Nationale Organisation Wasserstoff- und Brennstoffzellentechnologie

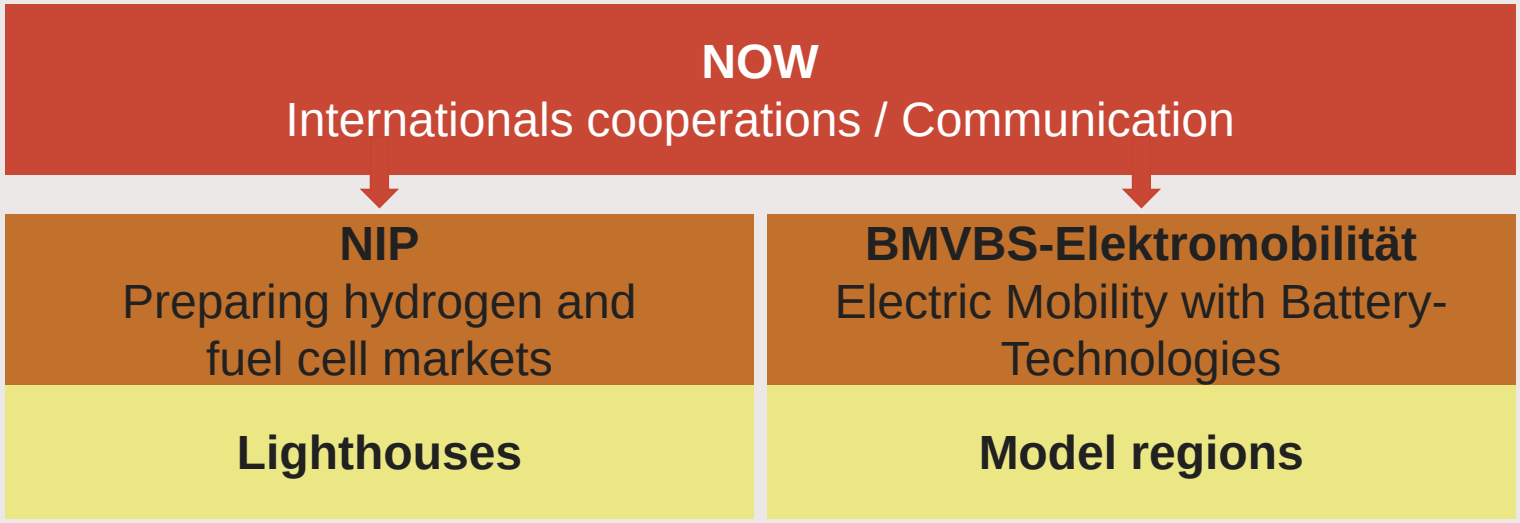
- Member Country Updates -
Germany

12th ILC & SC Meeting| Washington, D.C.| December 2, 2009

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

NOW GmbH
National Organization Hydrogen and Fuel Cell Technology

- Federal subsidiary (100 %)
- Co-financing by industry (project overheads)
- Supervisory board: BMVBS (Chair), BMWi, BMBF, BMU
- Advisory board: strategic controlling and development of programmes



Germany on ist way to leading market for sustainable mobility and energy technologies

Nationale Organisation Wasserstoff- und Brennstoffzellentechnologie

Federal States in Germany …

- launched „state initiatives“, that bring together partners from industry and science
- initiate projects on research, development, demonstration and market preparation of HFC technology
- fund projects in the field of HFC with 30 to 35 million Euro per annum
- align their activities with the Federal Government and NOW

State Programme “NRW Hydrogen HyWay”

