

# **Towards sustainable energy systems with fuel cells and hydrogen**

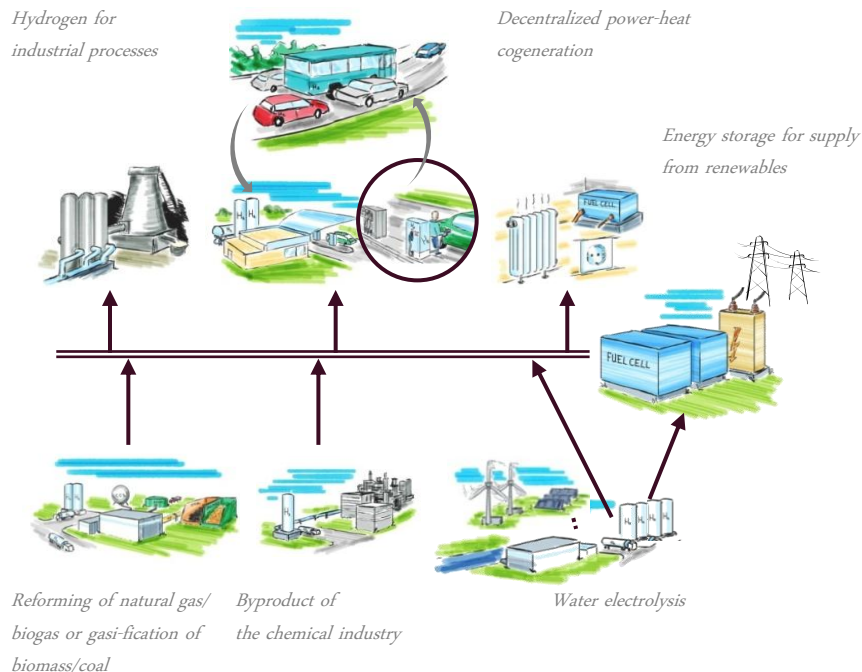
IEA H2-Roadmap Kick-Off Meeting

Paris | 9th of July 2013

Dr. Hanno Butsch | Head of International Cooperation, NOW GmbH

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

hydrogen produced from renewable power sources allows to connect various application sectors.



NIP – Integrated Approach for Market Preparation

## Technology

- components
- subsystem
- systems + products

## Application

- cost
- reliability
- lifetime

## Markets

- customer acception
- safety
- approval processes

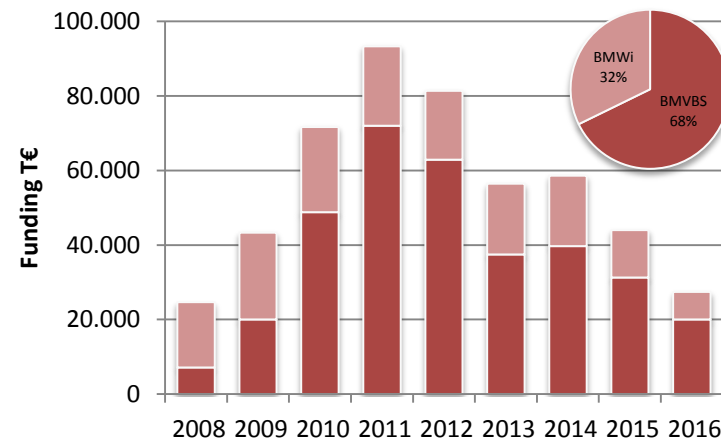
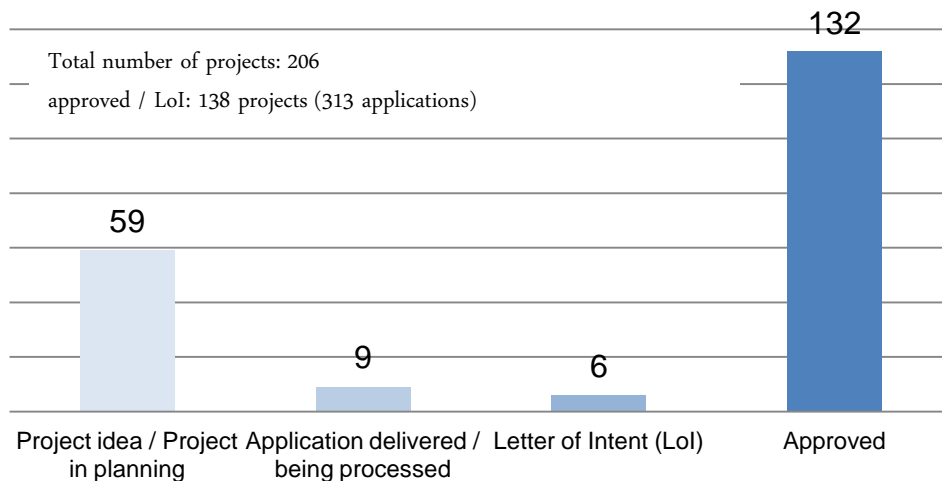
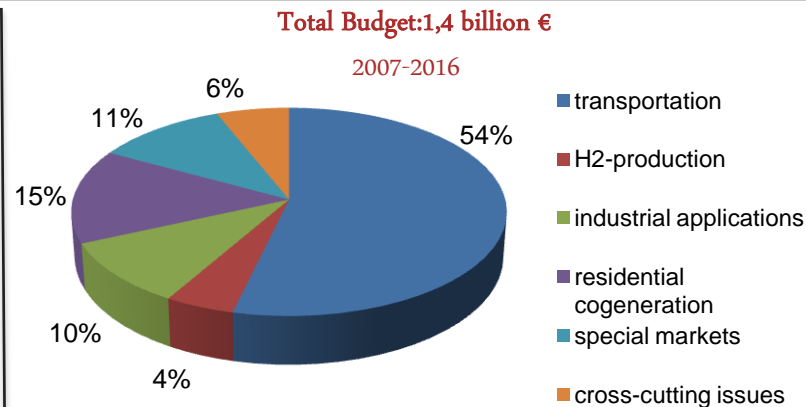


