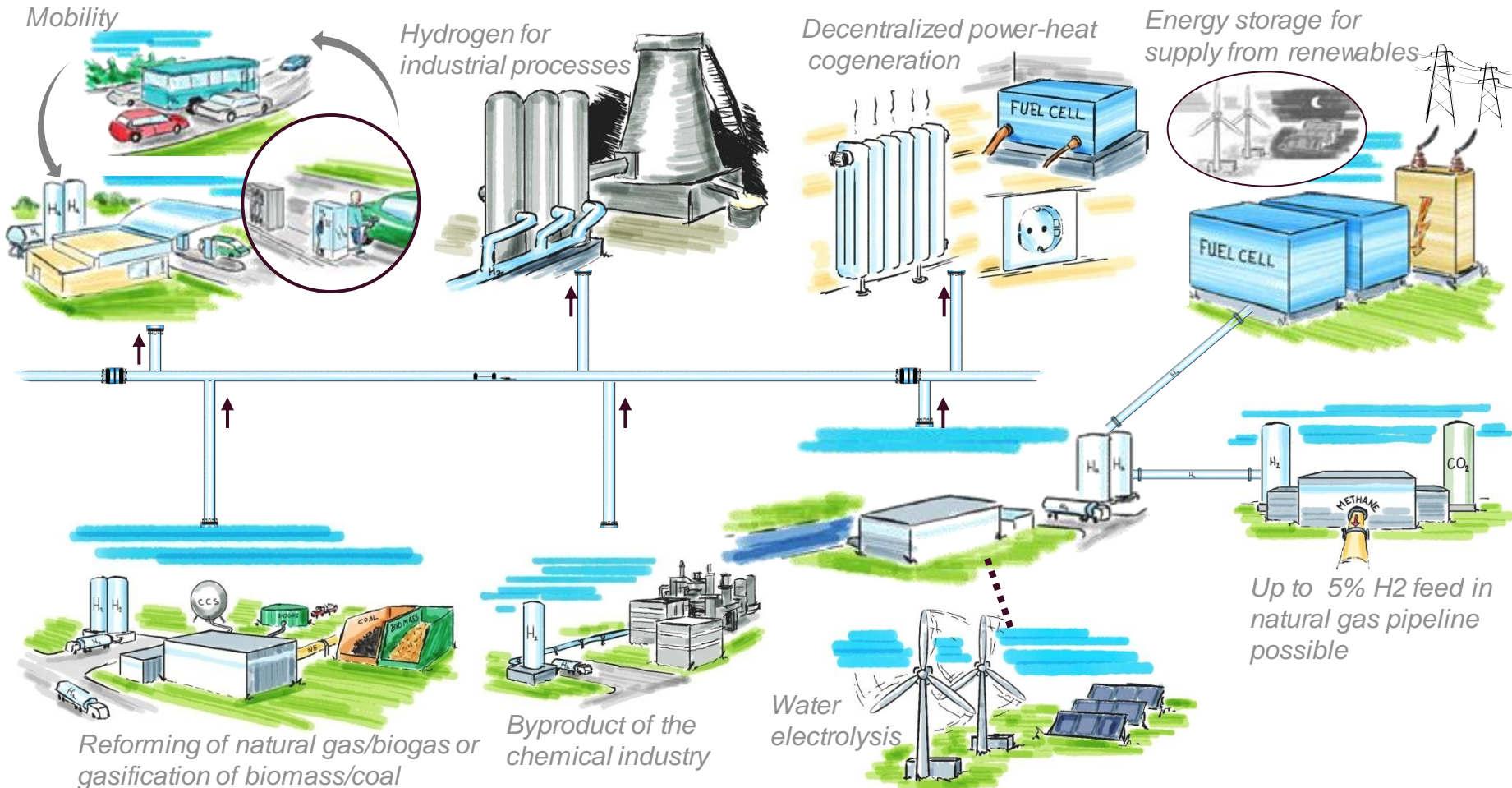


Hydrogen and fuel cell technologies – key pillars of the energy transition

5th International Conference on Hydrogen Safety | Brussels | September 9th, 2013

Thorsten Herbert | Programme Manager Transportation, NOW GmbH

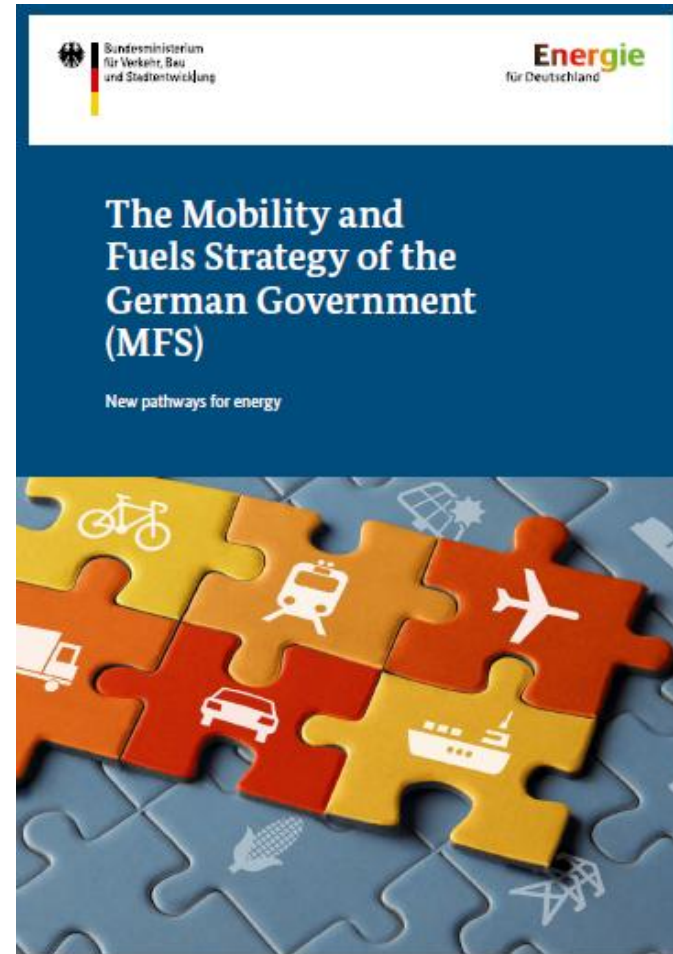
Key role of hydrogen as an energy carrier to facilitate the energy transition in Germany



New Pathways for the Energy Supply for Future Transport



In the transport sector, final energy consumption is to fall by about 10 % by 2020 and by about 40 % by 2050, the baseline in this case being 2005!



The National Innovation Programme Hydrogen and Fuel Cell Technology (NIP)



Politics

BMVBS / BMWi / BMBF / BMU

€ 500 million + **€ 200 million**
for demonstration 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

