



# Fuel Cell and Hydrogen Network Nordrhein-Westfalen

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Shanghai, November 2004



Ministry of  
**Transport, Energy  
and Spatial Planning**  
Nordrhein-Westfalen



Ministry of  
**Science and  
Research**  
Nordrhein-Westfalen

# Contents



- **NRW - The Energy State**
- **NRW State Initiative on Future Energies**
- **Promotion Programmes**
- **The Fuel Cell and Hydrogen Network**



**Fuel Cell and Hydrogen Network NRW.**

# Nordrhein-Westfalen – The Energy State



## Nordrhein-Westfalen –

**The most important power generation region in Europe and Germany's leading energy technology location**

**33% of the German electricity is produced in Nordrhein-Westfalen**

**40% of the German industrial energy consumption**

**Large power supply companies and important industrial energy users, manufactures of plants and equipment and scientific institutes are based in NRW**

**1.1 million employees work in the energy sector**

**A lot of energy know-how is concentrated in Nordrhein-Westfalen**



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# The Need to Take Action

## Nordrhein-Westfalen –

### Special responsibility for development and market introduction of technologies involved

- in energy saving
- in efficient energy conversion and use
- in use of renewable energy sources



- to guarantee sustainable energy supply
- to save energy resources
- to combat climate change and protect the environment



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# NRW State Initiative on Future Energies



Initiative for the energy industry and science founded in 1996 by the NRW State Government

## The Objectives

- to intensify the efficient use and generation of energy
- to further develop technologies for the utilisation of renewable energies and to speed up their market launch
- to boost the climate-friendly and environmentally sound use of domestically mined coal
- to accelerate national and international co-operation partnerships



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# Workshops and Networks

18 workshops and networks, 3,000 members from the energy industry

- Solar heating
- Photovoltaics
- Biomass
- Wind energy
- Geothermal energy
- Mine gas
- Hydro-electric power
  
- Housing & construction
- Heat pumps
- Light-emitting diodes
  
- Energy services
- Energy concepts for specific industries
- Decentralised power systems
- Co-generation of power and heat
- Power plant technologies
- Fuel cells  
(*NRW Fuel Cell and Hydrogen Network*)
  
- Foreign economic affairs



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# Promotion of Renewable Energy



## Support on National Level

### **Renewable Energy Sources Act (EEG)**

from 2000 to 2020

Compensation for electrical power by renewable energies

### **Market Incentive Program**

from 1999 (amounting to about 100 million Euro)

### **„100,000 Roofs Solar Power“ Program**

from 1999 to 2003 (for 1000 MW<sub>p</sub> from solar cells)

### **KfW environmental promotion programs**

## NRW Promotion Programs

### **REN-Promotion, Hafö (wood sales promotion)**



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## REN Program

### „Rational Energy Consumption and Use of Inexhaustable Sources of Energy“

- Energy consultancy
- Energy concepts
- Expansion of district heating
- Technical development
- Demonstrations
- Broad-based promotion (market introduction)



# Results of the REN Promotion Program

March 1988 – January 2004: Grants to around 50,000 projects

- Funding of more than 600 million Euro
- Further private investments of around 3 billion Euro