# NIP – A success story

BMVBS-funding Status 01/2013



Programme area	Lol & approved k€	In discussion €k	total k€
transportation	226.306	46.075	272.380
H2-production	15.040	8.537	23.577
industrial applications	33.623	16.858	50.480
residential cogeneration	58.347	16.074	74.421
special markets	34.116	21.586	55.701
cross-cutting issues	18.976	11.664	30.640
<b>product line</b>	<b>386.407</b>	<b>120.793</b>	<b>507.200</b>



# Clean Energy Partnership – FCV Fleet



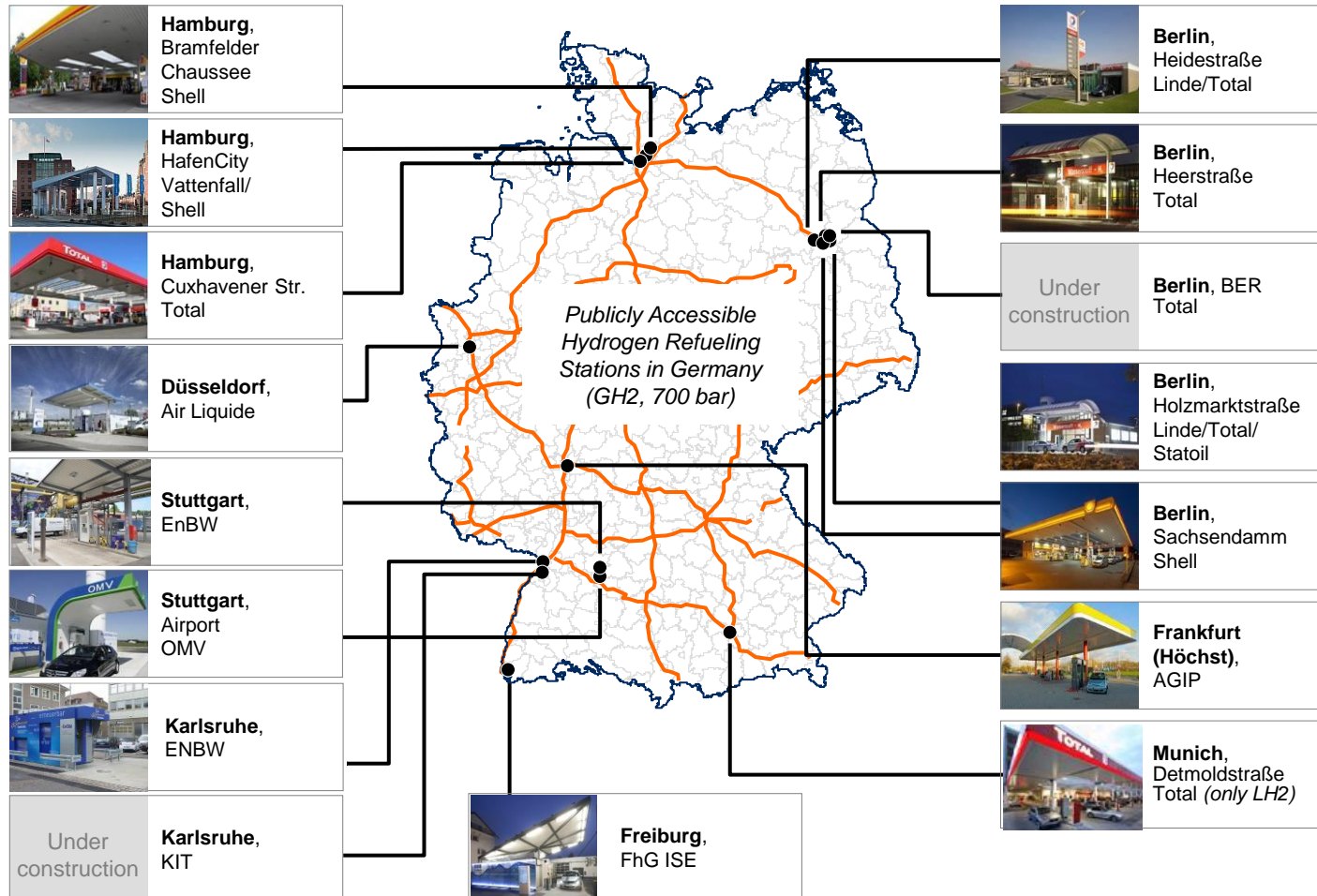
## Planned fleet of Fuel Cell Vehicles and buses

