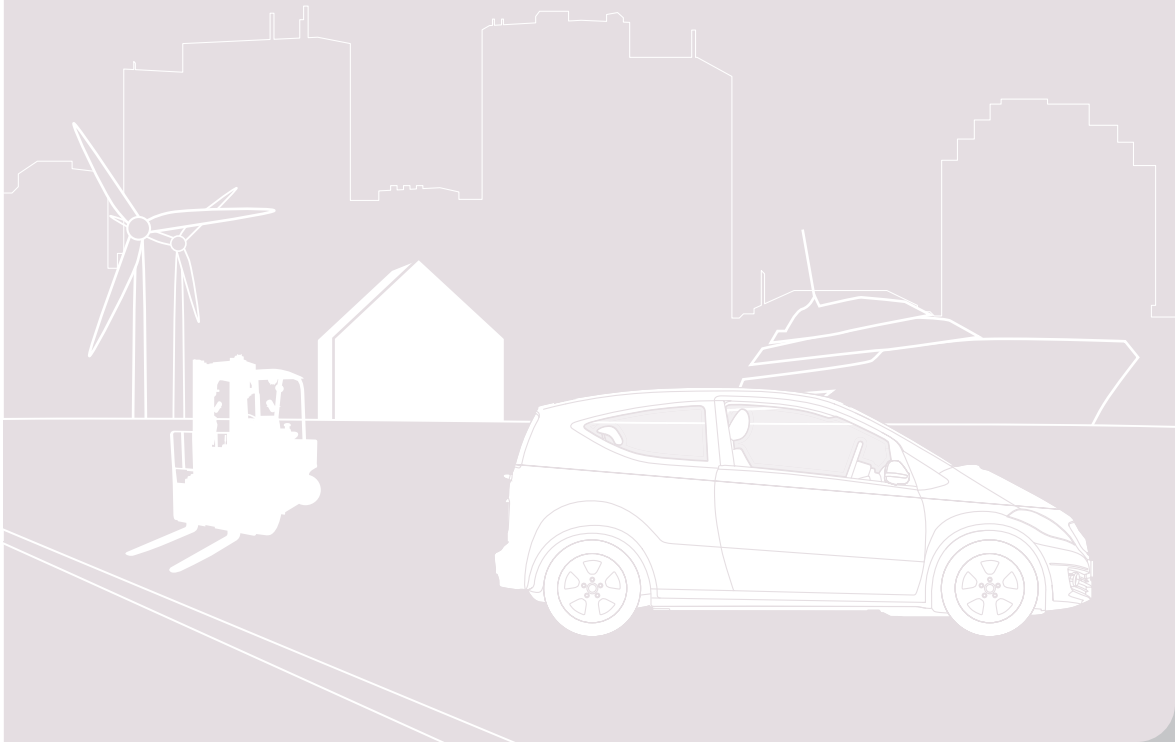
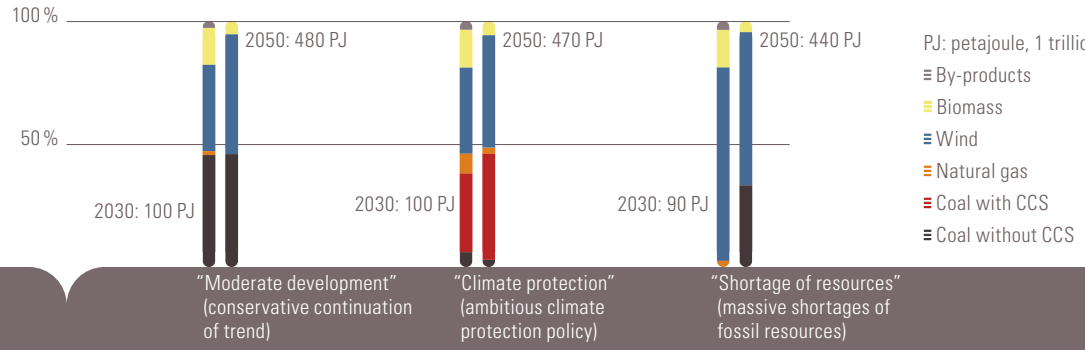
NOW
Nationale Organisation Wasserstoff- und Brennstoffzellentechnologie

