



8. May 2006

National Hydrogen and Fuel Cell Technology Innovation Programme

HYLIGHT-workshop, 16 May 2007, Berlin

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Federal Ministry of Transport, Building and Urban Affairs

Challenge:

- **Difficult – perhaps even crucial – transitional phase**
- **Threshold between R&D and demonstration and translation into hydrogen and fuel cell applications suitable for everyday use**

Tasks:

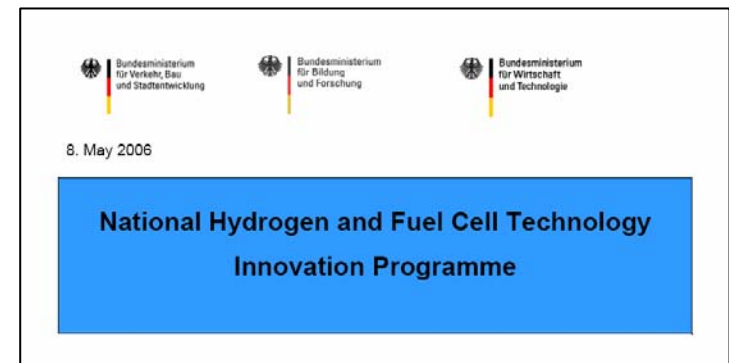
- Pool H2&FC skills
- Organize market breakthrough – from hydrogen production that generates as little CO₂ as possible, through distribution and storage, to the user-friendly application of fuel cell technology.

Objective:

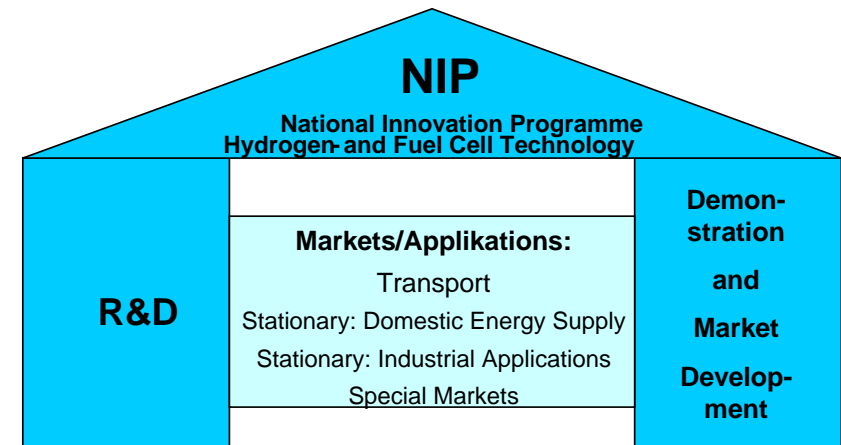
- Prepare hydrogen and fuel cell applications for commercialization in the next 10 years.

The new Hydrogen and Fuel Cell Technology Innovation Programme: 3 Partners – 1 Aim

- ➔ **Additional funding:** 625 M. USD (500 million €) over the next 10 years, i.e. nearly a **doubling** of the actual public funding
 - **Implementation:** through public-private-partnerships with average public funding of 50 %, i.e. 1,25 B. USD (1 billion €) over next 10 years
 - **Goals:** maintenance and expansion of **Germany's good starting position**
 - **Focus:** **market preparation** with demonstration and **lighthouse** projects, accompanied by targeted **R&D** projects (basic and applied research)



- ➔ build on **two pillars: existing R&D and – new – Public-Private-Industry-Programme** to foster market development/ strengthening excellencies
- ➔ **Objective now:** bridging the gap between R&D and market development
- ➔ The **aim of the new Programme pillar** is targeted support and promotion of the emerging Hydrogen and Fuel Cell sectors to accelerate the market development, e.g.:
 - Demonstration of efficient conversion technology in Lighthouse Projects
 - Optimising prototype engineering
 - To optimise H&FC system integration into existing infrastructure