- 90 Daimler B-series F-CELL
- 20 Opel Hydrogen4
- 8 Volkswagen Touran, Caddy, Tiguan HyMotion, Audi Q5-HFC
- 5 Toyota FCHV
- 2 Honda FCX Clarity
- more car manufacturers are planning to join the CEP
- > 10 EvoBus fuel cell buses in Hamburg, Stuttgart, Karlsruhe
- 4 Buses with Hydrogen-ICE in Berlin



# Clean Energy Partnership

## – Hydrogen Refueling Stations (HRS)



### Key achievements

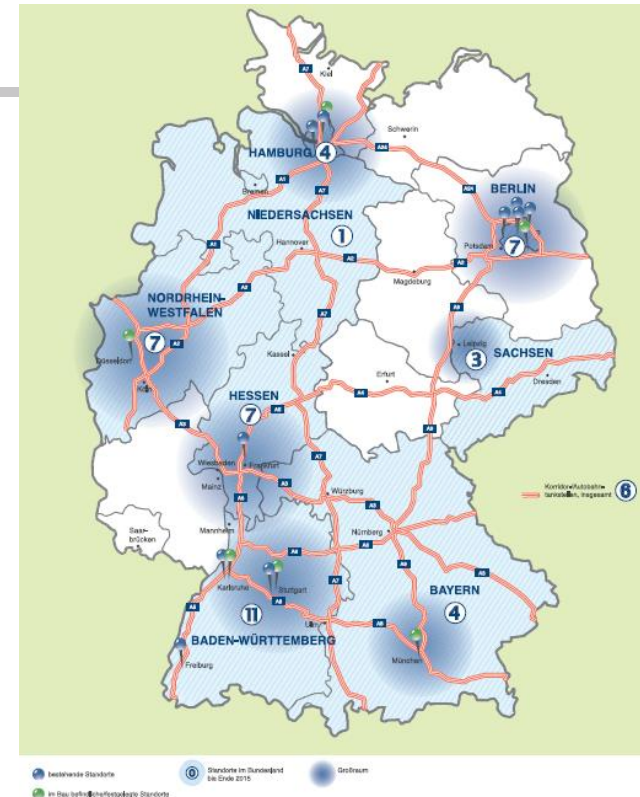
- Safety of stations proven
- Refueling standards agreed
- Storage and compressor technology tested
- H<sub>2</sub> supply chain tested
- Bugs of station technology eliminated



