

# German Hydrogen & Fuel Cell Technology Update

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## Summary 2005

- Continuation of **R&D** and **demonstration** programmes on **Federal** and **Federal States** level
  - ⇒ Strategy broadly defined in the **5<sup>th</sup> Federal Energy Research Programme** (July 2005)
- Establishment of the **Hydrogen & Fuel Cell Strategy Council** in 2005, coordination of activities by National Coordination Office **NKJ**
- Involvement in European (**HFP**) and international activities (**IPHE, IEA**)

## “Innovation and New Energy Technologies”

One main focus is placed on  
**fuel cells and hydrogen**



## Priorities for Fuel Cells and Hydrogen

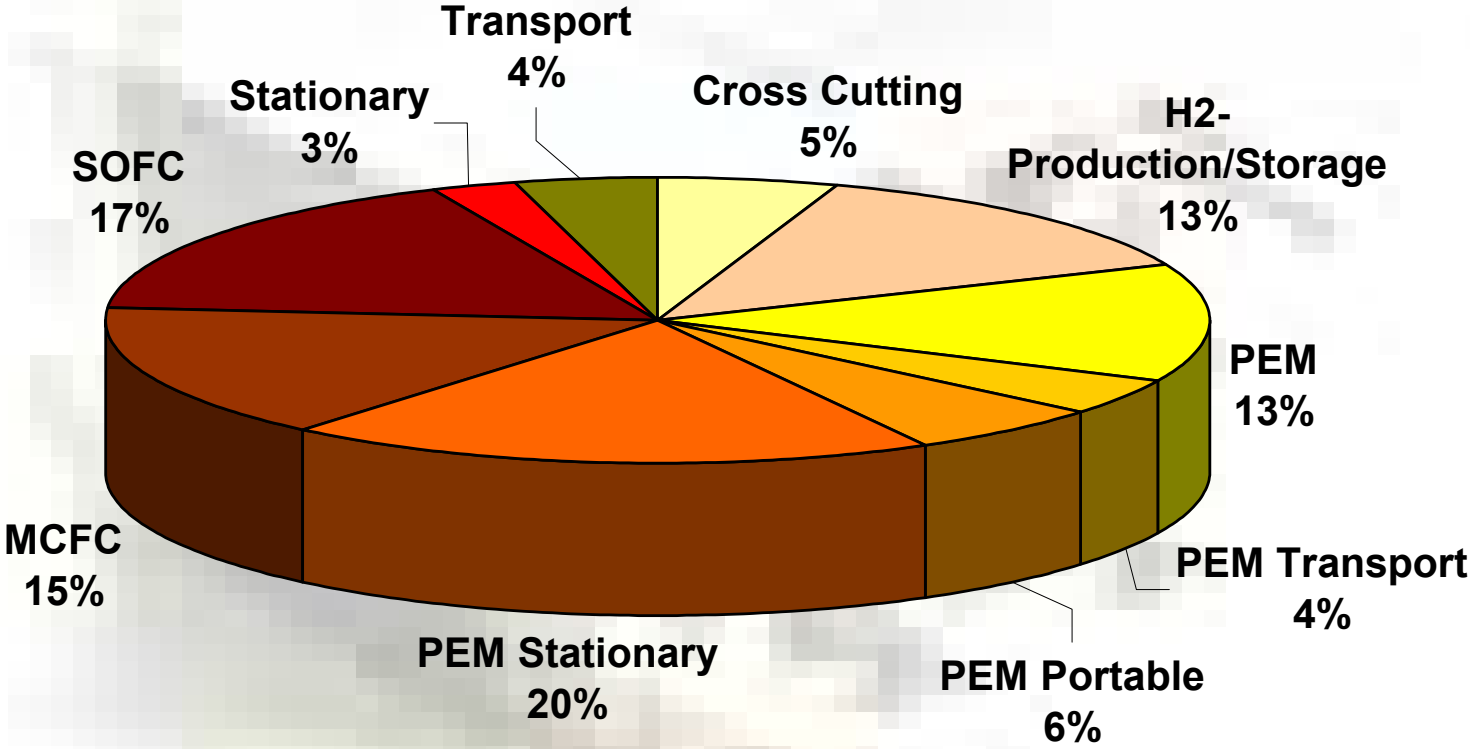
- The following FC technologies will be funded in the future with the main goals: **cost reduction, increase of lifetime and reliability**
  - PEFC and DMFC
  - MCFC
  - SOFC
- With regard to hydrogen, funding will be granted primarily for
  - **H<sub>2</sub>-production** without CO<sub>2</sub>-emissions (e.g. by CCS)
  - **H<sub>2</sub>-storage** upon new results of basic research (materials etc.)
- The approaching market introduction has to be accompanied by
  - stronger involvement of small and medium sized companies (**SME**) particularly as component suppliers
  - tailor-made **qualification** measures