National Development Plan
Version 2.1

for the

“Hydrogen and Fuel Cell Technology In-
novation Programme”

submitted by

Strategierat  Wasserstoff
Brennstoffzellen

30.04.2007

The present work programme is divided into four development plans which are designated according to the different areas of operation:

- transport including hydrogen infrastructure (production, distribution, storage and refuelling)
- Domestic energy application
- Industrial applications
- Special markets for fuel cells

National Development Plan - Transport

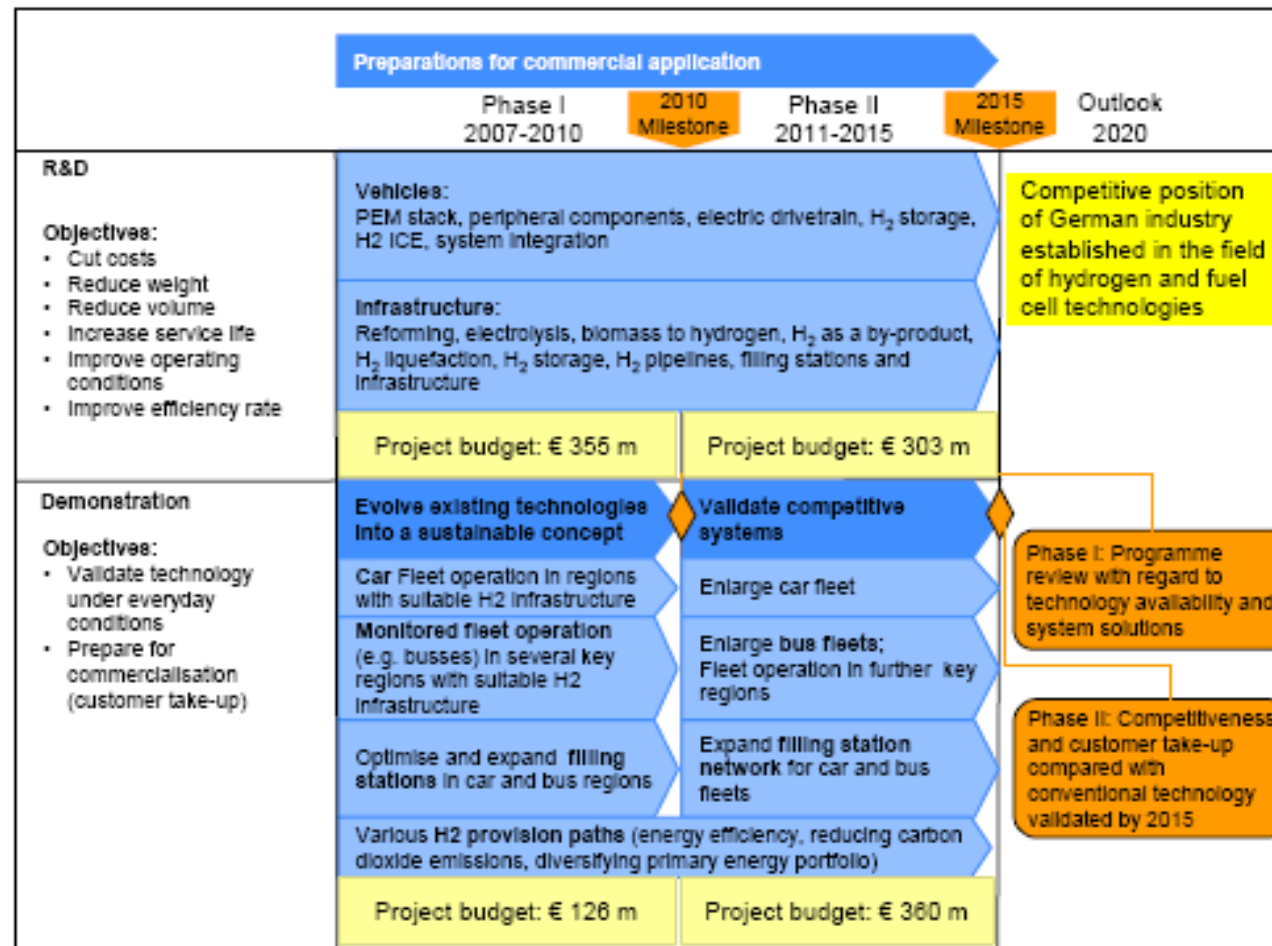


Figure 3-1: Development plan: "Transport"