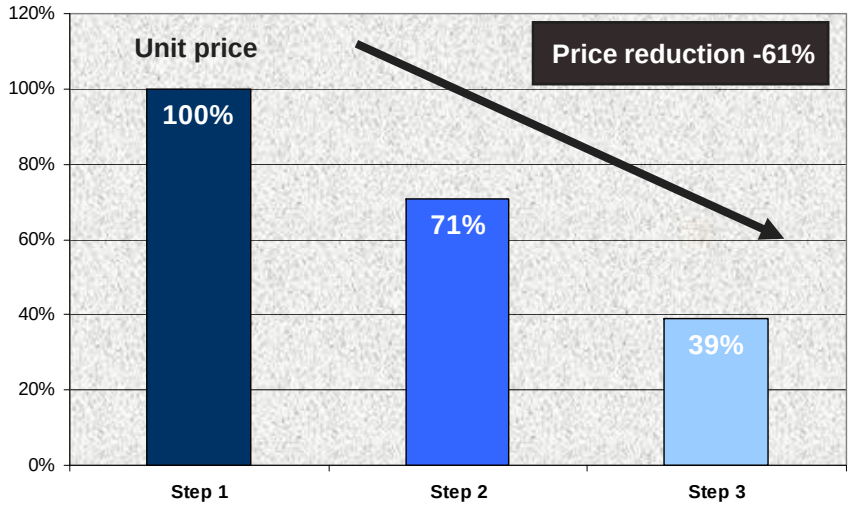
Framework Programme (2008 -2011)

- About 40 project ideas, ~ 200 mio. € budget
- Cofinancing partially by EU and Federal Gov.
- 11 locations (along the pipeline)

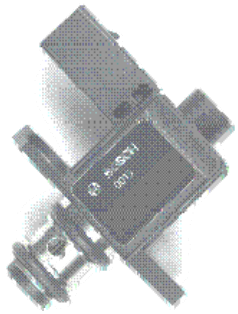
- **Infrastructure (11 projects)**
  Hydrogen production, filling stations
- **Mobile Applications (15 projects)**
  Buses, Cars, Light vehicles
- **Stationary Applications (7 projects)**
  CHP, UPS, Remote power
- **Research, Developm., Education**
  Storage, Components , Materials…

Supply industry

- Supply industry plays a key role in reducing system costs
  example: hydrogen valve – cost reduction >60 %



source: Robert Bosch GmbH



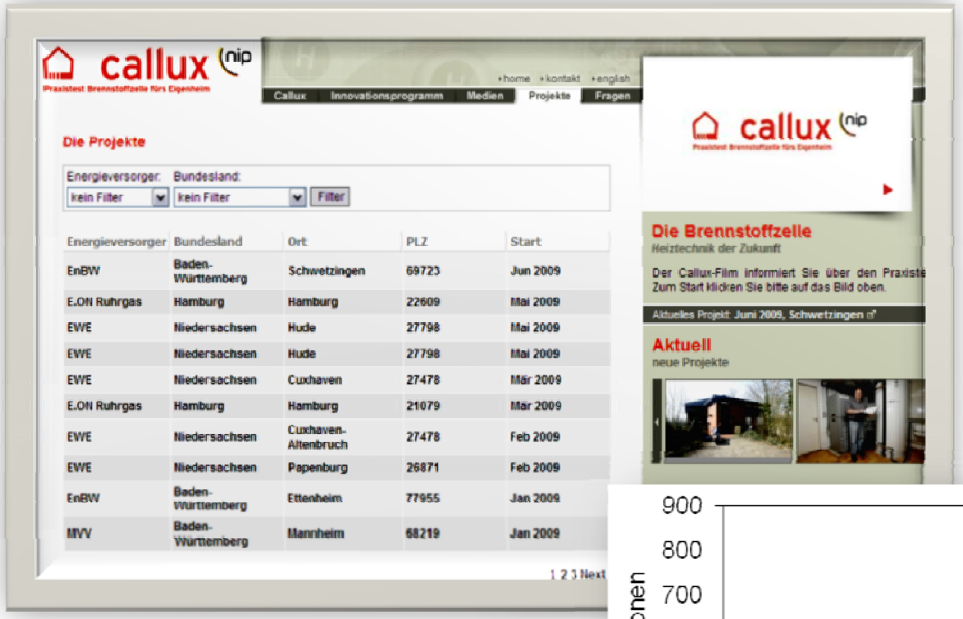
➔ **Cost reduction by innovative measures and production processes**