MOBILITY AND ENERGY SUPPLIES FOR TOMORROW

MARKET PREPARATION FROM A SINGLE SOURCE



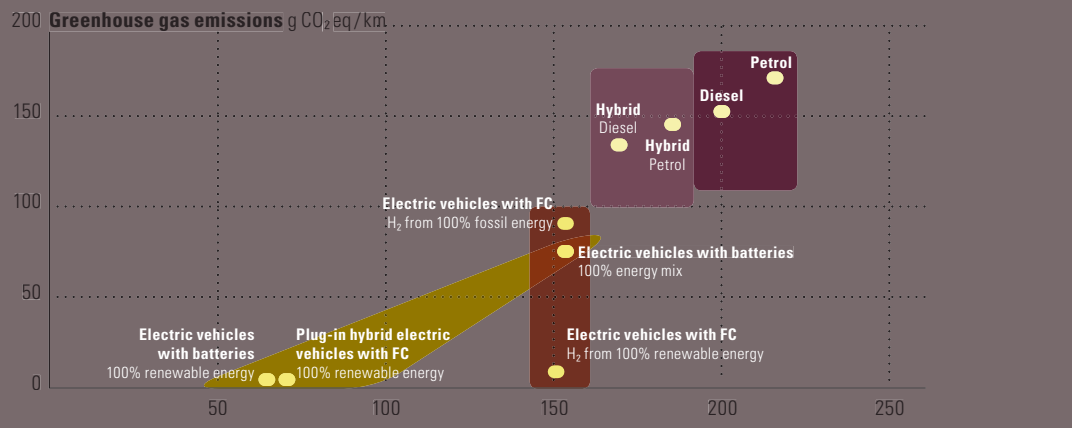


Three GermanHy-scenarios: hydrogen volumes and the hydrogen production mix – 2030 compared with 2050
Source: http://www.germanhy.de

HYDROGEN
… is used as a fuel for transport and as an energy carrier for fuel cell applications. Hydrogen can store large quantities of energy, which becomes especially important in the context of storing excess energy from renewable sources. Using hydrogen produces few or no emissions.

A FUEL CELLS
… are electrochemical devices which directly convert the chemical energy of fuels (for example hydrogen) into electricity. Fuel cells are the most efficient and clean energy converter: In the field of decentralised combined-heat-and power their efficiency rates lie at more than 80 percent; in vehicles their efficiency rates are twice as high compared to regular internal combustion engines.

ELECTRIC MOBILITY
… comprises two key technologies: Drive trains with fuel cells and purely battery-powered drive trains. The two complement each other. While battery-powered drive trains offer great potential primarily for city travel, fuel cell vehicles can also be used for longer distances. Hybrid concepts offer the possibility of efficiently linking the two, meeting specific demands of the users.



Emission-free mobility with fuel cells
Source: EUCAR / CONCAWE, 2004

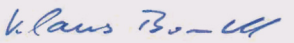
WELCOME

Global economic and environmental challenges call for new solutions for mobility and the energy supply of the future. Low emissions and high efficiency – these are the greater criteria while developing alternatives for fossil fuels. Products and applications based on hydrogen and fuel cell technology as well as on battery-powered drive trains have huge potential in terms of the sustainability of tomorrow's mobility and energy supply.

In Germany, industry, politics and academia agreed on a concerted effort to accelerate the market-preparation for these technologies. The National Innovation Programme Hydrogen and Fuel Cell Technology (NIP) was initiated as a strategic alliance in 2006.

In order to coordinate and implement the NIP most effectively and to achieve its objectives most comprehensively the NOW GmbH National Organization Hydrogen and Fuel Cell was founded in 2008 as a federally owned programme organization at the interface of politics, industry and academia. In 2009 NOW additionally was put in charge of coordinating and implementing the "Model Regions for Electric Mobility" programme launched by the Federal Ministry of Transport, Building and Urban Development (BMVBS).