The National Innovation Programme for Hydrogen and Fuel Cells Structure for the transport sector

R&D

- Research and development activities that are likely to produce commercially relevant findings in the medium to long term.
- Focus on
 - key components
 - system integration

Demo

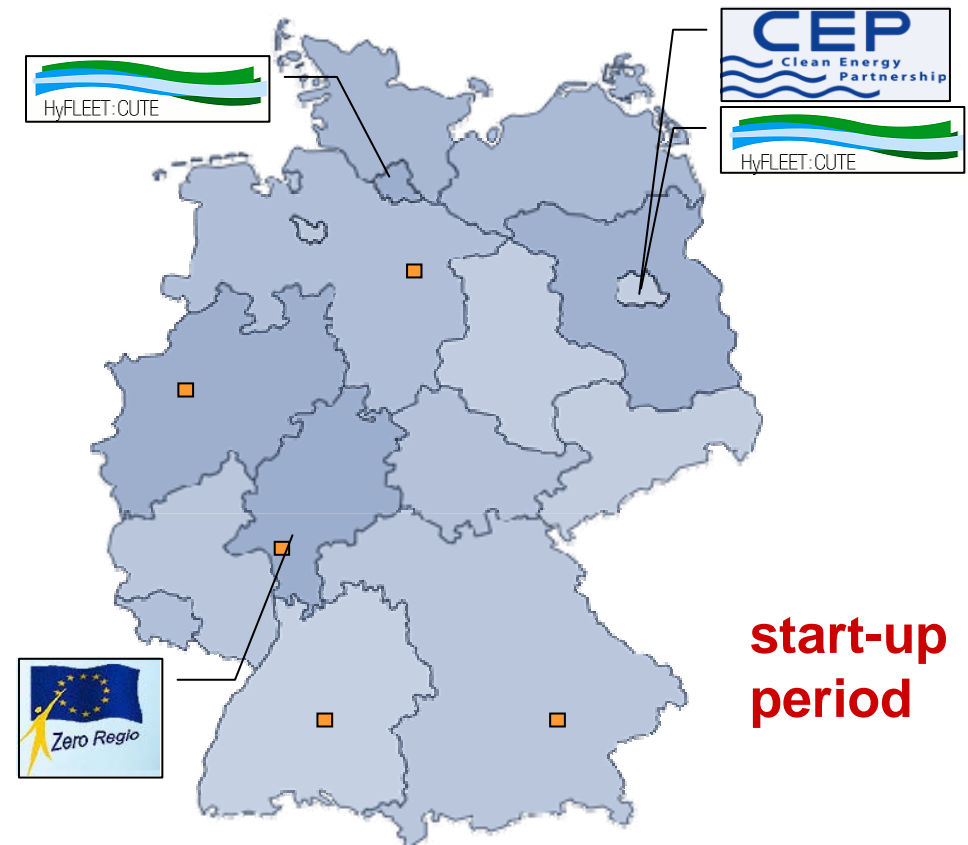
- Prepare, establish and operate
 - vehicles
 - infrastructure
 - H₂ production
- Focus on a few sites

Cross-cutting issues

- H₂ portfolio:
Hydrogen provision paths for Germany
- Regulations, codes & standards (RCS):
Support existing structures (specifically for different sectors of industry)
- Training (e.g. technical service)

Demonstration - Transport

- Focus on a few sites, at which larger fleets (critical mass) can be used for the optimum synchronization of vehicle operations and infrastructure
 - cars: e.g. Berlin
 - buses: e.g. Hamburg und Berlin
- Establish local H₂ refuelling networks and initial links via corridors
- Further applications (ships, rail, aviation) and sites in Germany possible for individual vehicle operations (depending on involvement of the region and industry)
- Expand vehicle fleets and networks in second phase of programme