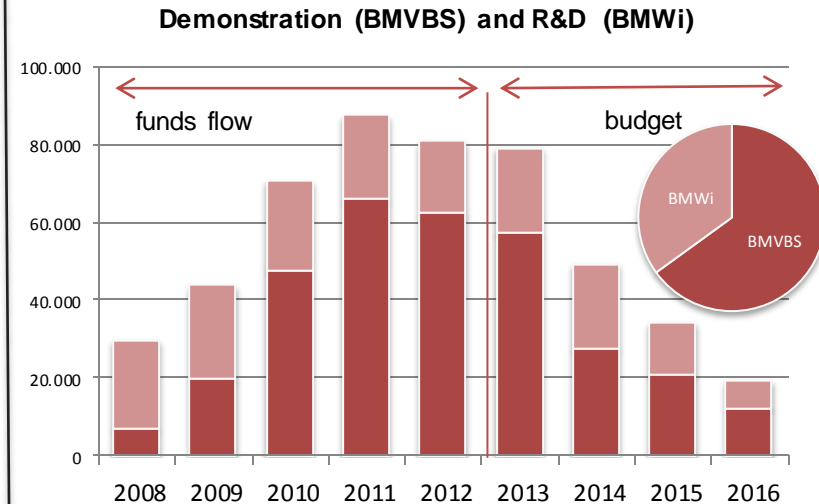
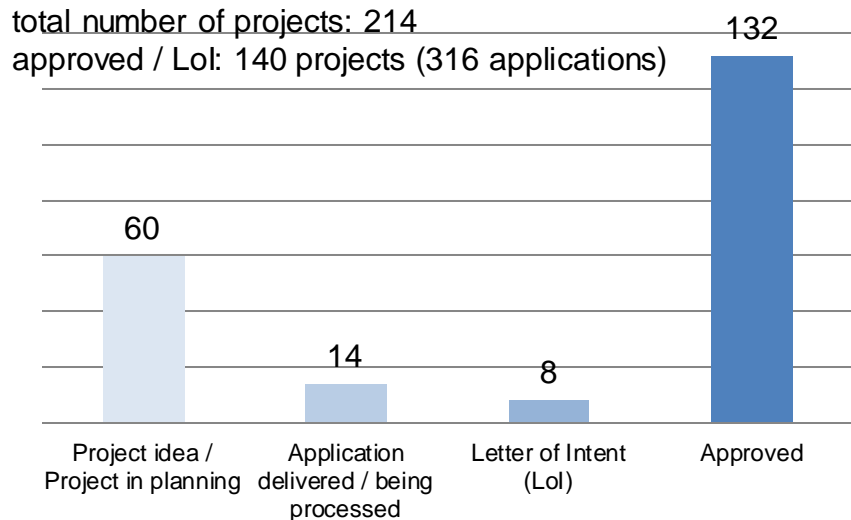
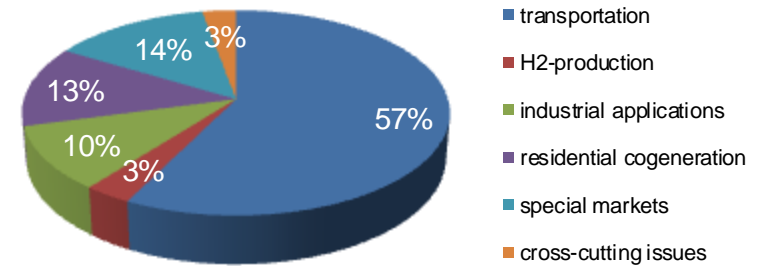


NIP – A success story

BMVBS-funding Status 08/2013



program area	Lol & approved k€	In discussion €k	total k€
transportation	238.685	54.961	293.645
H2-production	15.055	1.241	16.296
industrial applications	32.513	19.571	52.083
residential cogeneration	55.350	9.726	65.076
special markets	51.657	17.783	69.440
cross-cutting issues	4.839	9.893	14.732
total	398.099	113.174	511.273



NIP – Integrated Approach for Market Preparation



Technology

- components
- subsystem
- systems + products

Application

- cost
- reliability
- lifetime

Markets

- customer acception
- safety
- approval processes



Bosch:
Hydrogen Gas
Injector HGI



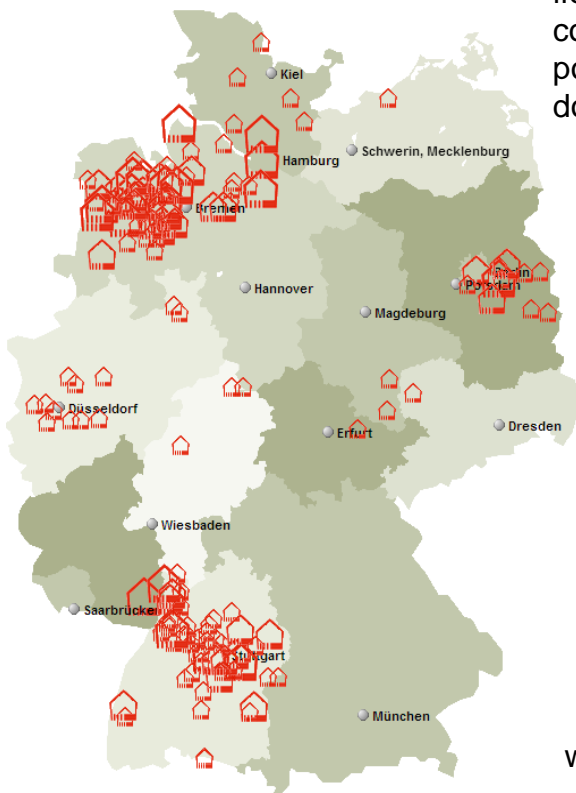
FCCT:
Gas Diffusion Layer
(GDL)