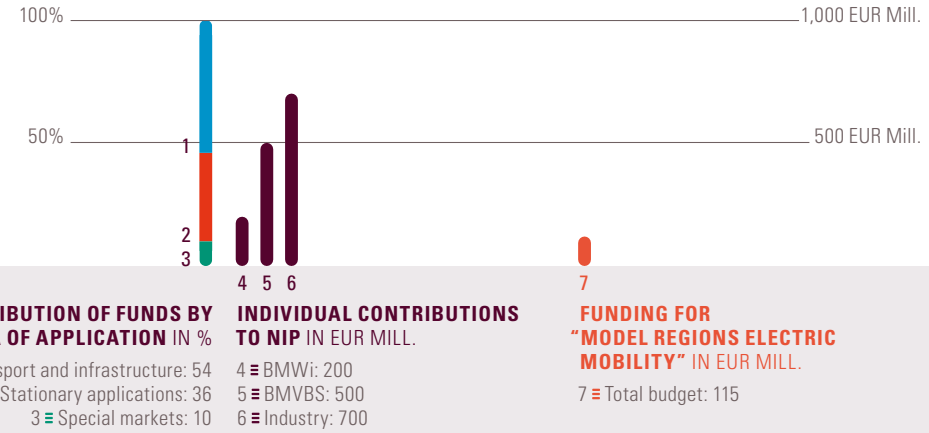
Both technology fields, hydrogen and fuel cell as well as batteries, are complementary key technologies for sustainable mobility and energy concepts. We need a comprehensive approach, bringing forward a diversified set of solutions to meet the future energy challenge.



Dr. Klaus Bonhoff
Chair of the Management Board

NOW

Programmes and Programme Implementation



DISTRIBUTION OF FUNDS BY AREA OF APPLICATION IN %

1 ≡ Transport and infrastructure: 54
2 ≡ Stationary applications: 36
3 ≡ Special markets: 10

INDIVIDUAL CONTRIBUTIONS TO NIP IN EUR MILL.

4 ≡ BMWi: 200
5 ≡ BMVBS: 500
6 ≡ Industry: 700

FUNDING FOR "MODEL REGIONS ELECTRIC MOBILITY" IN EUR MILL.

7 ≡ Total budget: 115

The **NOW GMBH NATIONAL ORGANISATION HYDROGEN AND FUEL CELL TECHNOLOGY** was founded in 2008 by the German Federal Government, represented by the Federal Ministry of Transport, Building and Urban Development (BMVBS). NOW's task is the coordination and implementation of two federal programmes: The National Innovation Programme Hydrogen and Fuel Cell Technology (NIP) and the programme "Model Regions Electric Mobility" of the BMVBS.

NOW's prime function is to initiate, evaluate and bundle projects in a meaningful way, but it also has cross-sectional functions which include topics such as production technologies or education and training, communication at the interface between government and industry and PR to raise awareness for these technologies and their products.

In its committees, NOW brings together representatives from the areas of politics, industry and the academic community. The advisory council provides a neutral platform which is used to develop the NIP flexibly and in line with market requirements. Formulating political objectives, promoting technologies, and preparing markets – this is an integrated process in which the partners constantly provide each other with new stimuli and valuable feedback. Thus full use can be made of the specific strengths of each individual partner.

International cooperation is another major concern for NOW – after all, using clean and economically sustainable technologies is a global challenge. The International Partnership for the Hydrogen Economy (IPHE) involves governments in these discussions. Germany will chair the IPHE in 2010 – 2011 with NOW running the secretariat.

Nationales Innovationsprogramm Wasserstoff- und Brennstoffzellentechnologie

The objective of the National Innovation Programme Hydrogen and Fuel Cell Technology (NIP) is to prepare the market for products and applications based on hydrogen and fuel cell technology. German industry is a world leader in this field. The NIP aims at preserving and developing this competitive advantage, enabling sustainability in both areas environment and economy.

(more on p. 6 – p. 9)

Modellregionen Elektromobilität

Electric mobility is advancing, offering an efficient alternative solution in the transport sector. The programme "Model Regions Electric Mobility" aims at promoting electric mobility in public spaces and developing electric mobility starting from clusters, thereby establishing Germany as European lead-market for battery-electric mobility.

(more on p. 10 and p. 11)

NIP
Market Preparation of Hydrogen and Fuel Cell Technology

Nationales Innovationsprogramm
Wasserstoff- und
Brennstoffzellentechnologie

The National Innovation Programme Hydrogen and Fuel Cell Technology (NIP) was adopted by the German Federal Government in 2006. Designed to run for ten years to 2016, the NIP has been allocated a total budget of € 1.4 billion. These funds are provided in equal parts by the government – the Federal Ministry of Transport, Building and Urban Development (BMVBS) and the Federal Ministry of Economics and Technology (BMWi) – and by the participating industrial partners.