Criteria for Lighthouse Projects

- Lighthouse projects should bridge the gap between today's **prototypes** and full-scale **commercialization**
- Use of extensive **experiences**, (financial) **commitments** and existing **infrastructure** in individual **regions**
- Advancement of **existing** (R&D and) demonstration **projects**
- Concentration on a few sites (**clusters**) in the beginning, later on, **broadening of activities** and then linking up with those in other **European region**
- Cooperation of a wide range of **companies** including **SMEs**

H₂ Portfolio in Germany

Objectives for future H₂ provision:

- Diversify sources of primary energy
- Reduce dependence on imported energy
- Expand renewable sources of energy
- Significantly reduce CO₂ emissions
- Enhance efficiency
(total energy chain)
- Enhance profitability / cut costs

National coordination required:

- regional initiatives
- demonstration projects
- Rules
(e.g. feeding into the grid)

Wind-Wasserstoff-Bündnis

Elektrolyse-Wasserstoff
(aus Windkraft)

CO₂-freie
Wasserstoffherzeugung
Industriewasserstoff

Wasserstoff aus
Schwachsauerstoff
(z.B. Grubengas)

Wasserstoff aus
Biomasse

Elektrolyse-Wasserstoff
(aus Photovoltaik und
Windkraft)

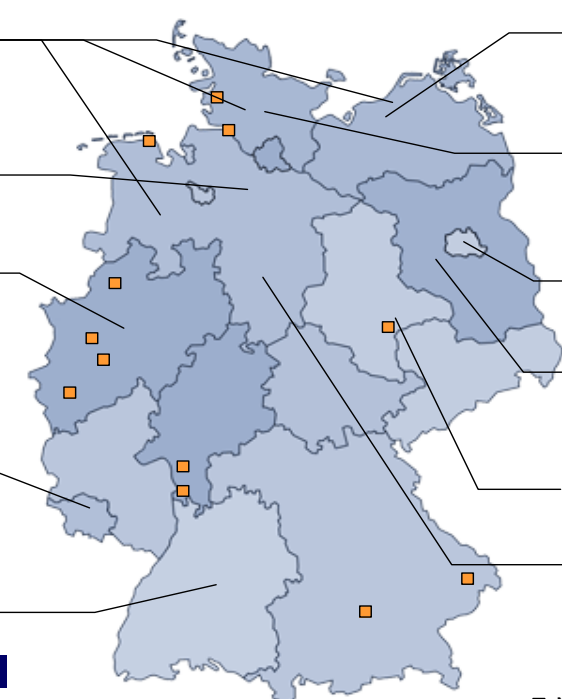
Elektrolyse-Wasserstoff
(aus Windkraft)
Wasserstoff aus Biogas

Elektrolyse-Wasserstoff
Dampf-Reformierung

CO₂-freie
Wasserstoffherzeugung
(z.B. Biomasse)