Project updates

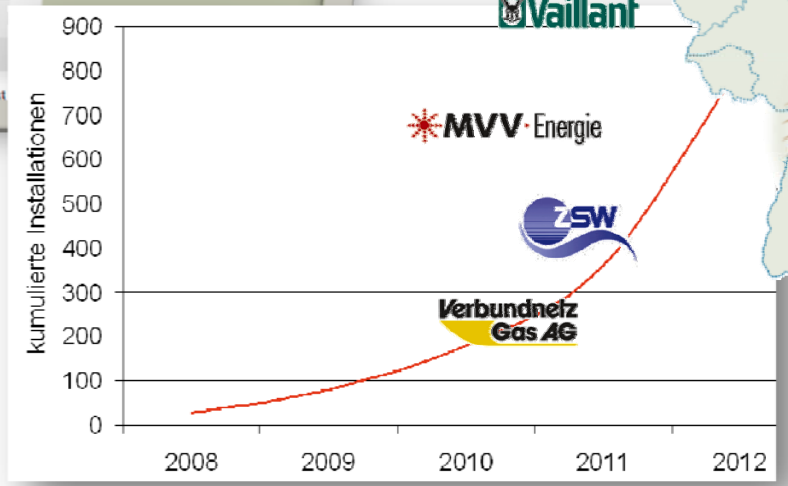
- callux / residential power supply with fuel cells
- HyFleet:Cute
- Clean Energy Partnership (CEP)
- H_2 Mobility

NIP Lighthouse Callux
Fuel Cells for Domestic Energy Supply

callux (nip)
Praxistest Brennstoffzelle fürs Eigenheim
Ein Projekt im Nationalen Innovationsprogramm Wasserstoff- und Brennstoffzellentechnologie



EnBW
BAXI INNOTECH
e·on Ruhrgas
HEXIS
EWE
Vaillant
MVV Energie
ZSW
Verbundnetz Gas AG

