

Fuel Cell and Hydrogen Activities in Germany

The National Hydrogen & FuelCell Innovation Program
(NIP)

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Federal Ministry of Transport, Building and Urban Development

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Political Support and Commitment

The driving factors for governments to support hydrogen and fuel cell technology are:

- Environmental benefits through reduced or no emissions
- Secure energy supply due to various sources of hydrogen
- Economic growth through innovative technologies

The German National Innovation Programme (NIP) and the European Joint Technology Initiative (JTI) provide the necessary public support

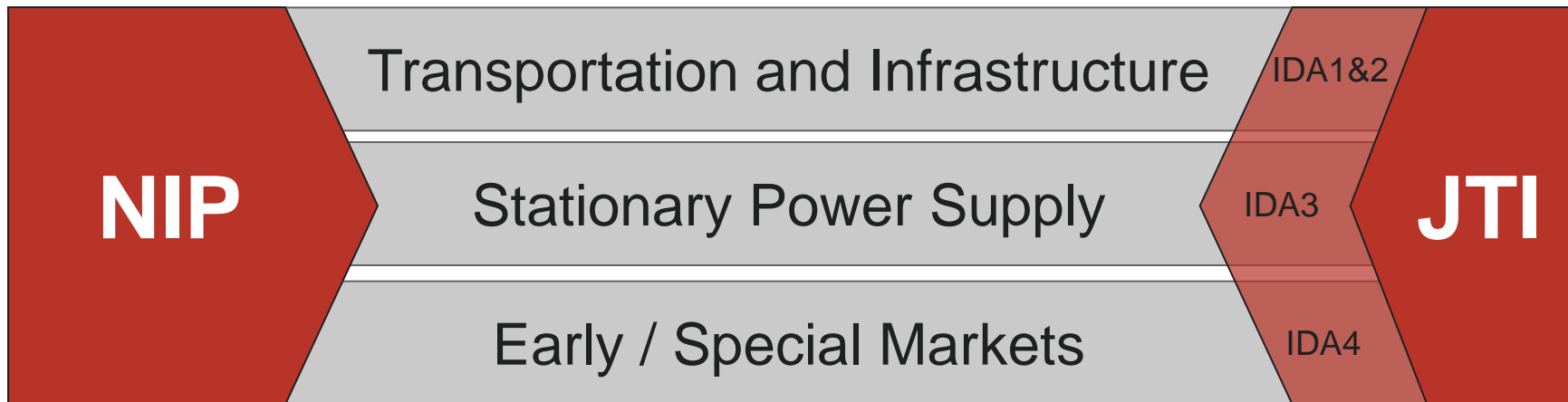


Status of Hydrogen and Fuel Cell Technology

- Successful demonstration programs ongoing in Germany
- Some systems are already close to commercial applications
- Further **R&D** is necessary for most applications, especially to cut costs
- **Demonstration** is required in order to
 - validate the technology
 - prepare the market environment
- **Industry, governments and research join forces to prepare the markets for hydrogen and fuel cell technologies**

Market Preparation Programmes

The German National Innovation Programme (NIP) has a similar structure like the European counterpart, the JTI.



The NIP follows the concept of **public-private-partnerships** meaning that industry, research and politics invest in and manage common activities.

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

Politics

BMVBS / BMWi / BMBF / BMU

500 million €
for demonstration

+ **200 million €**
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

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



Transportation 54% *

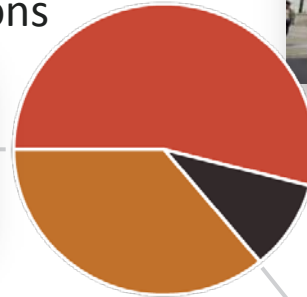
- Includes H₂ production and infrastructure
- Expanding vehicle fleets and hydrogen infrastructure starting from key regions



Source CEP



95 projects
Funding: € 229 million
(BMVBS, Jan.2011)



Stationary Applications 36% *

- FC micro CHP for residential use
- Industrial FC gensets for CHP and trigeneration



Source Vaillant



Source Telekom / PASM

Special Markets 10% *

- IT, telecommunications
- Logistics, leisure and tourism markets



Source BMW

* Planned distribution according to National Development Plan v 2.1.



“H₂ Mobility” Initiative – Overcoming the Chicken and Egg Dilemma

- Memorandum of Understanding for “H₂-Mobility” signed Sept. 10th 2009 in Berlin
- Ten key stakeholders from industries (OEM, oil, utility & industrial gas) and NOW as public-private-partnership
- Intention to build up hydrogen fueling infrastructure and establishing Germany as lead market



In Phase 1, 17 private companies and NOW developed roll-out scenarios for a hydrogen infrastructure and FCEVs

Participating companies

Car OEMs



Industrial gas companies



Oil and gas companies



Utilities



Governmental Org



Main achievements

- Bottom-up development of **consistent** infrastructure and FCEV **roll-out scenarios**
- Assessment of economics associated with hydrogen infrastructure rollout in GER
- Analysis of **sensitivities** and quantification of **risks and opportunities**

Conclusion – H&FC part of overall ENERGY Portfolio

Hydrogen and fuel cell technologies contribute to future energy requirements.