Wasserstoff aus Biomasse

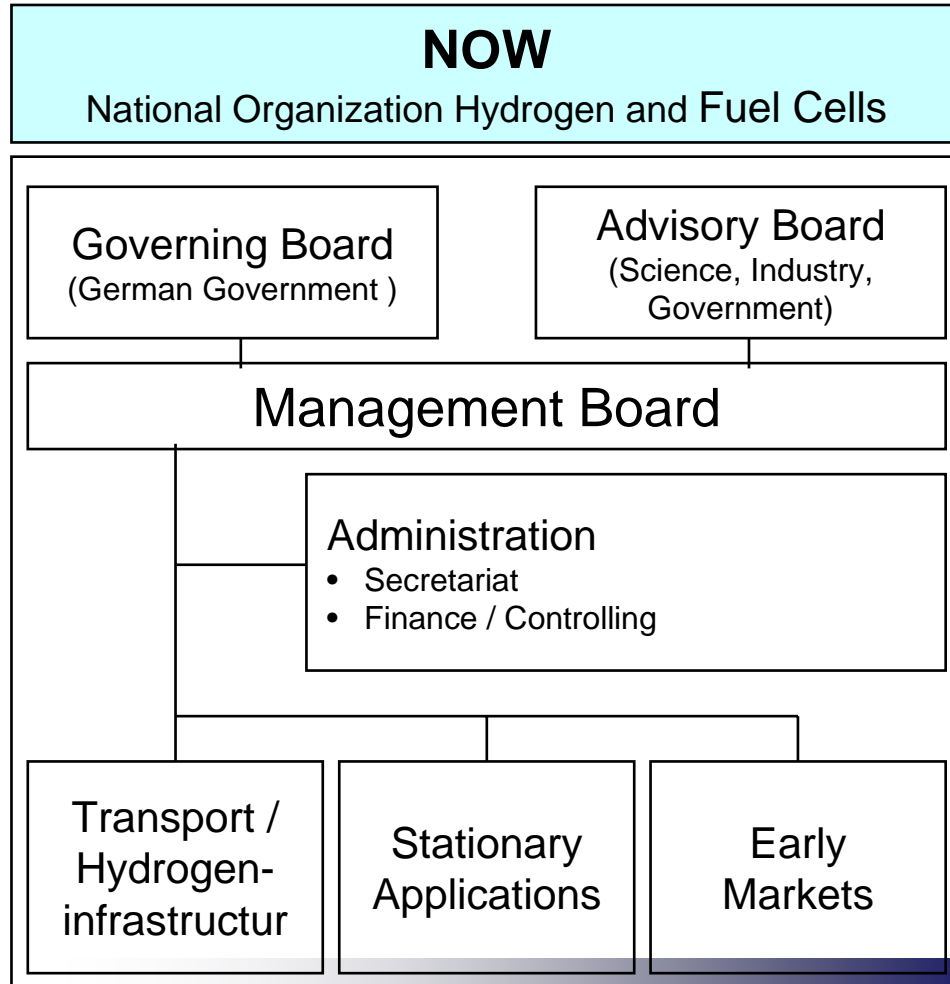
Elektrolyse-Wasserstoff
(aus Photovoltaik)



■ Nebenprodukt H₂ aus chem. Industrie

Cross-cutting issues

- Regulations, codes & standards (RCS)
 - No duplication of the work of existing bodies
 - International incorporation (e.g. EU RCS platform).
 - The individual fields are:
 - Hydrogen vehicles
 - Hydrogen refuelling
 - Hydrogen filling stations
 - Hydrogen provision (production and carriage)
- Training
 - Publicity campaigns for commercialization
 - Technological maturity (→ demonstration)
 - Safety of hydrogen technology (→ R&D)
 - Training of skilled workers



Programme coordination

- Coordinate and control implementation of the overall programme on the basis of the development plan
- Coordinate the process of fine-tuning between demonstration programmes and R&D activities and cross-cutting tasks
- Unlock and evaluate synergies between the applications and with related fields of technology (e.g. materials sciences, production technologies and basic research)
- Regularly review and update the development plan
- Continuously consult with all stakeholders (ministries and their project sponsors, industry, research institutes, federal states, local initiatives)
- Act as an interface with European and international initiatives
- Perform knowledge management to assess progress and findings
- Communicate with stakeholders and the public

Implementation of demonstration projects / lighthouse projects

- Act as a focal point for the funding of demonstration projects (two-stage application procedure – (1) outline research proposal and (2) application)
- Assess outline research proposals
- Approve applications
- Monitor lighthouse projects (e.g. by participating in control body)