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# Further Information



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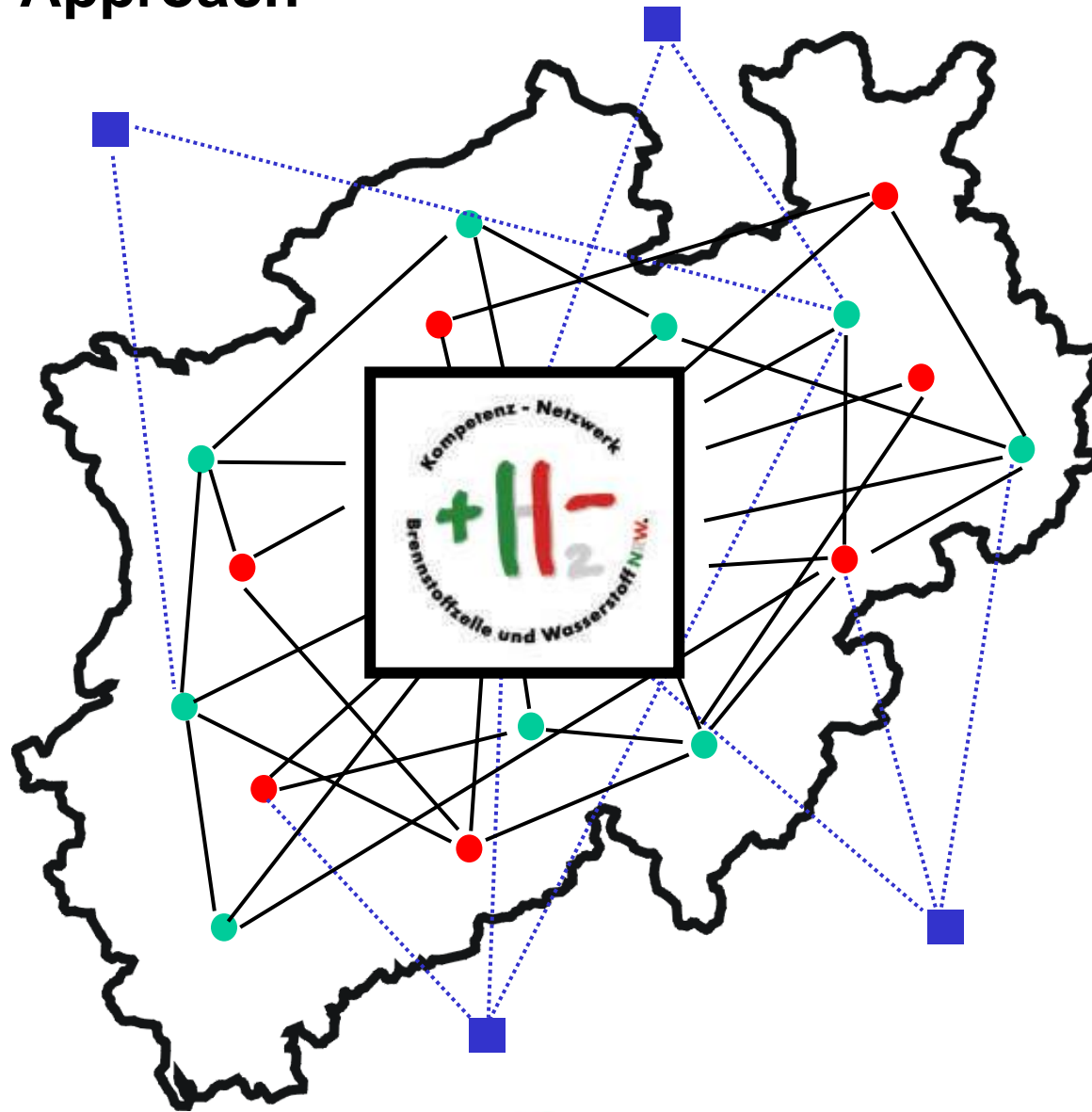
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# Objectives of the Network

- **Support the development of the fuel cell and of adapted system components accompanied by a targeted basic research**
- **Introduction of the fuel cell into early markets as bridges for the mass market**
- **Support the establishment of a ready-to-market and sustainable hydrogen energy economy**
- **Position Nordrhein-Westfalen as an internationally recognized location for the fuel cell and hydrogen technology**



