

# German Perspective on Hydrogen and Fuel Cell Technologies

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# NOW GmbH – Tasks and Programs

## Battery Electric Mobility

Research and Development  
Communal mobility concepts, Vehicle procurement



## Charging Infrastructure

Nationwide buildup  
Normal and fast charging

## NIP\*

Research and development  
Market activation



Coordination  
Implementation  
Networking  
Planning  
Visibility



## Mobility and Fuels Strategy

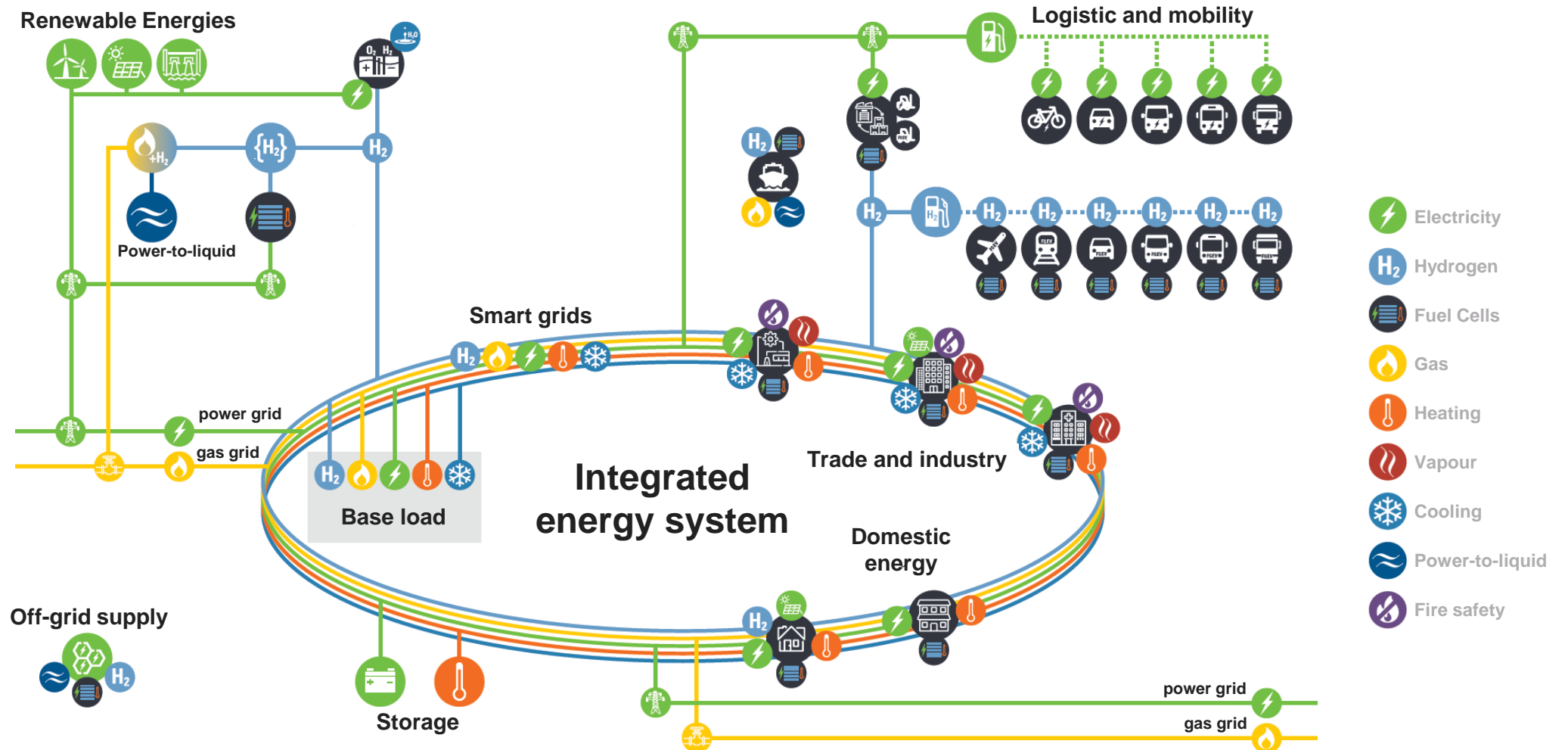
Pilot projects for alternative fuels

## Export Initiative Environmental Technology

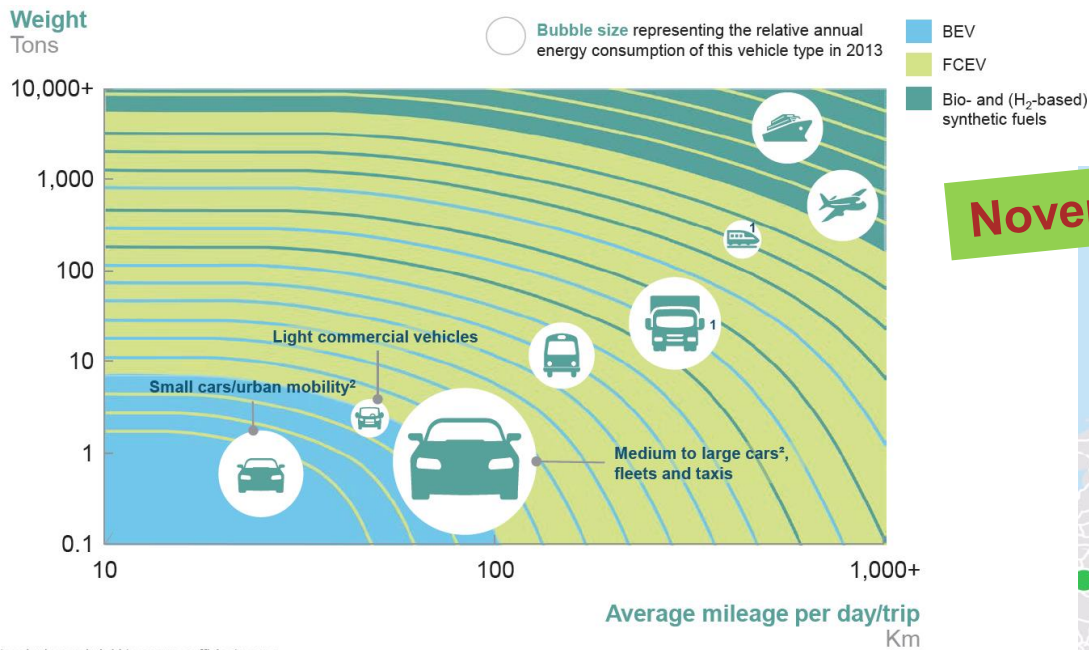
German-Japanese cooperation for PtG  
Development cooperation for H2/FC technologies  
(Cooperation with GIZ)