The NIP funds both large-scale demonstration projects and research & development projects. The NIP-demonstration projects are carried out under real-life conditions, thereby proving the products readiness for everyday-life use. In order to exploit synergies most efficiently NIP-demonstration projects are bundled thematically and/or corresponding to regional aspects to so called lighthouse projects. That way project partners can tackle questions and challenges together and more effectively, instead of having to find solutions individually at higher expenses.

Hydrogen and fuel cell technology offers a wide range in terms of products and applications. Considering this and in order to be able to approach market-specific challenges as precisely as possible, the NIP has been divided into three programme areas: “Transportation and hydrogen infrastructure”, “Stationary applications” and “Special markets”.

NIP-Program Area
Transport and Hydrogen Infrastructure

Hydrogen as alternative fuel for vehicles fitted with fuel cells or internal combustion engines is one of the most promising options for ensuring environmentally-friendly mobility in the future.

NOW’s transport section deals with the preparation and operation of hydrogen-powered cars and busses in regular road traffic, along with the pertinent hydrogen infrastructure. Its remit also covers related fields, such as fuel cells to supply onboard energy for aircrafts.

In the area of hydrogen infrastructure, NOW supports demonstration projects for hydrogen production, ideally from renewable sources, and develops strategic concepts for setting up a comprehensive distribution infrastructure. Studies such as GermanHy highlight future options regarding hydrogen production and infrastructure.

NOW LIGHTHOUSE PROJECT

- Clean Energy Partnership (CEP): 12 partner enterprises are using more that 40 hydrogen-powered cars as well as bus fleets in Berlin and Hamburg to test the suitability of hydrogen as a fuel in everyday use. This also involves creating the infrastructure for refuelling the vehicles and the use of hydrogen produced from renewable sources

GENERAL PROGRAMME OBJECTIVES

- Expanding the vehicle fleet and the hydrogen infrastructure starting from key regions
- Strengthening technological competence and establishing competitive supply industry
- Raising customer acceptance

Clean Energy Partnership CEP

Ein Projekt im Nationalen Innovationsprogramm
Wasserstoff- und Brennstoffzellentechnologie

NIP-Program Area
Stationary Applications

Two thirds of all energy is used for electricity, heating, warm water, and increasingly also for air-conditioning. More efficient technology that can bring about energy savings in this sector can make a particularly valuable contribution to protecting the global climate. The use of fuel cells in combined heat and power applications can save huge amounts of energy. In conjunction with biogenic fuels, such as biogas, it is possible to provide energy that is virtually CO_2-free. Stationary fuel cell units can be used in residential buildings, on commercial premises, in industrial plants and on ships.

NOW initiates and coordinates extensive projects which aim to demonstrate in practice the advantages offered by fuel cell technology, while at the same time identifying ways of further enhancing the technology and generating marketable products for the world market in the long term. To this end the projects conduct parallel research, develop production and establish the necessary supply network.

NOW LIGHTHOUSE PROJECT

- callux: Practical test of 800 fuel cell heating appliances in homes
- NEEDS: Operating 60 industrial fuel cell combined heat and power plants in conjunction with biomass plants
- e4ships: The use of fuel cells to supply onboard energy for larger ships and ferries
- The Potsdam “Speicherstadt”: the energy supply of this historic redevelopment has been designed to be completely CO_2 neutral.

GENERAL PROGRAMME OBJECTIVES

- Extensive field tests to prepare the market
- Maturation of domestic plants and industrial systems
- Development and testing of production technologies
- Establishing production units and a competitive supply industry in Germany

callux nip
Praxistest Brennstoffzelle fürs Eigenheim

e4ships nip
Brennstoffzellen im maritimen Einsatz

NIP-Program Area
Special Markets

Special markets describe specific fuel cell applications with a particular marketability. The spectrum ranges from critical energy supply (IT /telecommunications) and logistics (fork lifters) via portable applications (mobile phones, photo cameras) to fuel cell solutions for the leisure and tourism market.