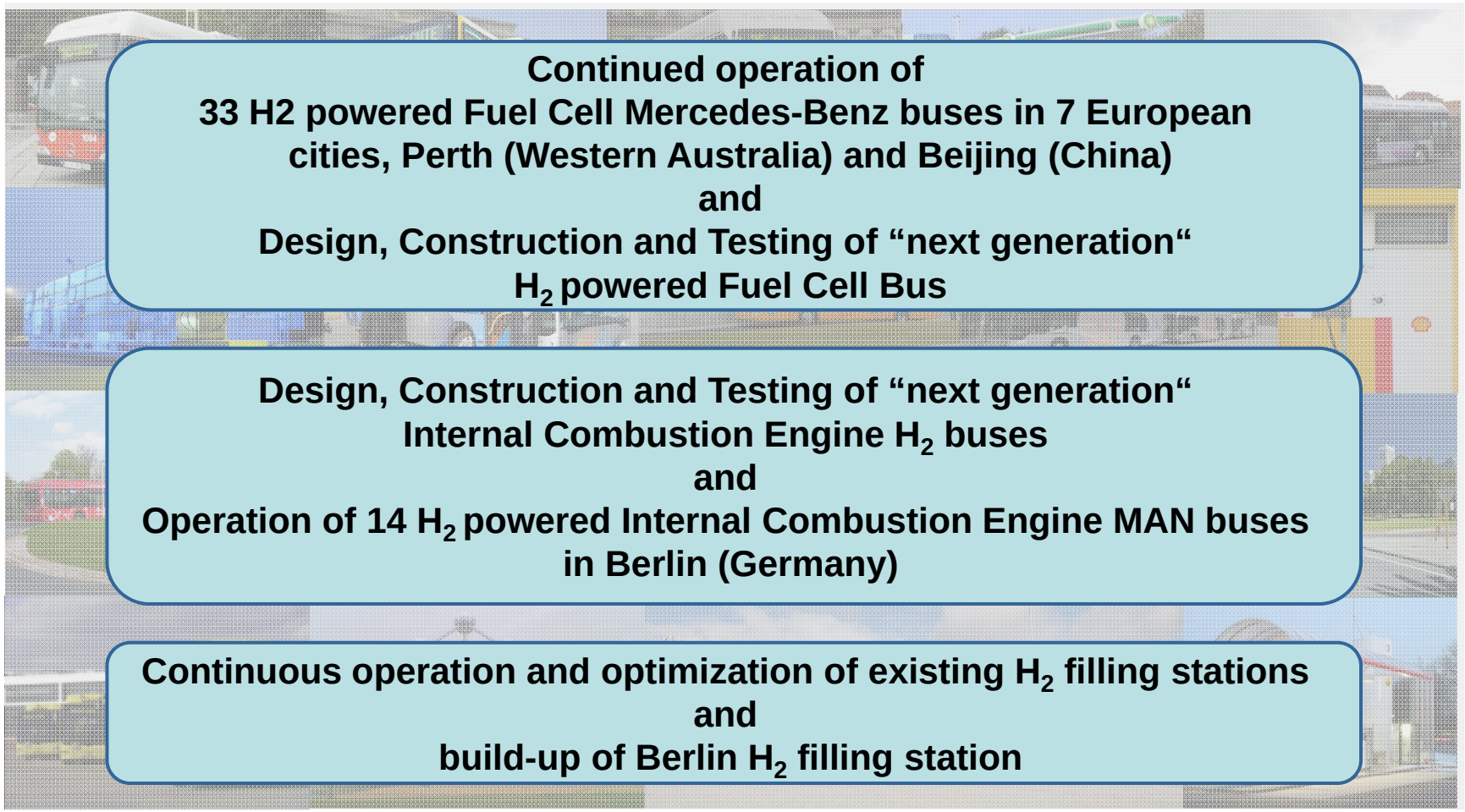


Bildquellen: http://callux.net/

Bundesministerium für Verkehr, Bau und Stadtentwicklung

NOW Nationale Organisation Wasserstoff- und Brennstoffzellentechnologie

What is HyFLEET:CUTE?

