Country Overview Germany

Philipp Braunsdorf | Programme Manager Infrastructure Hydrogen, NOW GmbH
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NOW GmbH –
Who we are

• NOW: National Organization Hydrogen and Fuel Cell Technology
• Sole shareholder is the Federal Republic of Germany (represented by BMVI)
• Founded in 2008 to implement the National Innovation Program Hydrogen and Fuel Cell Technology (NIP)
• Today's task: Designing, coordinating and implementing national strategies and public-private programs in the field of technology for sustainable mobility and energy supply
• Currently 41 employees

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NOW GmbH – Programmes and tasks of NOW

**Electromobility on site**
- Research & Development
- Procurement, concepts

**Funding Guidelines**
- Charging Infrastructure
- Area-wide construction
  - normal charge
  - Quick charge

**Mobility and Fuel Strategy**
- Pilots

**Export Initiative**
- Environmental Technology

- German-Japanese cooperation in the field of PtG
- H2 / BZ technology in development cooperation (cooperation with GIZ)

**NIP**
- Research & Development procurement

* National Innovation Programme for Hydrogen and Fuel Cell Technology
Hydrogen and Fuel Cell Technology – Renewable, intelligent and connected across all sectors
Status – Technology readiness level (TRL)

1. Basic research
2. Detailed concept
3. Test / laboratory test
4. Prototype
5. Field tests
6. Pre-serial
7. Commercial use

Quelle: Shell Wasserstoffstudie 2017
**Status** – continuing the National Innovation programme

Hydrogen and fuel cell technology (NIP 2)

<table>
<thead>
<tr>
<th>Research and development</th>
<th>Market activation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical/cost targets</td>
<td>Milestones (quantities/costs)</td>
</tr>
<tr>
<td>Fundamental research</td>
<td>Hydrogen in transport</td>
</tr>
<tr>
<td>Applied research and development</td>
<td>Hydrogen from renewable energy sources</td>
</tr>
<tr>
<td>Demonstration</td>
<td>Cogeneration (domestic energy supply/industry) secure power supply</td>
</tr>
<tr>
<td>Cost reductions</td>
<td>Lead market / lead supplier Germany</td>
</tr>
</tbody>
</table>

**Value creation / competitiveness Germany**

10 years → Federal funding € 1.4 bn → Combining R&D funding with market activation
Status – Project and budget overview research & development and innovation

Autostack Industrie
GEN5-BZ
ROBALD
LHMC
HyPerformance

BIC H2
VerfügbarkeitBZBus
rHYn-main

Bethy 2a
X-EMU

ELEKTRA
Pa-X-ell2
RiverCell2
SchIBZ2

BILBO
Go4H2

FFZ70

RSOC

BePPel
Hy-Lab
QuBK
RoundRobin
Precoil

160 applicants

23 projects

77 Mio. € granted

20 Mio. € applications
### Status – Project and budget overview market activation

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Applications</th>
<th>Calls</th>
<th>€</th>
<th>€ Granted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cars</td>
<td>563</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LDV</td>
<td>500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buses</td>
<td>81</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HRS</td>
<td>3</td>
<td>4</td>
<td>18 Mio.</td>
<td>200 Mio.</td>
</tr>
<tr>
<td>Ely</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trains</td>
<td>164</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HRS</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ely</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ships</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 270 Mio. € applications
- 200 Mio. € applications in the train call
- 18 Mio. € granted
The national strategic framework covers electricity, CNG/LNG and hydrogen

- Assessment of the state of play and future market developments
- National targets and objectives
- Measures to reach targets and objectives
- European coordination
Framework – Germany’s National Strategic Framework (hydrogen infrastructure for passenger cars)

2006-2016
- Secure technological basis, meet conditions for ramp up
- 50 stations

until 2020
- Basic coverage for Germany
- 100 stations

until 2025
- Support market roll-out
- 400 stations

until 2030
- Commercial roll-out
- 1000 stations

INDEPENDENT OF VEHICLES

DEPENDENT OF VEHICLES
Status –
National Strategic Frameworks – Hydrogen
Status –
HRS in Germany

Passenger Car, 700 bar

- 50 operation
- 8 installed / final approval
- 14 construction
- 18 permission
- 6 planning
Status – HRS network in 2019

- **Technology**: uniform standard worldwide (700 bar pressure refueling, in 3-5 minutes 400 - 600 km range)
- **Clean Energy Partnership (CEP)**: cross-industry development, analysis and testing in everyday life, uniform acceptance of all filling stations
- **Current topics**: Grid expansion (including H2 MOBILITY), cost reduction, integration of new modes of transport
- **Target (end of 2019)**: 100 stations
Status –
Stock BEV / FCEV

<table>
<thead>
<tr>
<th>Jahr</th>
<th>Anzahl Fahrzeuge</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>15.111</td>
</tr>
<tr>
<td>2014</td>
<td>22.684</td>
</tr>
<tr>
<td>2015</td>
<td>34.825</td>
</tr>
<tr>
<td>2016</td>
<td>48.754</td>
</tr>
<tr>
<td>2017</td>
<td>70.983</td>
</tr>
</tbody>
</table>

Quelle: KBA Flensburg
Status – Electric Buses

Funding BMVI
- EM 1. Call: 11
- EM 2. Call: 35
- EM 3. Call: 62
- NIP I: 16
- NIP II + JIVE: 51
- NIP II (+ JIVE II): 30
- Sofortprogramm Saubere Luft (Teil BMVI): 441*

Sum: 646*
Status – Fuel cell trains
Status –
Power-to-Gas projects in Germany

Overall performance: 17.9 MW

Hydrogen
- In operation: 10.4 MW
- Planned: 11.7 MW

Methane
- In operation: 7.3 MW
- Planned: 1.0 MW

Quelle: www.europeanpowertogas.com/demonstrations
### Status –
**Business models for fuel cell applications and green hydrogen**

<table>
<thead>
<tr>
<th>Costs (CAPEX/OPEX)</th>
<th>Durability</th>
<th>Framework</th>
<th>Market für fuel cell applications and green hydrogen</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reducing CAPEX</td>
<td>• Increasing durability</td>
<td>• Acknowledgment of hydrogen as a</td>
<td>• Market Roll-out for green hydrogen</td>
</tr>
<tr>
<td>• Increasing efficiency</td>
<td>• Reducing degradation of components</td>
<td>• energy carrier</td>
<td>• Market activation in transport and industrial</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• fuel</td>
<td>sector</td>
</tr>
<tr>
<td></td>
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<tr>
<td><strong>Activities of NOW (on behalf of Ministry of Transport)</strong></td>
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</tr>
<tr>
<td>• Market activation NIP</td>
<td>• R&amp;D NIP</td>
<td>• Transposition AFID</td>
<td>• Funding fleets and their infrastructure</td>
</tr>
<tr>
<td>• R&amp;D NIP</td>
<td>• Studies</td>
<td>• Accompaniment RED II</td>
<td>(passenger cars, trains, buses)</td>
</tr>
<tr>
<td>• Studies</td>
<td></td>
<td>• Study IEK2050</td>
<td></td>
</tr>
</tbody>
</table>
Thank you!

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