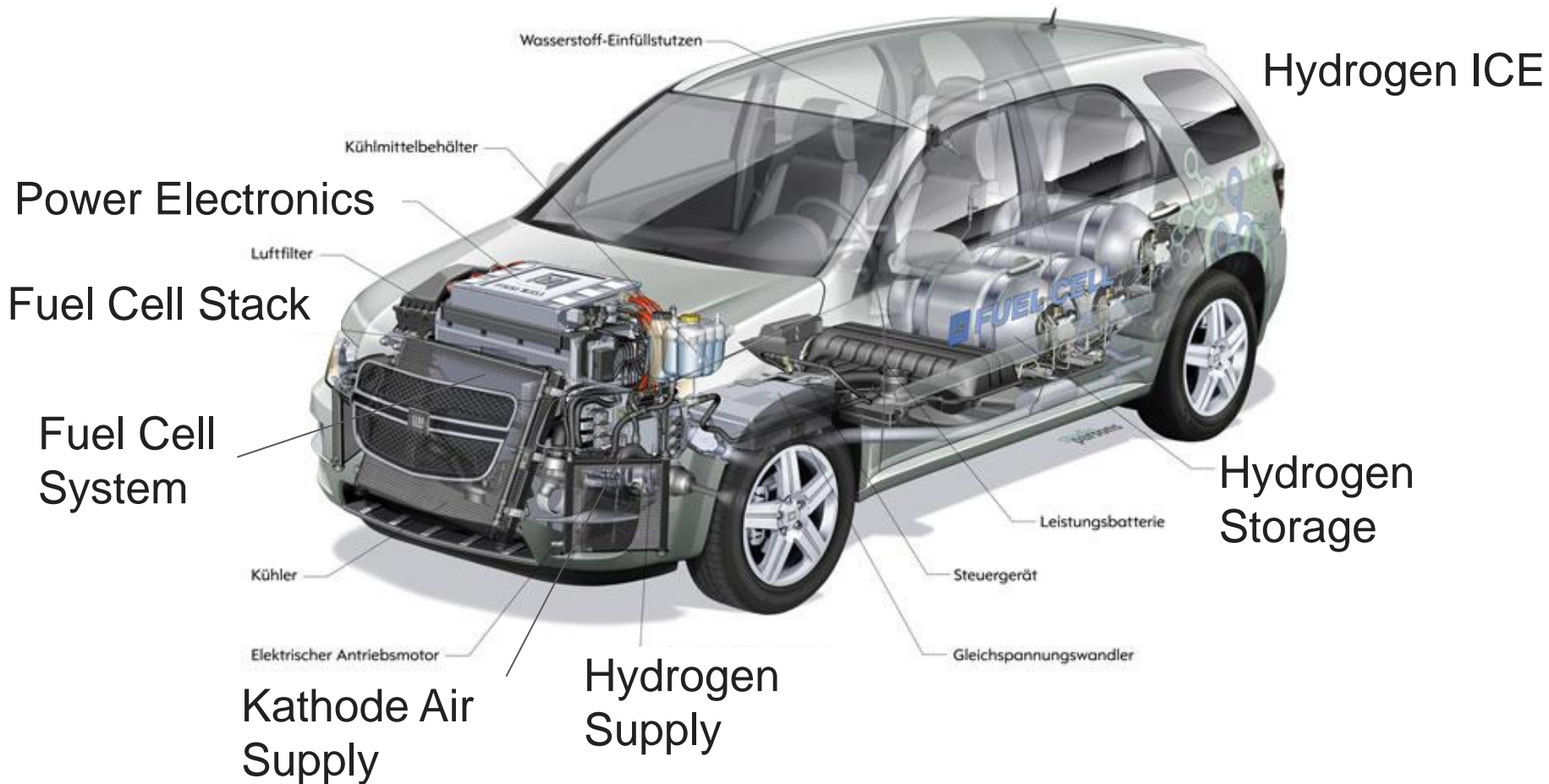
# “H<sub>2</sub>-Mobility” Initiative – Overcoming the Chicken and Egg Dilemma

- Signing of Memorandum of Understanding for “H<sub>2</sub> Mobility” Sept. 10th in Berlin
- Eight key stakeholders from industry (OEM, oil, utility & industrial gas) and NOW as public-private-partnership
- Intention to jointly build up hydrogen fueling infrastructure and establishing Germany as lead market