# Approach



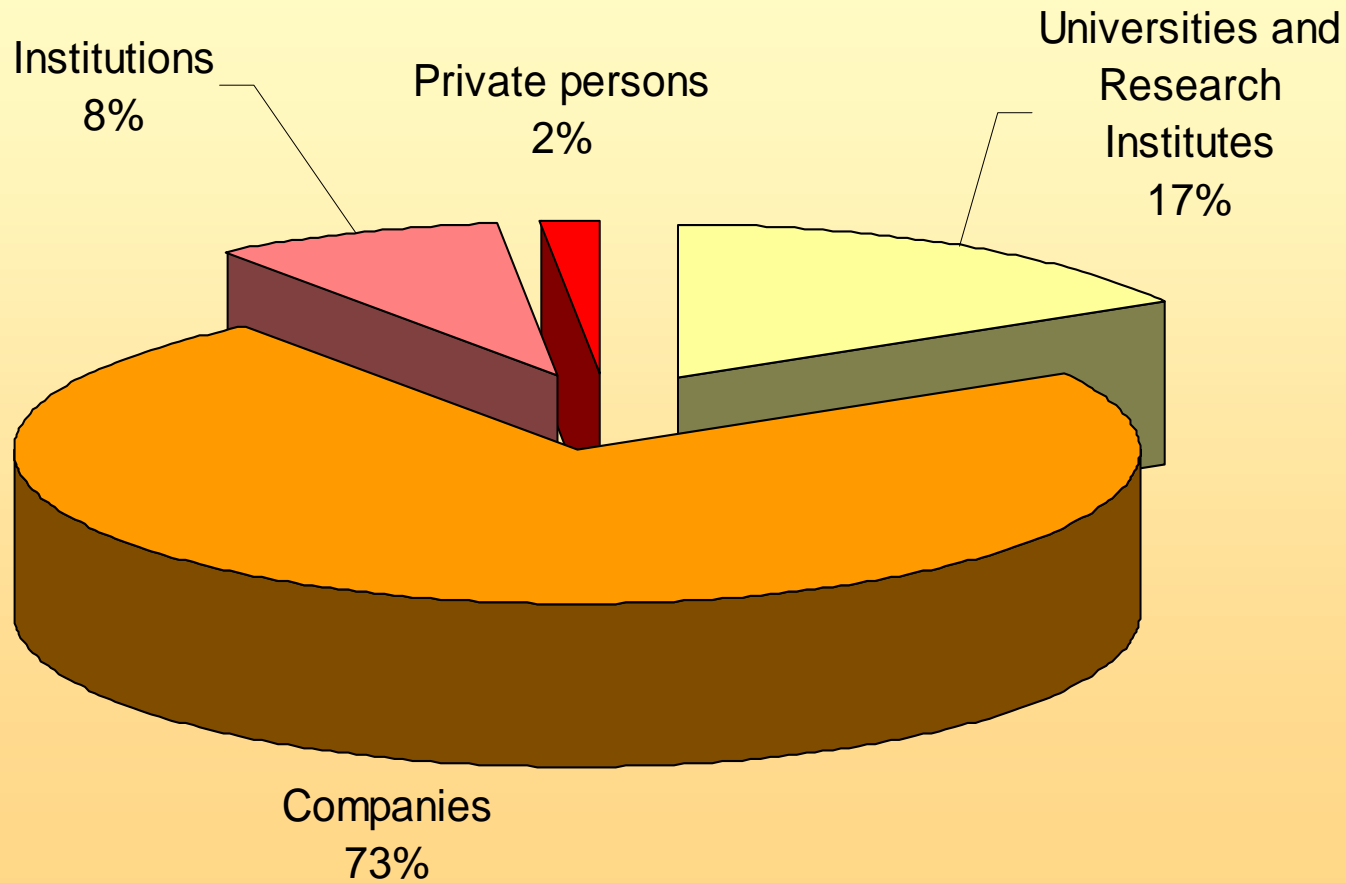
- Focussing and organizing existing skills
- Identifying and integrating new proficiency (members)
- Establishing an effective and active network
- Integrating partners from outside of Nordrhein-Westfalen