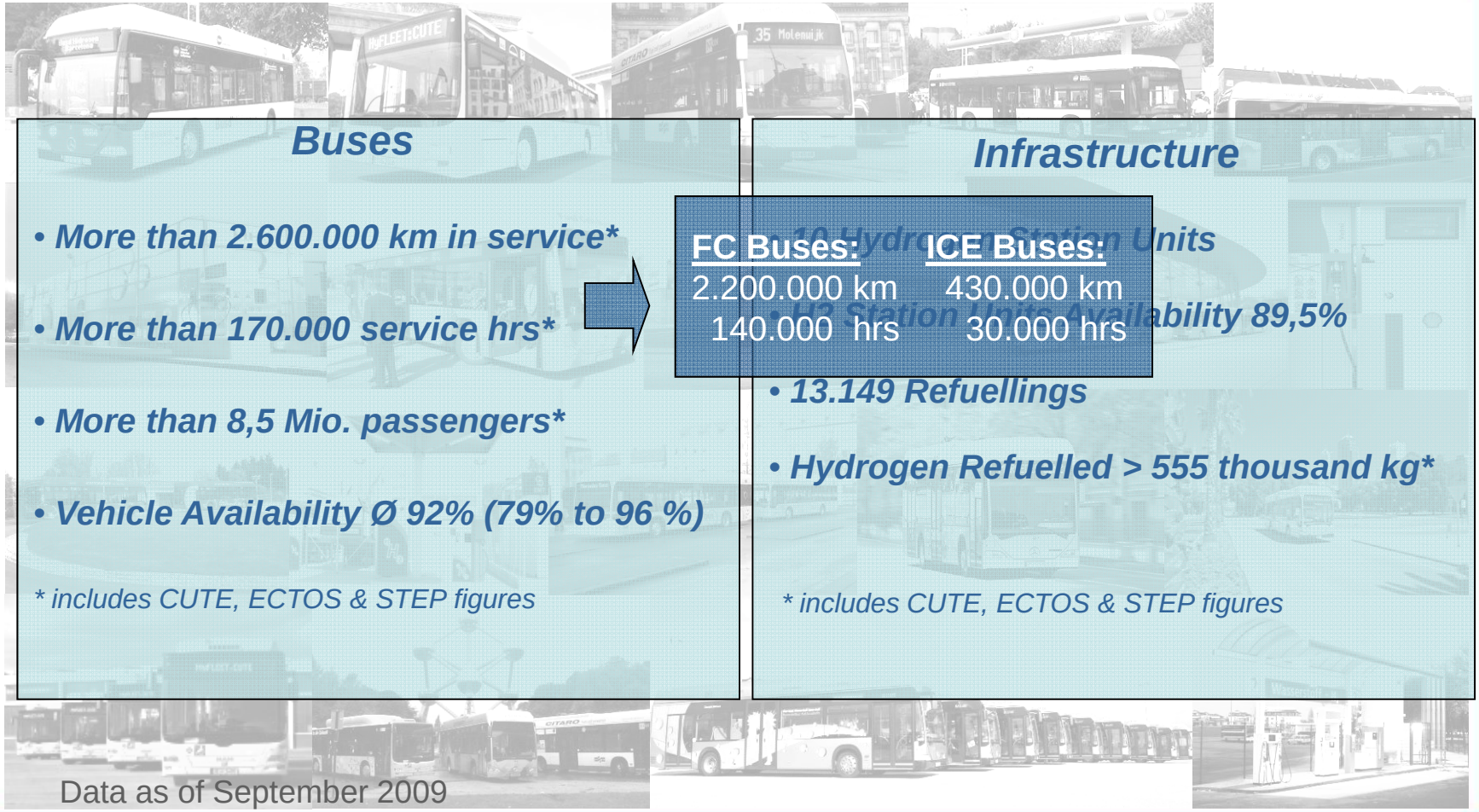


Continued operation of
33 H2 powered Fuel Cell Mercedes-Benz buses in 7 European cities, Perth (Western Australia) and Beijing (China)
and
Design, Construction and Testing of "next generation"
H_2 powered Fuel Cell Bus

Design, Construction and Testing of "next generation"
Internal Combustion Engine H_2 buses
and
Operation of 14 H_2 powered Internal Combustion Engine MAN buses in Berlin (Germany)

Continuous operation and optimization of existing H_2 filling stations
and
build-up of Berlin H_2 filling station

Achievements of the Worlds´ Largest Hydrogen Powered Bus Fleet



Buses

- *More than 2.600.000 km in service**
- *More than 170.000 service hrs**
- *More than 8,5 Mio. passengers**
- *Vehicle Availability Ø 92% (79% to 96 %)*

** includes CUTE, ECTOS & STEP figures*

FC Buses:	ICE Buses:
2.200.000 km	430.000 km
140.000 hrs	30.000 hrs

Infrastructure

- *10 Hydrogen Station Units*
- *Station Availability 89,5%*
- *13.149 Refuellings*
- *Hydrogen Refuelled > 555 thousand kg**

** includes CUTE, ECTOS & STEP figures*

Data as of September 2009

Achievements of the Worlds´ Largest Hydrogen Powered Bus Fleet

Quality & Safety and Environmental Impact

- *Nil Accidents*
- *> 1 million liters diesel replaced*
- *79% Share of renewable energy used for on-site H_2 generation*

Dissemination & Communication

- *Global outreach*
- *67 thousand unique visitors to Website/ 2000 viewings of Project video*
- *800 Subscribers to News Service from 95 different countries*

Data as of September 2009

Project Learnings

Buses

- HyFLEET:CUTE demonstrated that funded projects are necessary to advance the technology towards commercialization.
  - FC – lifetimes of the fuel cells of greater 4000 hrs were reached, need to improve to meet customer expectations. Similar holds true for some non-FC components.
  - ICE – naturally aspirated engines performed well, turbocharged engines have some issues to be resolved.