# Supply Industry

## Key Components for Next Generation Vehicles



# STATIONARY ENERGY SUPPLY PROGRAMME AREA





# Demonstration Residential Co-Generation

— EnBW

BAXI  INNOTECH

e-on | Ruhrgas

HEXIS

 EWE

 Vaillant

 MVV Energie

 ZSW

 Verbundnetz  
Gas AG





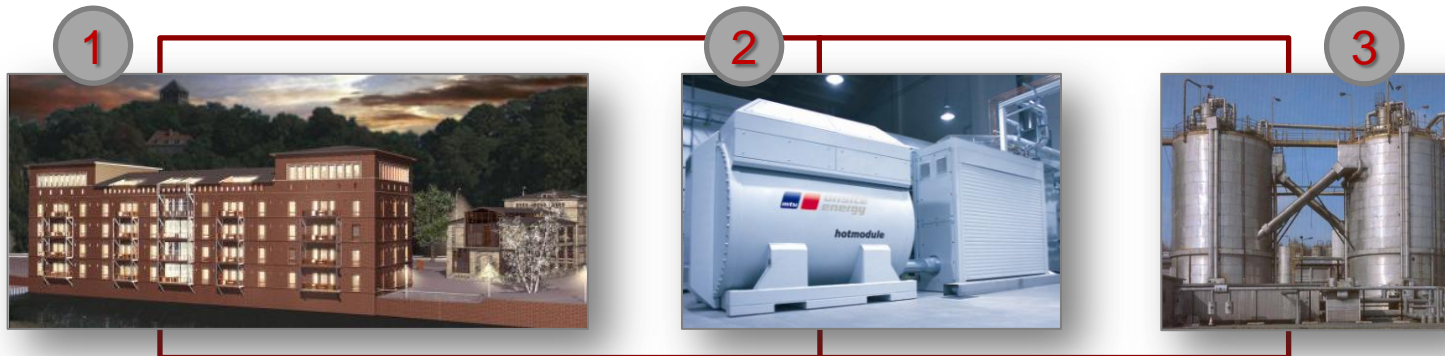
# Power Plant in Barth from DALKIA MCFC operated with Biogas



# "Speicherstadt Potsdam"

## Integrated Energy Concept

1. Energy Efficient Building (Modernizing)
2. Efficient supply of power, heat and cold (tri-generation) with fuel cells
3. CO<sub>2</sub>-neutral Biogas Production



# E4ships

## Fuel Cells in Maritime Applications





# SPECIAL MARKETS PROGRAMME AREA



# Fuel Cells in Critical Power Supply / Back-up Power



# Fuel Cells in Leisure Applications and Tourism Markets

**BodenseeProjekt**



Brennstoffzellen im Freizeitbereich

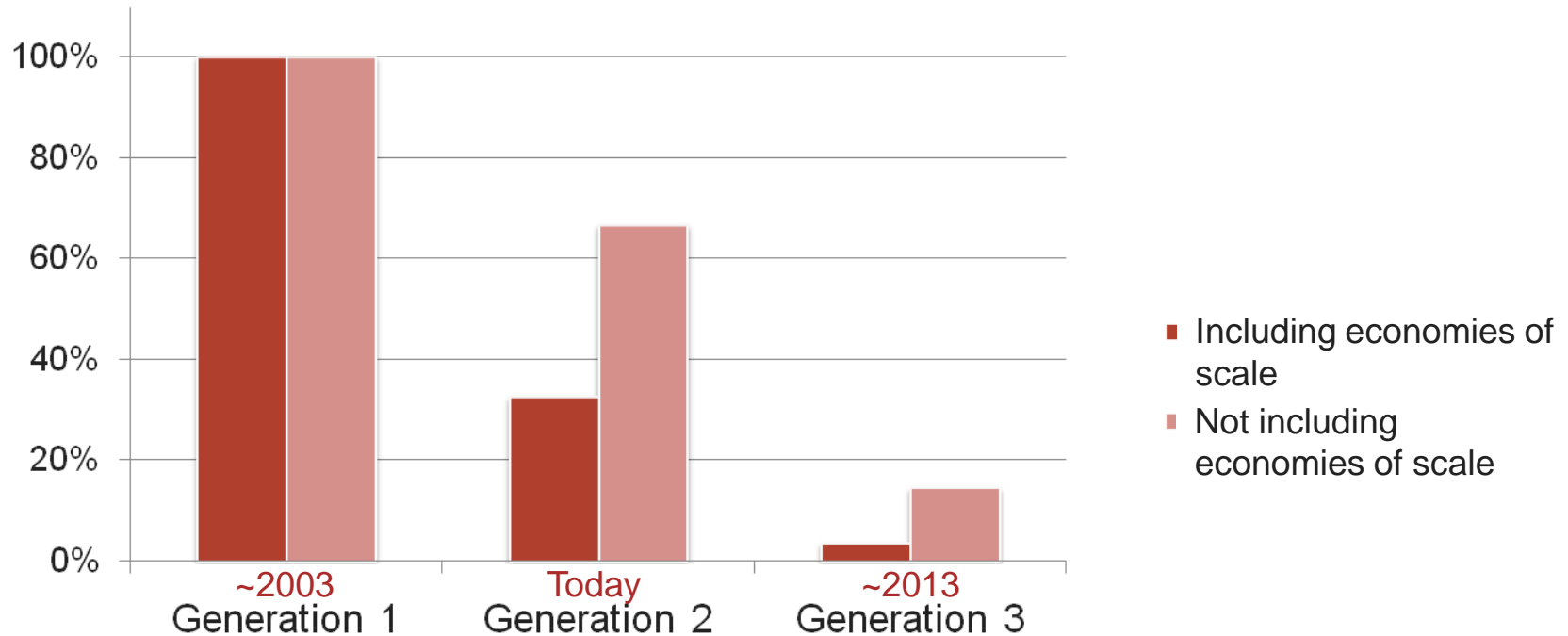
- On-board power supply in caravans, boats etc.
- Special vehicles
- Grid-independent power supply