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

June 20<sup>th</sup>, 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)**



„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

# Clean Energy Partnership

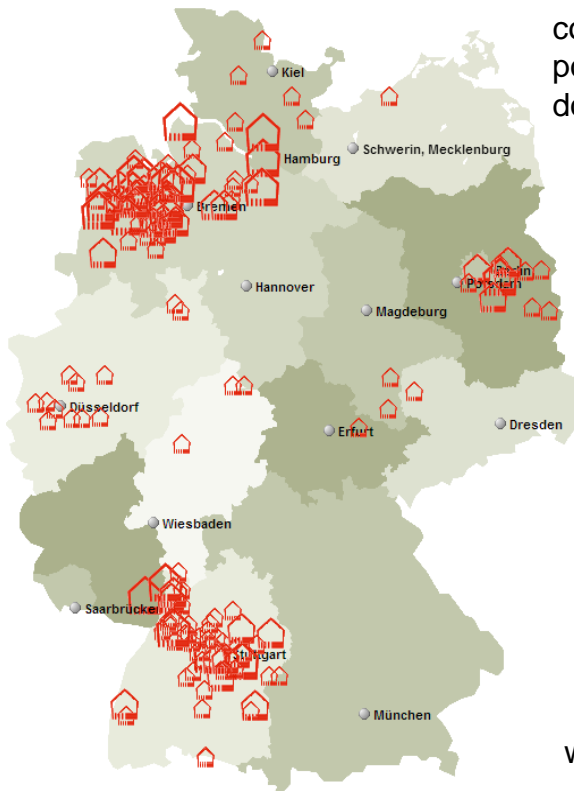
## – Workgroups to solve infrastructure issues



	H <sub>2</sub> filling	H <sub>2</sub> quality	Leakproofness test filling system	H <sub>2</sub> flow measurement
Goal	Inspect filling stations with regard to refuelling (pressure and temperature)	Take samples of hydrogen at filling stations and subject them to analysis/testing	Leakproofness of nozzle, hose and tear-away coupling	Calibratable hydrogen flow measurement
Work group Participants [Management]	      	     	     	     
Modelled on	• SAE 2601 / CSA 4.3	• SAE 2719 / ASTM	• SAE 2600	

➔ Need for international harmonization and potential for collaboration.

# NIP Lighthouse Projects – Callux & Clean Power Net



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

- 300 fuel cell CHP in the field today

[www.callux.net](http://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](http://www.cleanpowernet.de)



<http://www.youtube.com/HalloHerrNachbar>

# Thank you very much!

Dr. Hanno Butsch

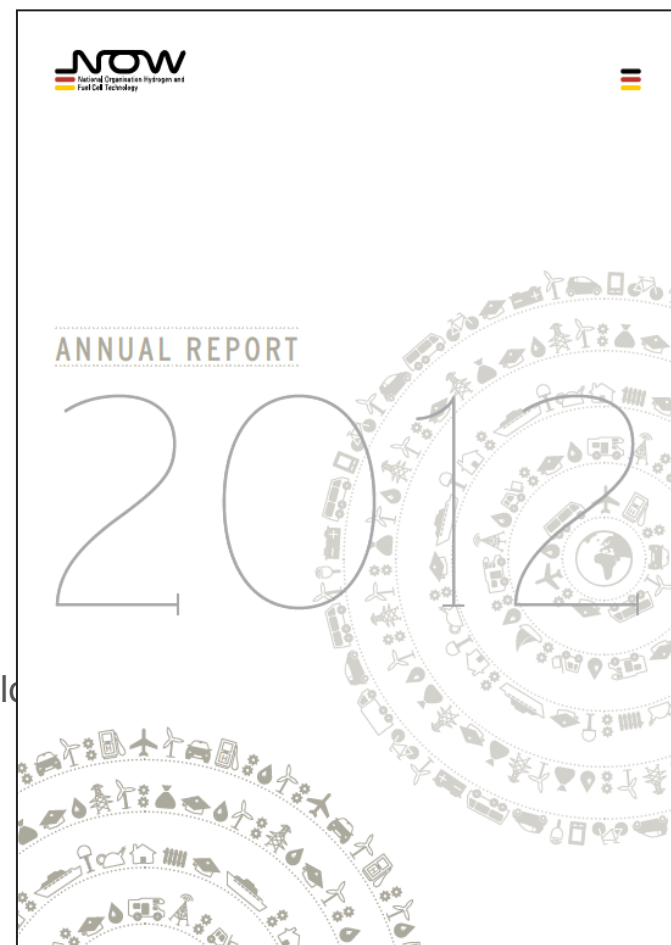
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