Infrastructure

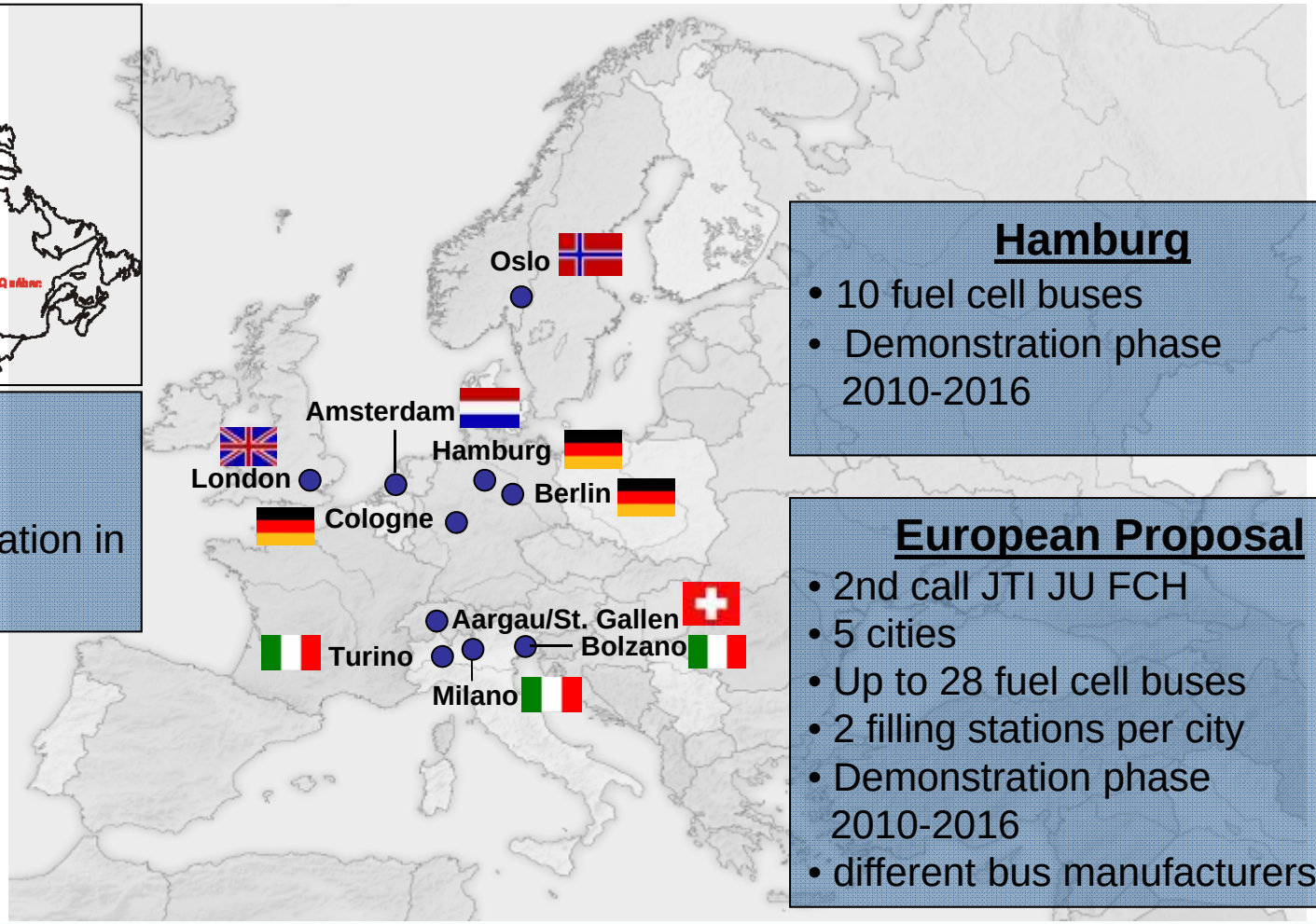
- Operation of fueling stations for up to 14 buses showed good reliability, but also improvement potential.
  - Acceleration in technology development necessary
  - Large scale refueling station projects to be defined in order to support large hydrogen bus fleets with higher hydrogen throughput.

HyFLEET:CUTE

Spotlights into the future

Whistler

- 20 fuel cell buses
- Start of demonstration in 2009



Hamburg

- 10 fuel cell buses
- Demonstration phase 2010-2016

European Proposal

- 2nd call JTI JU FCH
- 5 cities
- Up to 28 fuel cell buses
- 2 filling stations per city
- Demonstration phase 2010-2016
- different bus manufacturers

The projects should be interlinked and know-how transfer to further future regions should be ensured!