Linde:
Ionic H2-Compressor



NIP Lighthouse Projects – Callux & Clean Power Net



Germany's biggest field test for fuel cell combined heat and power systems for domestic use:

- 500 units will be installed until end of 2013

www.callux.net



Projects for uninterrupted power supply financed by NIP:

- >10 projects
- 100 fuel cells in field test operation across Germany



www.cleanpowernet.de



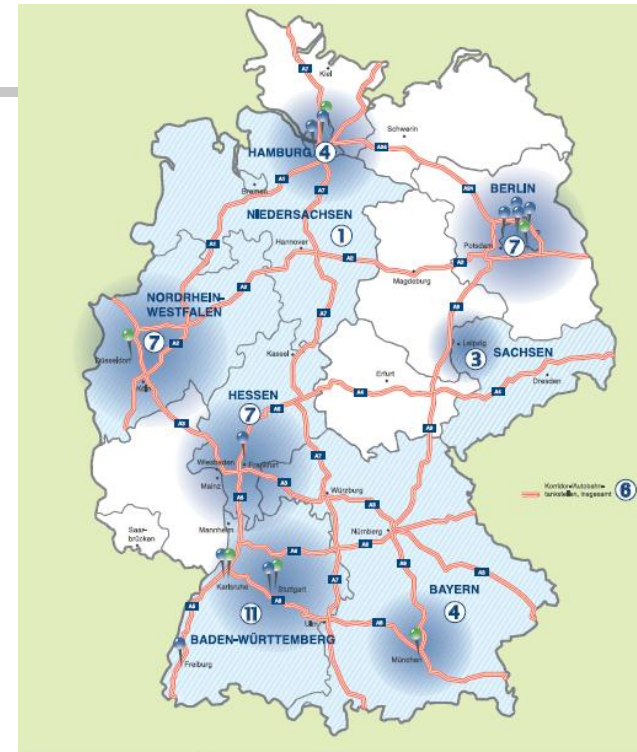
Germany to expand nationwide network of hydrogen filling stations from 15 to 50 by 2015

June 20th, 2012

- **joint Letter of Intent to expand the network of hydrogen filling stations in Germany**
 - signed by the German Ministry of Transport, Building and Urban Development (BMVBS) and several industrial companies
 - part of the National Innovation Programme for Hydrogen and Fuel Cell Technology (NIP)
 - overall investment more than €40 million (US\$51 million)
- **market-relevant testing of filling-station technology**
- **ensure a needs-driven supply for fuel cell vehicles**
- **coordination by NOW GmbH in the frame of the Clean Energy Partnership (CEP)**



Ein Projekt im Nationalen Innovationsprogramm Wasserstoff- und Brennstoffzellentechnologie 



„To facilitate market introduction [of fuel cell vehicles] we need a hydrogen station network covering and connecting the metropolitan regions.“

Dr. Peter Ramsauer, Federal Minister for Transport, Building and Urban Development

Guideline for the approval of Hydrogen Refueling Stations



Goals: -Harmonization of permission process
-Efficient procedure



Background: Study „Safe Hydrogen Infrastructure“ carried out by NOW; Strong request by H2Mobility/CEP