\* National innovation program for hydrogen and fuel cell technologies

# Integrated energy system – Renewable, flexible and connected across all sectors



# Hydrogen as energy carrier – Demand in the transportation sector

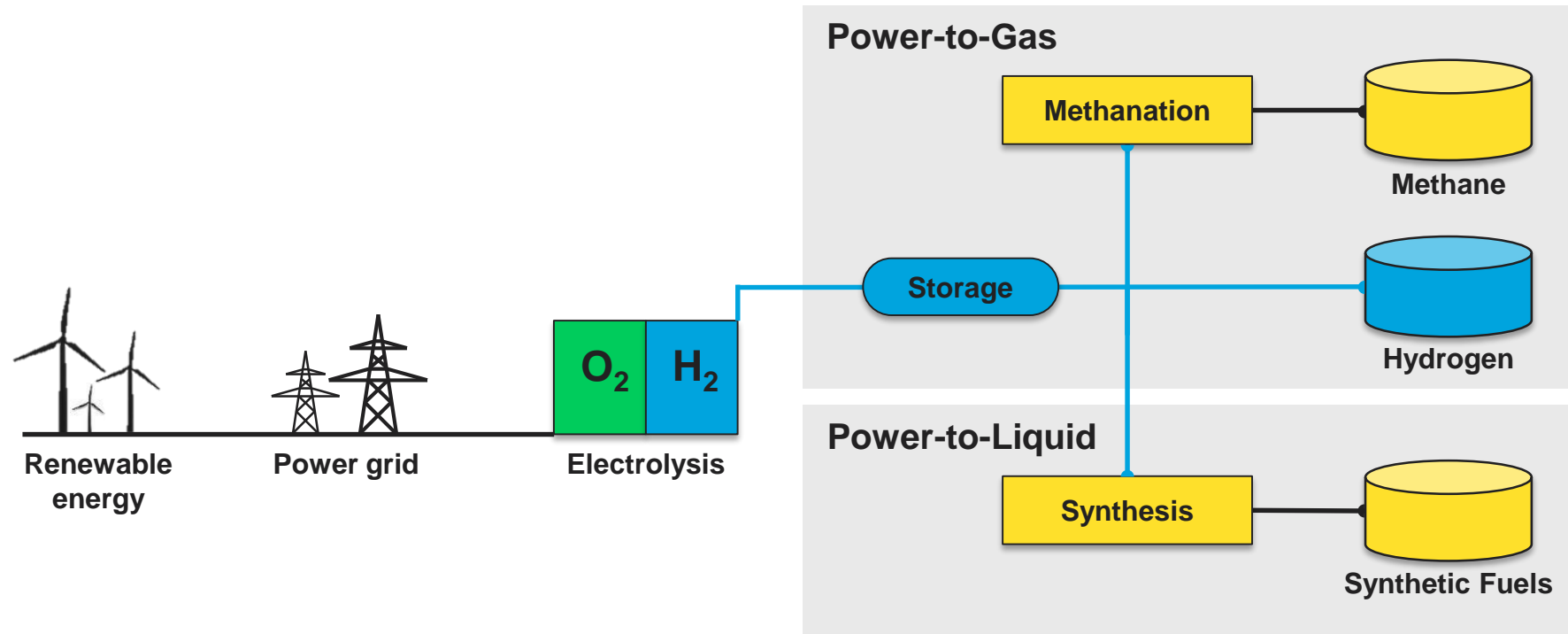


<sup>1</sup> Battery-hydrogen hybrid to ensure sufficient power  