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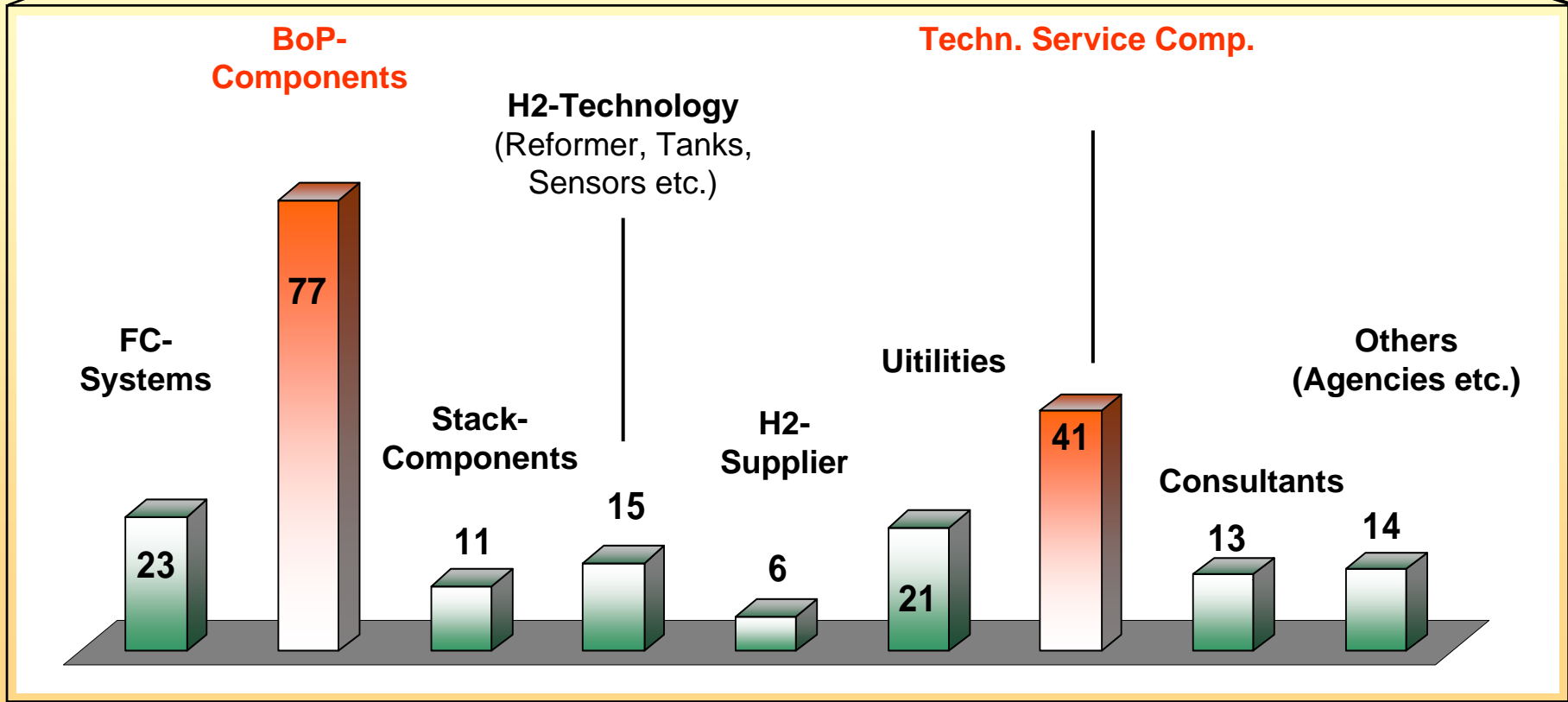
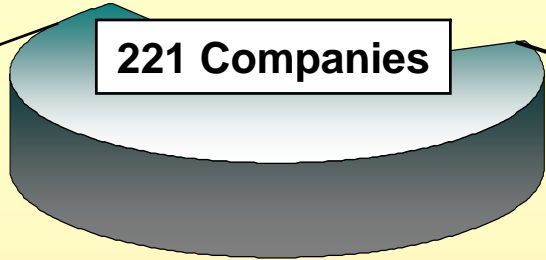
# Network Status