Emissions

Fuel cells in combination with hydrogen based on renewable energy sources are emission free

Efficiency

Fuel cells are more efficient than most other energy conversion devices

Energy portfolio

Different sources of hydrogen broaden the primary energy portfolio significantly and offer regional opportunities



Germany is a major driver for hydrogen and fuel cell technology in Europe

Frankfurter Allgemeine

ZEITUNG FÜR DEUTSCHLAND

Contribution by Dr. Klaus Bonhoff, Managing Director (Chair)
NOW for the F.A.Z. supplement »Clean Tech«, 15.09.2010
(Translated from the original German)

The journey is the destination

Functioning transport on German roads is essential to secure our mobility needs. At the same time transport must be designed in a climate-friendly way as possible.

By KLAUS BONHOFF

The transport sector consumes about a third of final energy in Germany and accounts for almost 20 per cent of carbon dioxide emissions. Here the share of road traffic totals around 70 percent. By 2050, carbon dioxide emissions are to be decreased by 80 percent. This ambitious goal can only be reached with renewable energies and efficient drives which do not cause emissions harmful to the climate. Intensive collaboration of all participants and coordination of their activities is essential for the successful launch of these products onto the market.

Because of people's individual mobility needs, no one technology will fulfil the requirements of all customers. Rather a demand-oriented portfolio of drive systems and fuels will be established - from hybrid vehicles with varying levels of electrification to battery-electric drives as well as hydrogen and fuel cell vehicles. Fuel cell vehicles are especially suited to overland journeys because of their fast refuelling times and long range. Battery-electric drives in compact cars on the other hand, best develop their potential in urban transport. Alongside increasing efficiency of drive systems, renewable energies such as liquid hydrocarbons from biomass as well as electricity and hydrogen from regenerative sources in the transport area must be introduced. Moreover hydrogen provides a solution to the necessary intermediate storage of large amounts of energy in the context of the further development of renewable energies.

The Federal Government supports a holistic approach to electromobility. Thus the goal of the »National Innovation Programme Hydrogen and Fuel Cell Tech-

nology« (NIP) is to prepare the market for these technologies in the areas of transport, household and industry applications as well as special markets. Until 2016 NIP constitutes a ten-year strategic alliance between industry, science and several federal ministries. Including industry funds already made available, approximately 1.4 billion euro will be invested. From basic research to everyday testing, the development of electromobility with batteries will be funded with 500 million euro from 2009 to 2011 in the framework of the Federal Government's second economic stimulus package. Within this the Federal Ministry of Transport, Building and Urban Development is making 115 million euro available for the »Electromobility Model Regions Funding Programme«. This focuses on eight model regions in the areas of vehicles testing and infrastructure. A continuation of the programme of the current activities is now being discussed: the goal is to establish Germany as a leading market for electromobility.

The German transport sector has traditionally been of great importance in terms of industrial policy as well as national economy policy. To sustainably strengthen the economic aspect in the long-term, market leadership must be developed with new, efficient drive systems on an international level. However only the trio of politics, industry and science can provide a successful value chain. Currently a gap still exists between research and development and market introduction. In addition to testing the technologies in everyday conditions, participants are working on overarching policy issues in order to appropriately prepare the market. These include safety aspects, uniform standards, interfaces between stationary energy supply and transport, new market models or legal frameworks. Last but not least, the necessary public support for a technologically-open market introduction also requires acceptance among the people.

See more, visit:

www.now-gmbh.de

NOW ANNUAL REPORT 2010

MAGAZINE

Welcome - Dr. Peter Ramsauer

Foreword - Dr. Klaus Bonhoff

NOW - NIP - Electromobility Model Regions

Contribution of Federal Ministry of Economics and Technology to NIP

International collaboration

»The journey is the destination« - article by Dr. Klaus Bonhoff

Public Relations 2010

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TRANSPORT AND
INFRASTRUCTURE

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NIP Programme Area

STATIONARY
ENERGY SUPPLY

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NIP Programme Area

SPECIAL MARKETS

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BMVBS Programme

ELECTROMOBILITY
MODEL REGIONS

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International Collaboration

International Partnership for Hydrogen and Fuel Cells in the Economy





- established in 2003
- international institution to accelerate the transition to a hydrogen economy.
- The IPHE Partners members include:



- Partners have committed
 - to accelerate the development of hydrogen and fuel cell technologies
 - to improve their energy security, environmental security and economic security.



International Cooperation

IPHE Activities

Current IPHE Activities

- Workshop Series
 - Infrastructure
 - Governmental Programs on E-mobility
 - Demonstration
 - Stationary Applications
 - Hydrogen as Large Scale Energy Storage
- Biennial Awards Program
- 2010 Hydrogen and Fuel Cell Global Commercialization and Development Report
- High-level government meeting targeted for late 2011
- Chair 2009-2011: Germany

IPHE Priorities

- Accelerating market penetration and early adoption of hydrogen and fuel cell technologies and their supporting infrastructure
- Policy and regulatory actions to support widespread deployment
- Raising the profile with policy-makers and public
- Monitoring technology developments

For more information, see <http://www.iphe.net>

Thank you!