## Funding in Germany

Total Public funding in Germany: approx. **65 – 75 million €/year**

- **Federal Ministries: 45 – 50 million €/year**
  - ⇒ Federal Ministry of Education and Research (BMBF):  
Basic research, Programme for micro fuel cells, National Research Institutions (co-funded by Federal States)
  - ⇒ Federal Ministry of Economics and Technology (BMWt):  
Applied R&D, Demonstration & deployment (stationary application)
  - ⇒ Federal Ministry of Transport, Building and Urban Affairs (BMVBS):  
Demonstration & deployment (transportation)
- **Federal States: 18 – 22 million €/year**
- **Other public funding organisations: 2 – 3 million €/year**

## Breakdown of Funding of Federal Ministries

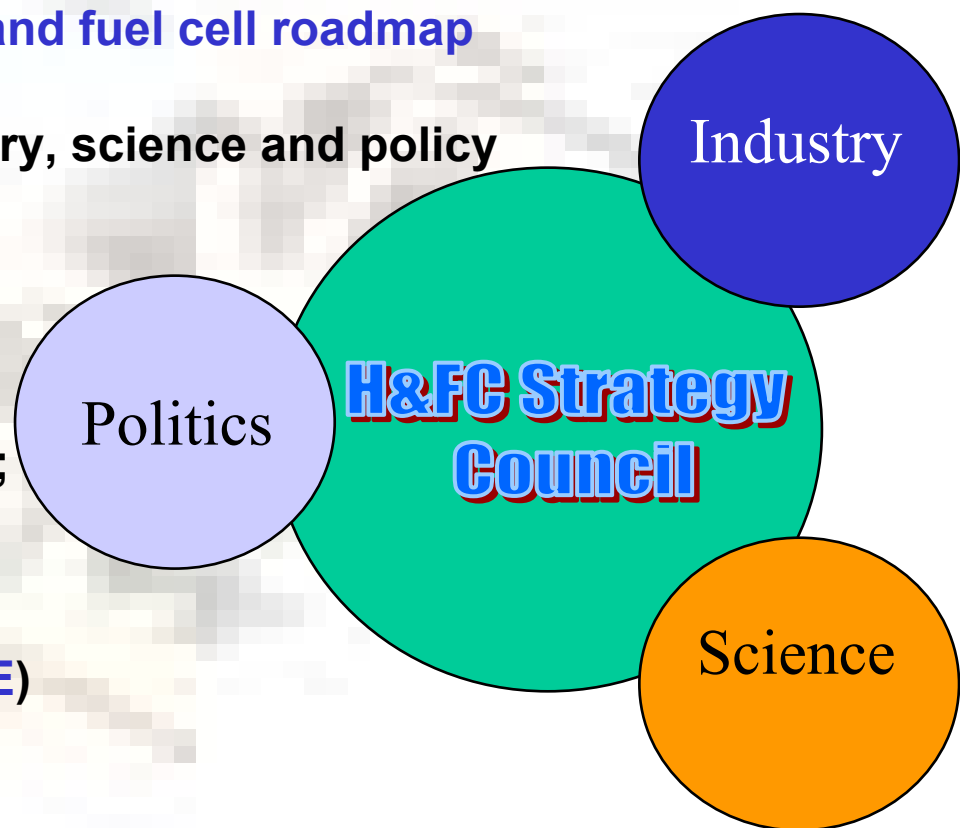


## Funding in Germany

- Recently announced: **National Hydrogen & Fuel Cells Programme**
  - Additional funding from the Federal Government: **500 million €** for the **next 10 years**, matched by private funds (in total > 1 billion €)  
⇒ Nearly a **doubling** of public funding
- **Programme details will be defined in 2006**, advisory role by Hydrogen & Fuel Cell Strategy Council
  - **thematic distribution** to hydrogen production, storage, infrastructure and fuel cell applications (transport, stationary and portable) resp. to research, development and demonstration