## 300 Members: Companies, Research Institutes and Institutions

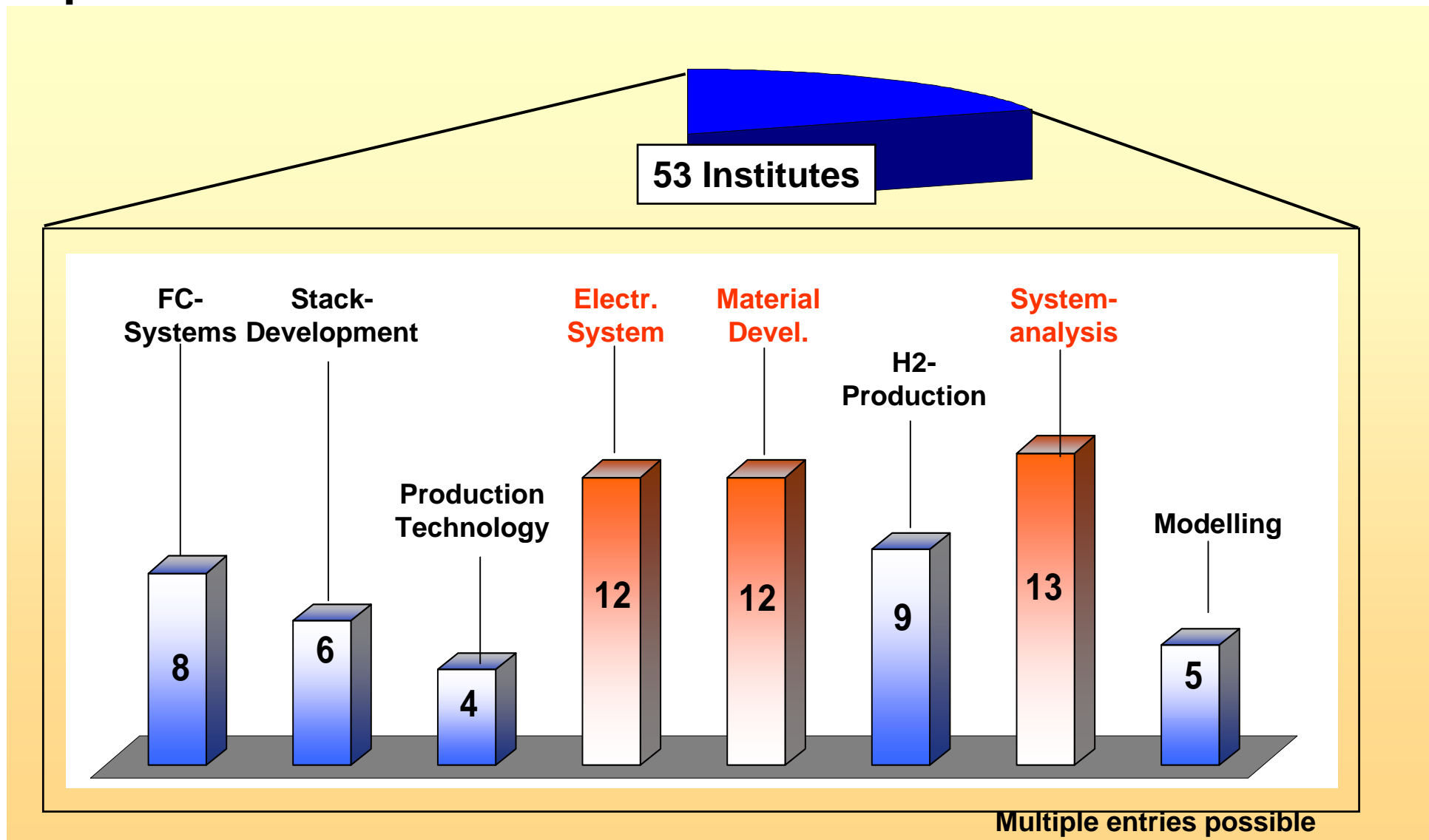




# Pattern of Competence of Companies



# Expertise in Science



# Network Services

- **Information and Communication**
  - Support the knowledge transfer from science to industry
- **Initiation of Co-Operation Projects and Single Projects**
  - Encourage the development of fuel cell and hydrogen technology
- **Settlement of Relevant Expertise**
  - Close the value added chain from hydrogen to fuel cells
  - Create new working places
- **Public Relations**
  - Inform about the network and its members
- **Qualification**
  - Prepare for the future by teaching craftsmen and service companies



# Initiation of Projects

## The 3 Project Columns

Development,  
Production and Market Introduction  
of Fuel Cell and Hydrogen Technology