# Cost Reduction

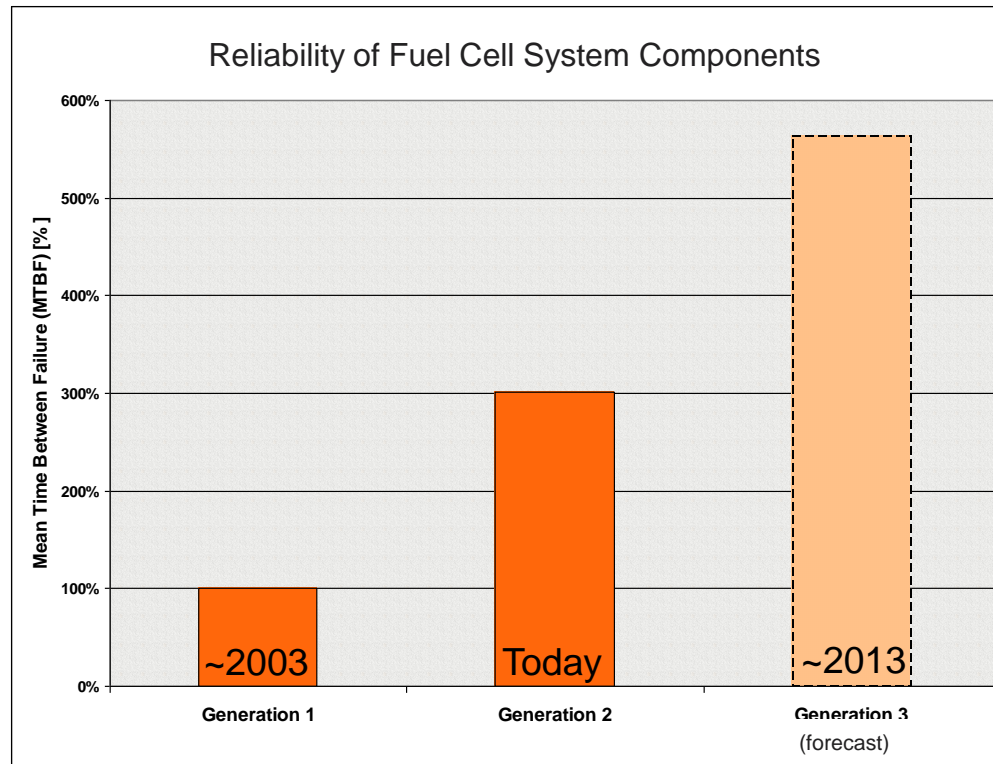
Cost of the Fuel Cell System (not including the stack)



System cost reductions of more than 90% were achieved through integration of components, optimized manufacturing processes, use of new materials and technologies and economies of scale.

Source: NuCellSys; Project "System Test of Next Generation Fuel Cell (DV HyWay4)"

# Increase of Reliability



Reliability of fuel cell components has tripled in recent years. The next generation is expected to demonstrate double the current reliability.

Source: NuCellSys; Project "Systems Development of a Fuel Cell Bus (HyWay 23)"; 2008-2011



# Discussion of Key Messages

## - Policy and Markets

- An integrated long term strategy with support from all stakeholders (politics, industry, academia) is needed as a stable framework. Regarding electric mobility this should include
  - The role and the perspective of electrified / electric vehicles in the context of the broad transportation market
  - Impact assessment on life-cycle aspects (e.g. battery-recycling, disposal)
  - Energy supply for the transportation sector (fuels / energy carriers) as part of / integrated into the overall energy system
  - Commercialization timelines
  - Business models with respect to cost reduction and cost sharing
- A viable policy framework ensuring environmental benefits and a wide customer acceptance of electric vehicles is needed
- Establish coherent programs / instruments for market preparation (R&D, demonstration) and market introduction depending on commercial viability of different technologies

# Thank you!

[www.now-gmbh.de](http://www.now-gmbh.de)