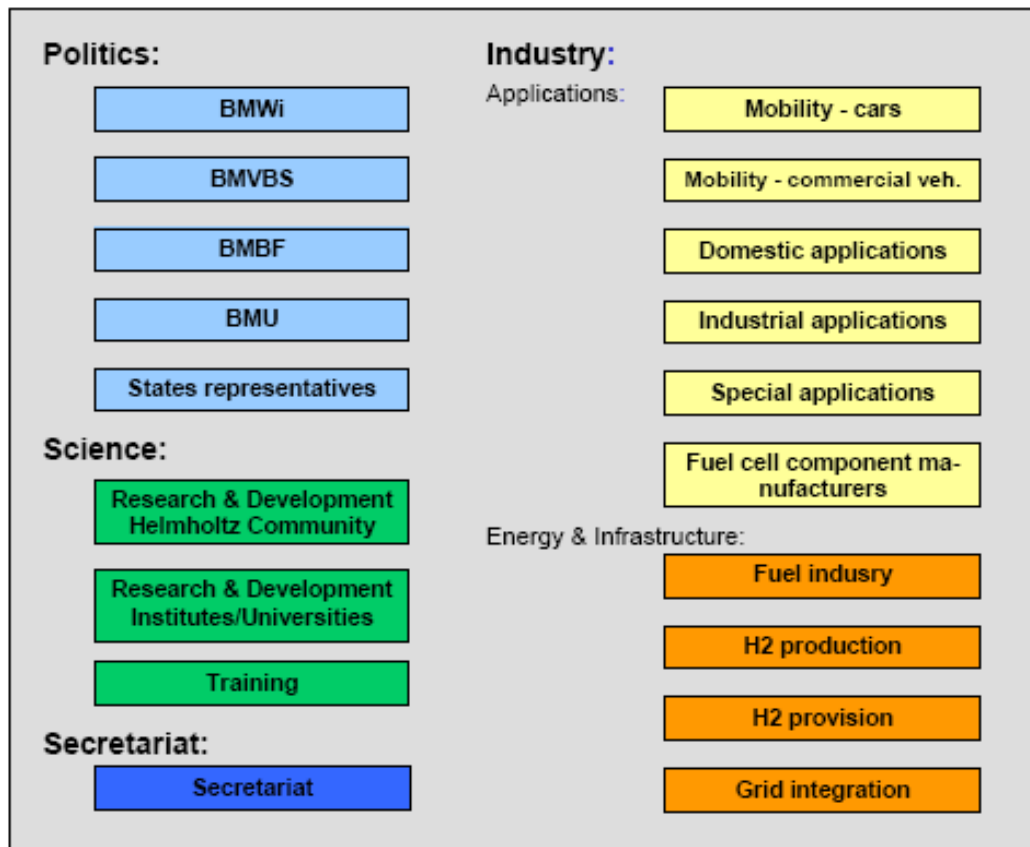


Figure 8-1: Structure of the Advisory Board (one representative per subject field)

- Combines the individual strategies (mobile, stationary, portable) to a national strategy,
- Continuously monitors the strategy and develops it further,
- Guarantees an exchange of information,
- Creates consensus and reconciliation of the interests involved,
- Communicates findings to regional, European and international bodies and to the public.

Where are we today?

- On behalf of the German and European H₂&fuel cell industry 24 companies have promised active and financial participation.
- National Development Plan as basis of decision-making on project funding exists.
- The federal states have agreed to participate.
- Stakeholders have concretely stated the R&D requirements.
- Consortia are forming for demonstration projects in the „starter“ or Lighthouse” regions.
- ➡ **ready for implementation!**

Our vision

Vision

Strategierat Wasserstoff Brennstoffzellen



Ressourcenschonende, emissionsfreie
Mobilität
mit Wasserstoff aus Erneuerbaren Energien

Vision

Strategierat Wasserstoff Brennstoffzellen



Emissionsfreier
Nahverkehr
Nukleus für eine breite
Markteinführung

Vision

Strategierat Wasserstoff Brennstoffzellen



Gleichzeitig Strom und Wärme aus
Stationären Brennstoffzellen
ressourcenschonend und emissionsarm

Vision

Strategierat Wasserstoff Brennstoffzellen



Aufbau einer Brennstoffzellen-Industrie über
Frühe Marktchancen
Freizeit – Elektronik – Notstrom – Flurförderfahrzeuge

Thank you for your attention!

www.nkj-ptj.de