### „Systems“

#### Tasks of FCHN

Identification of  
markets,  
acquisition of  
system  
manufacturers

### „Components“

#### Tasks of FCHN

Initiation of projects  
for the development  
of components for  
fuel cell and  
hydrogen systems  
and their worldwide  
marketing

### „H2- Infrastructure“

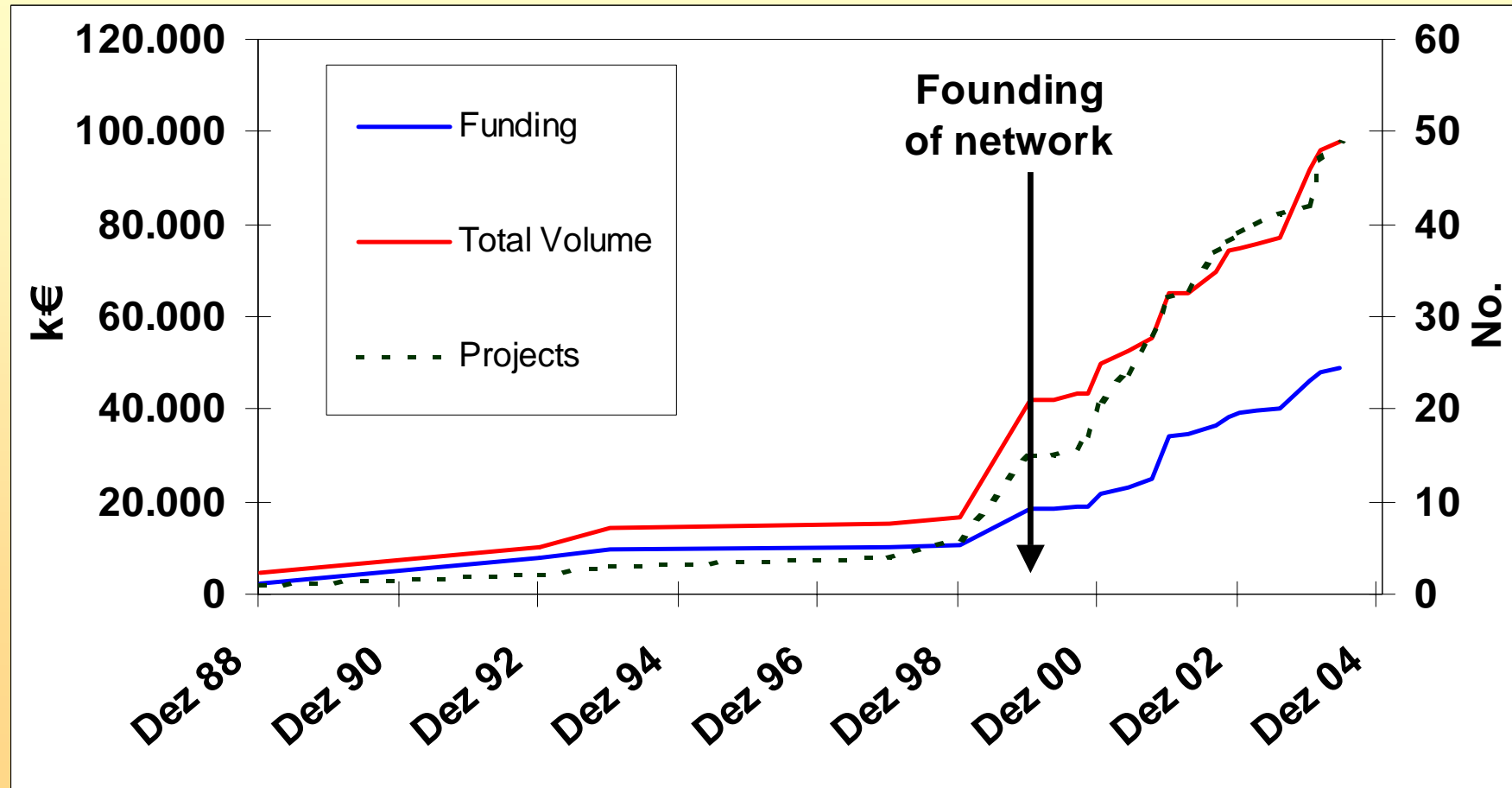
#### Tasks of FCHN

Acquisition of  
partners for the  
development and  
establishment of a  
H2-infrastructure