Clean Energy Partnership (CEP)

Ein Projekt im Nationalen Innovationsprogramm Wasserstoff- und Brennstoffzellentechnologie

- Linde
- Shell Hydrogen
- StatoilHydro
- TOTAL
- Vattenfall Europe
- BMW Group
- Daimler
- Ford
- GM/Opel
- Volkswagen
- BVG
- Hamburger Hochbahn

Clean Energy Partnership (CEP)

Ein Projekt im Nationalen Innovationsprogramm Wasserstoff- und Brennstoffzellentechnologie

Background and further development

- The Clean Energy Partnership (CEP) is a lighthouse project supported by the National Hydrogen and Fuel Cell Technology Innovation Programme (NIP)
- CEP currently operates one of the world's largest demonstration projects for hydrogen technology in Berlin and Hamburg
- **The CEP ist growing (fleets, hydrogen station network, regions, partners, …)**
- CEP partners Shell, Total, Vattenfall, Linde, Daimler and EnBW and OMV discussed further steps supporting the development of Hydrogen infrastructure in Europe.
- This will take place under the umbrella of the Initiative "H_2 Mobility" and moderated by the NOW GmbH

Letter of Understanding on the Development and Market Introduction of Fuel Cell Vehicles

- *„Based on current knowledge and subject to a varity of prerequisites and conditions, the signing OEMs strongly anticipate* ***that from 2015 onwards a quite significant number of fuel cell vehicles could be commercialised****. This number is aimed at a few hundred thousand (100.000) units over life cycle on a worldwide basis.“*

- „[…] *The signing OEMs strongly support the idea of* ***building-up a hydrogen infrastructure*** *in Europe, with Germany as starting point and at the same time developing similar concepts for market penetration of hydrogen infrastrucure in other regions of the world, with one US market, Japan and Korea as further starting points.“*

H_2 Mobility

Memorandum of Understanding (MoU)

- Signed by leading industrial companies
- Agreement intends the evaluation of the setup of a hydrogen infrastructure in Germany and to promote serial production of electric vehicles with fuel-cell
- Milestone towards the commercialization of such locally emission-free vehicles
- Co-operation is open for further partners

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

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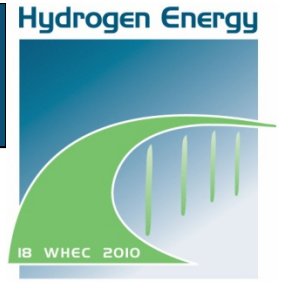
H_2 Mobility

Phase one (2009-2011)

- Evaluation of options for an **area-wide roll-out of hydrogen fuelling stations** in Germany
- Definition of a **joint business plan** agreement including an analysis of possible public support measures
- Standard concepts for hydrogen fuelling stations

Phase two

- Subject to the positive and satisfactory outcome of such a business case agreement the partners will implement the corresponding action plan
- Nation-wide roll-out of hydrogen fuelling stations
- **Support of the introduction of series produced hydrogen powered vehicles in Germany around 2015**