Products: Website & booklet



Target groups: Applicants and authorities



www.h2-genehmigung.de





Absicht des Anlagenbetreibers eine öffentliche H₂-Tankstelle zu errichten und zu betreiben

1 Identifizierung der relevanten Genehmigungsbehörde

Vor der Erstellung des Genehmigungsantrags ist die übergeordnet zuständige Genehmigungsbehörde zu identifizieren. Über die Eingabe des Stadtnamens im unteren Suchfeld, kann der entsprechende behördliche Ansprechpartner ermittelt werden. Die zuständige Genehmigungsbehörde kann sich, je nach Bundesland oder Kommune, unterscheiden, d.h. unterschiedliche Arten von Behörden können zum Einsatz kommen. Zusätzlich können in einer Region unterschiedliche Genehmigungsbehörden zuständig sein, je nachdem ob eine Liefer-H₂-Tankstelle oder H₂-Station zu genehmigen ist. Nach der Identifikation der Genehmigungsbehörde ist ein enger Kontakt zu den Ansprechpartnern der Behörde aufzubauen.

Geben Sie hier bitte den geplanten Standort der Wasserstoff-Tankstelle ein:

Ort

2 Studieren des vollständigen Genehmigungsprozesses und der relevanten Dokumente

3 Vereinbarung eines Vortermis mit der Genehmigungsbehörde

19 Start der Bauvorbereitung/Errichtung/Installation der H₂-Anlage

20 Zusammenstellung Dokumente für Inbetriebnahme

Für die Inbetriebnahme der Anlage sind weitere Unterlagen an den Gutachter sowie an die Genehmigungsbehörde zu übergeben, falls diese nicht bereits im Genehmigungsantrag enthalten waren, z.B.:

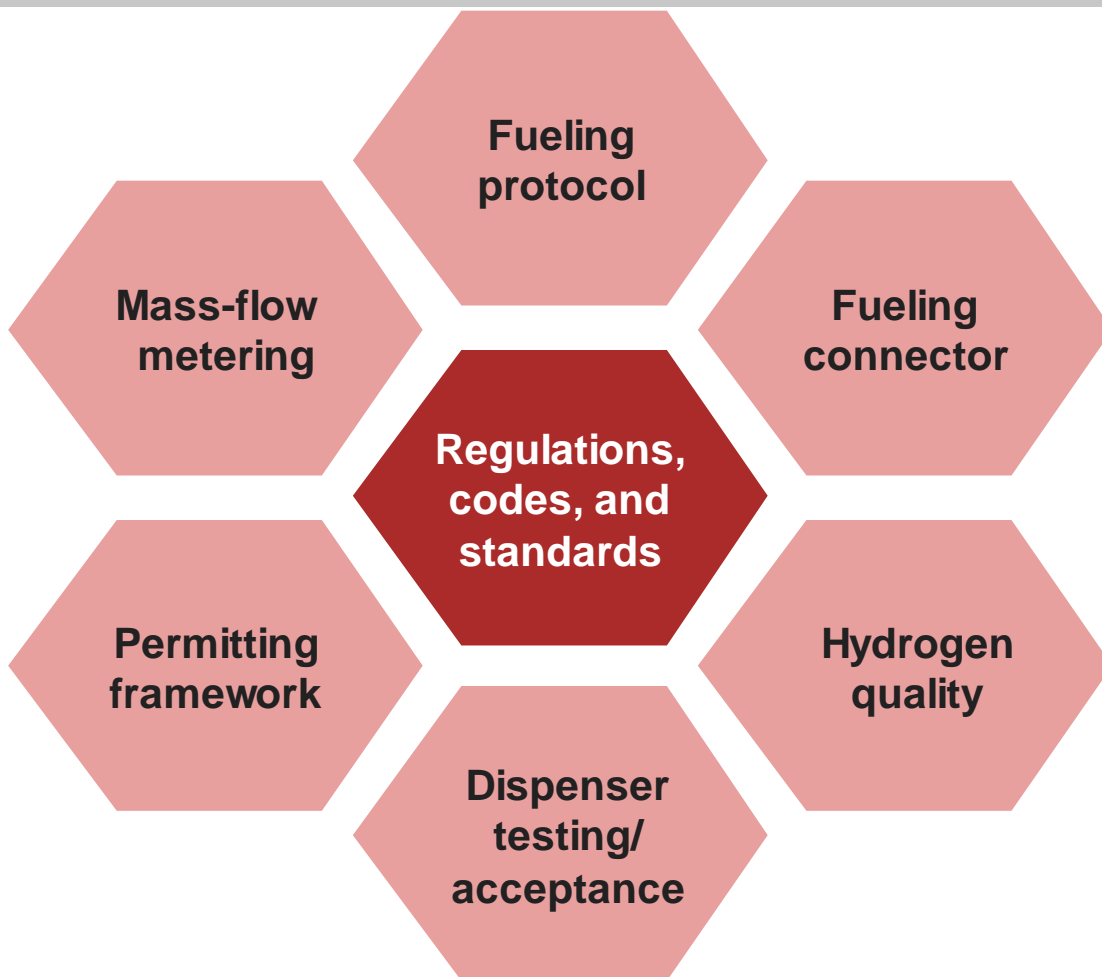
- Gefährdungsbeurteilung gemäß BetrSichV
- Explosionsschutzdokument
- Notfall-Gefahren-Abwehrplan
- Alarm- und Feuerwehreinsatzplan
- Unterlagen zu Druckgeräten
- Elektrische Schaltpläne