# Projects

Status November, 2004: 50 Projects; 100 M€ Total Volume, 50 M€ Funding



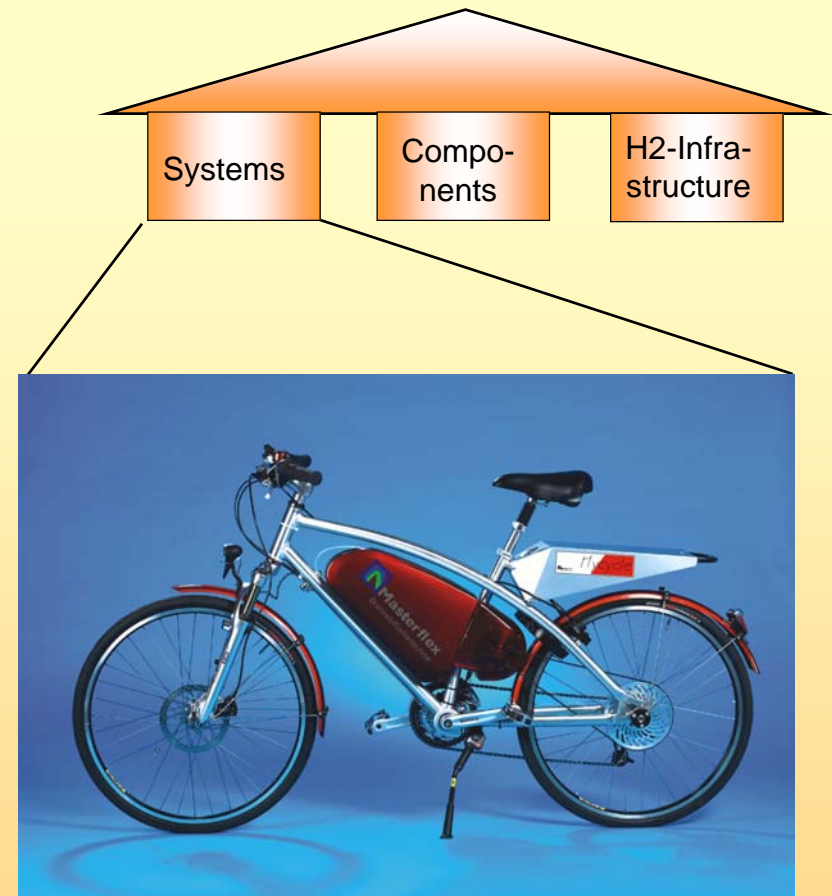
# Project Highlight - Systems

## Bicycle with Fuel Cell Drive

Project Leader: Masterflex AG  
Projekt Brennstoffzellen,  
Herten

Objective: Increase of range, for  
commercial purposes

Technical facts: 250 W PEMFC  
  
Metal hydride storage tanks or  
pressurized tanks  
  
conventional electrical engine



# Project Highlight - *Components*

## Air supply for fuel cell systems

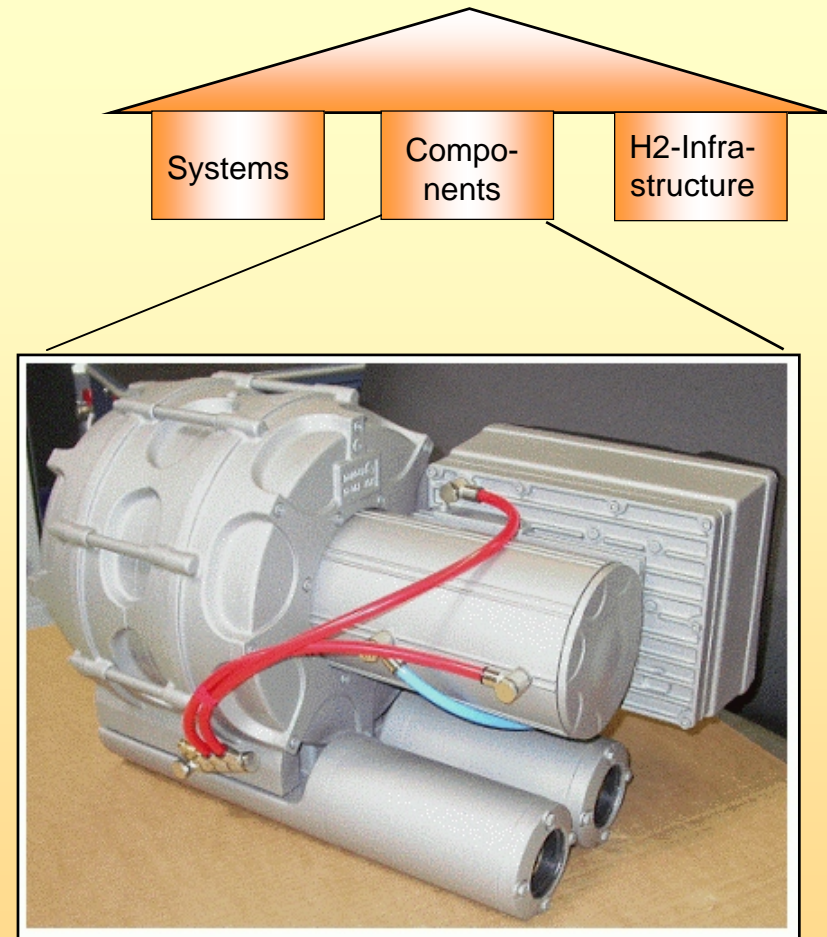
Project leader: Gebr. Becker GmbH & Co.KG, Wuppertal

Objective: Air supply for stationary fuel cell systems from 1 to 200 kW

Technical facts: fast rotating compact turbo engine with integrated air conditioning

Pressure: up to 500mbar

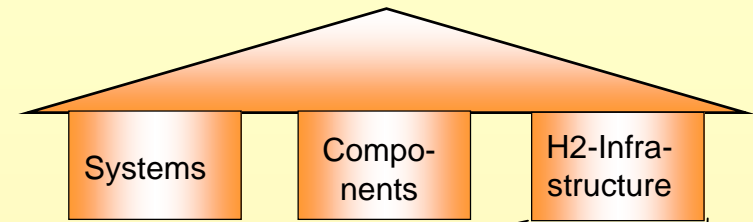
Flow rate: up to 500m<sup>3</sup>/h



# Project Highlight: *Infrastructure*

## Filling Station for Small-sized Hydrogen Tanks

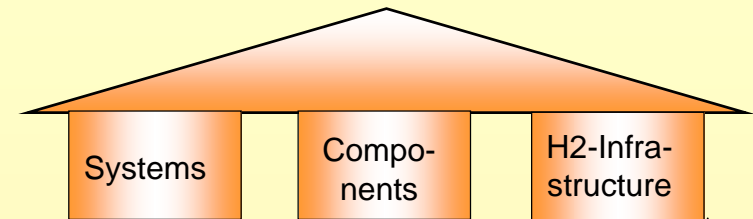
- Project leader: Air Liquide GmbH,  
Düsseldorf
- Objective: Installation of an infrastructure for portable systems
- Technical facts: Capacity: 100 bottles per day  
Filling pressure: 700 bar





# Project Highlight: *Infrastructure*

## Portable Hydrogen Bottle



Project leader: OperaThing GmbH,  
Hürth

Objective: Supply of portable and  
mobile fuel cell systems

Technical facts: Stainless steel liner  
Carbon fibre coating  
Integrated valve  
Volume: 2 Litres  
Weight: max. 2.5 kg  
Capacity: 3 kWh



# FCHN on SIF 2004

The Fuel Cell and Hydrogen Network NRW is looking for co-operation partners in the fields of

- joint development of fuel cells and components
- supply of fuel cell stacks
- Fuel cell applications
- Other renewable energy technologies
- ...



# Contact Data and Postal Address



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[www.brennstoffzelle-nrw.de](http://www.brennstoffzelle-nrw.de)



**Fuel Cell and Hydrogen Network NRW.**

**Thank you for your kind attention!**