WHEC2010

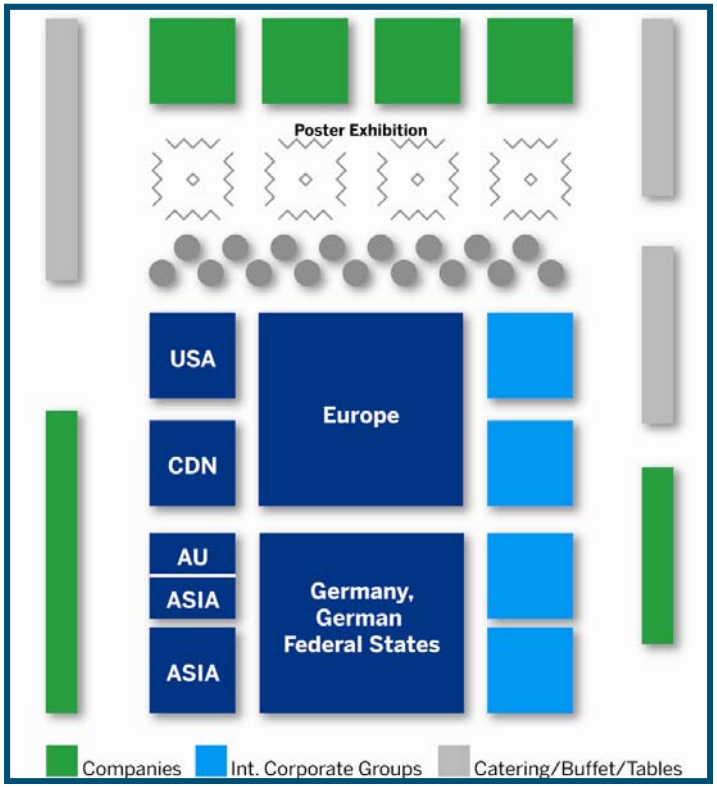
18th

World Hydrogen Energy Conference 2010

May 16–21, 2010,
Essen, Germany

At a glance

- High-profile conference with international presentations
- International trade fair on advanced HFC technologies
- Wide range of side events
  - Students`Day
  - Parallel IPHE, PATH and IEA Exco sessions
  - Technical tours
  - Ride & Drive
  - Evening events/tourist program
- 1,500 international participants expected



Scope & Conference Programme

- Promotion of hydrogen as a sustainable and environmentally friendly energy
- Presentation of cutting edge hydrogen and fuel cell science and technology
- Outreach to the public/private sector and politicians
- Students' Day as a training and information event

IPHE Awards

ICELAND PRIME MINISTER LEADS 2007 IPHE AWARD RECIPIENTS

The 2007 IPHE Awards were presented November 14 during the 20th World Energy Congress in Rome, Italy. The IPHE Annual Awards Program was launched in 2006 to formally recognize and honor noteworthy international hydrogen and fuel cell achievements that fulfill the objectives of the IPHE.

IPHE Awards Ceremony at WHEC 2010 Plenary Session

IPHE School Student Competition

Presentation of all national winners at WHEC Students' Day; Awards Ceremony at WHEC Plenary Session

Contact and Information

WHEC 2010 office
c/o EnergieAgentur.NRW
Contact: Anna Bremer
bremer@EnergieAgentur.NRW.de
contact@whec2010.com
Phone: +49 209 167-2814

Conduct of the trade fair
WHEC 2010 trade fair office
c/o Peter Sauber Agentur
Messen und Kongresse GmbH
Contact: Lena Jauernig
Phone/Fax: +49 711 656960-56/-99
tradefair@whec2010.com

Side events, registration, marketing
WHEC 2010 registration office
c/o punktgenau GmbH
Veranstaltungsmanagement
Contact: Nicole Heinrichs
Phone/Fax: +49 221 579208-12/-21
registration@whec2010.com

18th World Hydrogen Energy Conference 2010

Hydrogen Energy

18 WHEC 2010

Please mark your calendar …

… May 16-21, 2010

Essen, Germany

Host and organizer

EnergieAgentur.NRW

Under the auspices of

International Association for Hydrogen Energy (IAHE)

In cooperation with

JÜLICH FORSCHUNGSZENTRUM

DWV Deutscher Wasserstoff- und Brennstoffzellen-Verband

EnergyRegion.NRW Cluster Energy Sector

MESSE ESSEN Place of Events

First major sponsor

VORRWEG GEHEN The energy to lead

Supported by

EUROPEAN UNION
Investing in our Future
European Regional Development Fund

ZSW

ESSEN

ZBT

h2-netzwerk-ruhr

REHAU Unlimited Polymer Solutions

PATH

IPHE International Partnership for the Hydrogen Economy

Brennstoffzellen-Allianz Baden-Württemberg

NOW Nationale Organisation Wasserstoff- und Brennstoffzellentechnologie

wiba Koordinationsstelle der Wasserstoff-Initiative Bayern

EHA EUROPEAN HYDROGEN ASSOCIATION

wirtschaftsförderung metropoleruhr

HYDROGEN IMPLEMENTING AGREEMENT

Nationale Organisation Wasserstoff- und Brennstoffzellentechnologie

Thank you for your attention.

12th ILC & SC Meeting| Washington, D.C.| December 1-3 2009

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