## Establishment of the Hydrogen & Fuel Cell Strategy Council with Key Players in 2005 with following Mission

- Development of a **national hydrogen and fuel cell roadmap**
- **Information exchange** between industry, science and policy
- Temporary **working groups** for special tasks (e.g. education)
- Communication of results in **national and international** institutions; public relation
- Interaction with European and international activities (**HFP, IEA, IPHE**)





## Investing - into - the - Future Program (ZIP, since 2001)

Market stimulation with about **55 M€** support from BMWi for fuel cells projects by P...

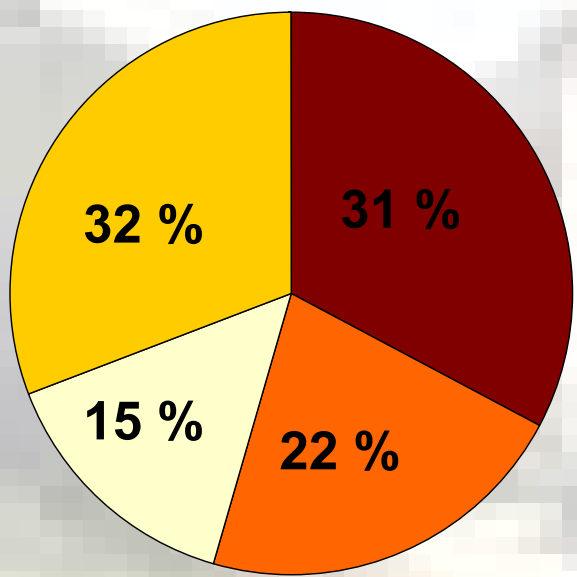
Decentr. Cogeneration (250 kW):  
10 projects : ~ 18 M€



Small CHP units for houses:  
8 projects : ~ 17 M€



Education, regulation etc.:  
13 projects : ~ 8 M€



Mobile applications:  
10 projects : ~ 12 M€



# MCFC in the Investing - into - the - Future Program

## Gaining practical experience with MCFC plants (250 kW) of MTU CFC

- Different Applications: hospitals, telecommunication, industry and utilities
- Fuel: natural gas, biogas
- Efficiency: 47 % (el.), 90 % (overall)
- Max. operating time: > 25,000 h (goal: 40,000 h)
- Operating time accumulated: > 100,000 h
- Costs: 8,000 €/kW (goal: 1,000 - 2,000 €/kW)
- Supported by BMWi
- Additional MTU CFC demonstration plants funded by Federal States



## Clean Energy Partnership (CEP)

[www.cep-berlin.de](http://www.cep-berlin.de)

### Hydrogen demonstration project in Berlin to demonstrate the reliability of hydrogen in everyday motor vehicle operation

- Since November 2004, duration: 5 years
- Opening of 2<sup>nd</sup> public H<sub>2</sub>-filling station in March 2006
- Hydrogen: gaseous and liquid
- 20 vehicles (cars and busses) from **BMW, DC, Ford, Opel and MAN** with **ICE and FC**
- Total cost: 33 million €
- Supported with 5 million € by Federal Ministries of Transport, Economy and Environment



## NRW involved in EU-Project “HYCHAIN-MINITRANS”



- HYCHAIN-MINITRANS: 25 partners a network in 4 major regions
- HYCHAIN-MINITRANS project will deploy approx. 160 innovative fuel cell vehicles operating on H2
- Strategic objectives
  - Deploy of first series to validate technical and economic viability
  - Cost reduction by move from prototype to industrialised manufacturing
- Start: January 2006

# Examples of demonstration activities (V)



## Lighthouse-Idea Hamburg

### Project Partners:

Airbus Deutschland GmbH, Behörde für Stadtentwicklung und Umwelt, European Fuel Cell GmbH, HDW-Fuel Cell Systems GmbH, Hamburger Hochbahn AG, Hermes Logistik Gruppe, HEW, Still GmbH



Cars, Buses



Ferries



H2-Fuelling



Forklifts



Aviation



Stationary FCs (Heating)