NOW promotes demonstration projects that show the operability of these applications in everyday life. It aims to use these special markets to open the door for mass roll-outs.

NOW LIGHTHOUSE PROJECT

- Lake Constance Project: practical tests of fuel cells in the area of onboard power supply, and drives for leisure vehicles
- Critical energy supply: Fuel cells for uninterrupted power supply – for example for public safety communication systems (TETRA network)

GENERAL PROGRAMME OBJECTIVES

- Demonstration of large number of systems in field tests
- Laying the foundations for series production on the part of suppliers
- Raising public awareness for these technologies

Model Regions for Electric Mobility

Modellregionen Elektromobilität

The programme **"MODEL REGIONS FOR ELECTRIC MOBILITY"** of the Federal Ministry of Transport, Building and Urban Affairs (BMVBS) allocates € 115 million in funding to the promotion of electric mobility in public spaces and the general development of electric mobility starting from regional clusters, aiming at establishing Germany as European lead-market for electric mobility. The programme is part of the 2009 German Stimulus Package and has a runtime of two years until 2011.

In eight selected model regions across Germany the programme sets out to generate as much empirical value from different concepts as regards to contents, different technological and operational concepts and varying regional conditions.

The focus in the model regions lies on the integration of producers, customers and public transportation services, utilization patterns of electric mobility solutions, demonstration, integration of different transport modes and the development of new business models. Cross-sectional tasks include communication and expectation management, regulatory framework, socio-scientific secondary research, busses, passenger cars, transporters and infrastructure.

BERLIN / POTSDAM

- Integration of electric vehicles into public transport in the city and the region
- Link with tourist car sharing service (electric cars, electric bicycles, electric scooters) in selected areas of the city
- City logistics concepts for environment-friendly deliveries in and around the capital (delivery transports)
- Freely accessible charging stations on public roads

BREMEN / OLDENBURG

- Establishment of a Personal Mobility Center (PMC) for the sustained introduction of electric mobility in the model region
- Creation of a vehicle fleet (electric cars for commuter use, electric bicycles)
- Integration into the existing public transport system
- Car sharing, integration of electric vehicles into existing mobility services
- Charging stations for electric vehicles at suitable publicly accessible locations

HAMBURG

- Integration into existing mobility concepts (electric vehicles in municipal public transport, private and industrial transport)
- Development of a charging infrastructure (energy entirely from renewable sources)
- Supply of electricity from various providers without discrimination
- Trials of diesel hybrid buses
- Innovative energy storage for rail vehicles

MUNICH

- Development of a production line for commercial electric vehicles, both cars and delivery vehicles
- Network of charging stations for electric vehicles
- Integration of vehicles into municipal public transport, development of hybrid buses
- Meeting additional power requirements exclusively by renewable energy

RHINE-MAIN AREA

- Development of the ECOStyle line (to connect Frankfurt, Mühlheim and Offenbach)
- Along the bus line: a variety of projects will show renewable energy sources in transport, at home and at work
- Extending the use of battery-powered vehicles at the Rhine-Main Airport
- Establishing an e-fleet in city delivery services
- Gradual development of an infrastructure for e-mobility

RHINE-RUHR AREA

- Deployment of a total of around 220 e-vehicles
- Establishment of the necessary infrastructure
- Fleet of 25 cars, 22 hybrid buses in public transport, 10 commercial vehicles
- 160 special vehicles (garbage collection vehicles, electric bicycles, electric scooters)
- Development of car sharing models and new mobility concepts

SAXONY

- Deployment of hybrid bus fleets in Dresden and in Leipzig
- Integration of electric vehicles into fleets (car sharing, taxi companies)
- Use of electric commercial vehicles
- Research and production facility for traction storage
- Network integration and integration of renewable energy sources
- Establishment of a charging infrastructure

STUTTGART

- Tests of up to 1,000 electric vehicles by private, public and commercial users
- Deployment of hybrid buses under everyday conditions, electric mobility in existing municipal facilities
- Small, battery-powered transporters in urban distribution services
- Use of electric scooters
- Establishment and integration of charging stations in public areas
- Creation of a competence centre for electric mobility

You'd like to know more?
Detailed information on NOW, NIP and the "Model regions for electric mobility" programme is available in the Internet at: www.now-gmbh.de

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