21 Vorbesichtigung H₂-Anlage durch ZUS-Gutachter

22 ZUS-Prüfung H₂-Anlage vor erstmaliger Inbetriebnahme

www.h2-genehmigung.de

International alignment on regulations, codes and standards required



NOW in cooperation with the Federal Ministry of Transport, Building and Urban Development (BMVBS) initiated the **first 'International workshop on H2 infrastructure and transportation' from 24th to 26th of June in Berlin**. The Goal of the workshop was to **share international experience and knowledge** in order to **discuss current challenges** and to **develop new strategies to further integrate HFC (hydrogen and fuel cell) technologies into the global transportation sector**. The workshop opened the opportunity to align common interest and to harmonize the appearance of key players, such as the **USA, Japan, Germany, Scandinavia and the European Commission** to **accelerate the advancement of hydrogen and fuel cell technology globally**.



Hydrogen and fuel cell technologies – key pillars of the energy transition 2.0

Further development of the National Innovation Programme for Hydrogen and Fuel Cell Technology (NIP)



Milestones 2025

- Fuel cells for electric vehicle drives and hydrogen infrastructure for comprehensive, emission-free mobility, with
 - more than **500 public hydrogen fuelling stations** nationally,
 - over **half a million fuel cell cars** on the road and
 - **2,000 fuel cell buses** in line service operation within the public transport system
- Hydrogen generation from renewable energies and integration in the energy system as a link between sustainable mobility and energy supply
 - **1,500 MW electrolysis capacity** for the generation of hydrogen from renewable energies
 - definition and implementation of successful **business models for power to gas**
 - development of **hydrogen storage mechanisms** to store renewable electricity
- Fuel cells for stationary energy supply using decentralized cogeneration in house and building supply, industry and a secure power supply for public safety communication systems, telecommunications, etc.
 - more than **half a million fuel cell heating appliances** in operation
 - more than **1,000 MW fuel cell CHP installations** in operation
 - more than **25,000 secure power supply installations** in place



Thank you very much!

Dipl.-Ing. Thorsten Herbert
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Wasserstoff- und Brennstoffzellentechnologien –
Tragende Säulen der Energiewende 2.0

Weiterentwicklung
des
Nationalen Innovationsprogramms
Wasserstoff- und Brennstoffzellentechnologie
(NIP)



Nationales Innovationsprogramm
Wasserstoff- und
Brennstoffzellentechnologie

Berlin im Juni 2013

download: www.now-gmbh.de