<sup>2</sup> Split in A- and B-segment LDVs (small cars) and C+-segment LDVs (medium to large cars) based on a 30% market share of A/B-segment cars and a 50% less energy demand  
 Source: Toyota, Hyundai, Daimler

Source: <http://hydrogeneurope.eu/wp-content/uploads/2017/01/20170109-HYDROGEN-COUNCIL-Vision-document-FINAL-HR.pdf>



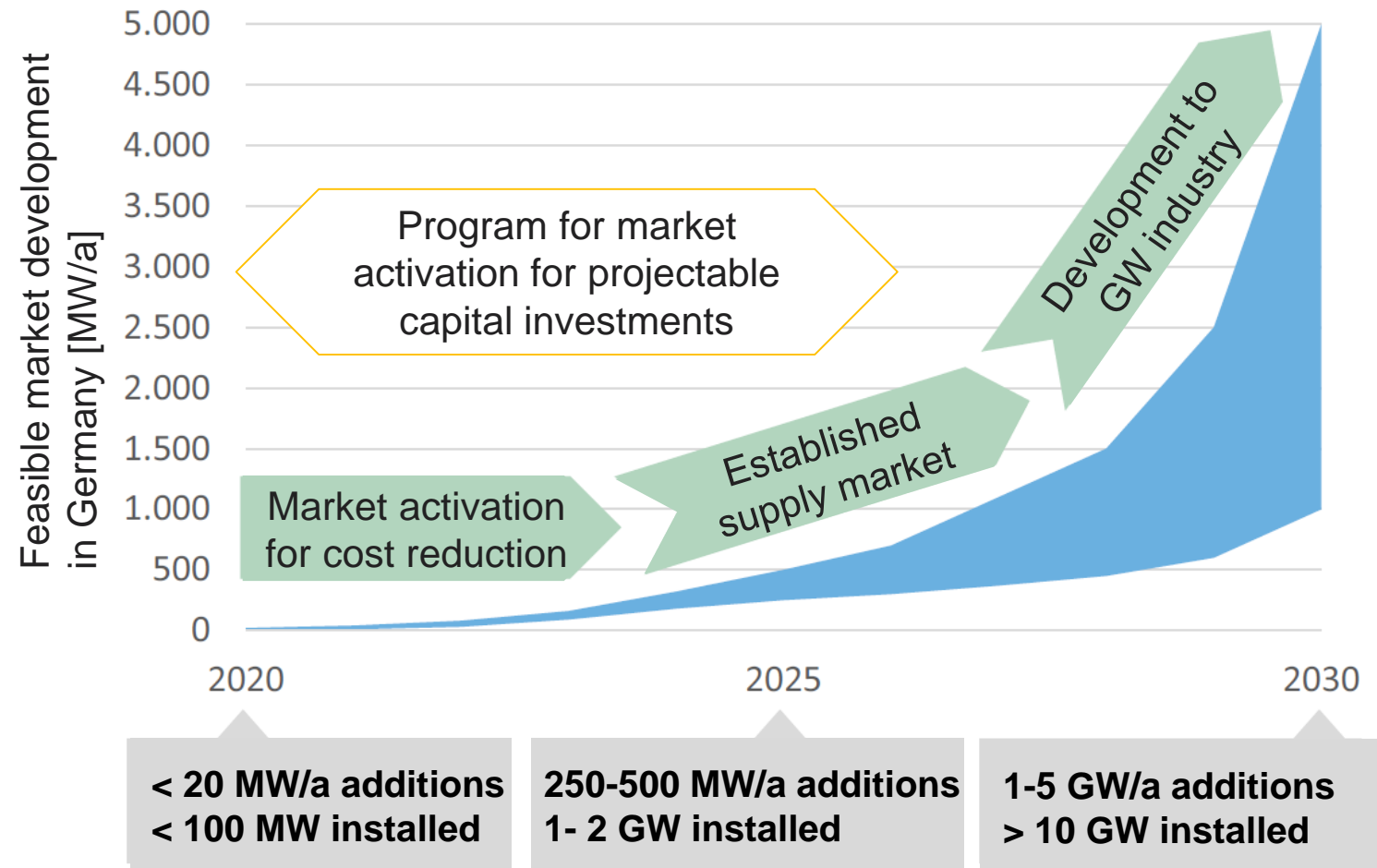
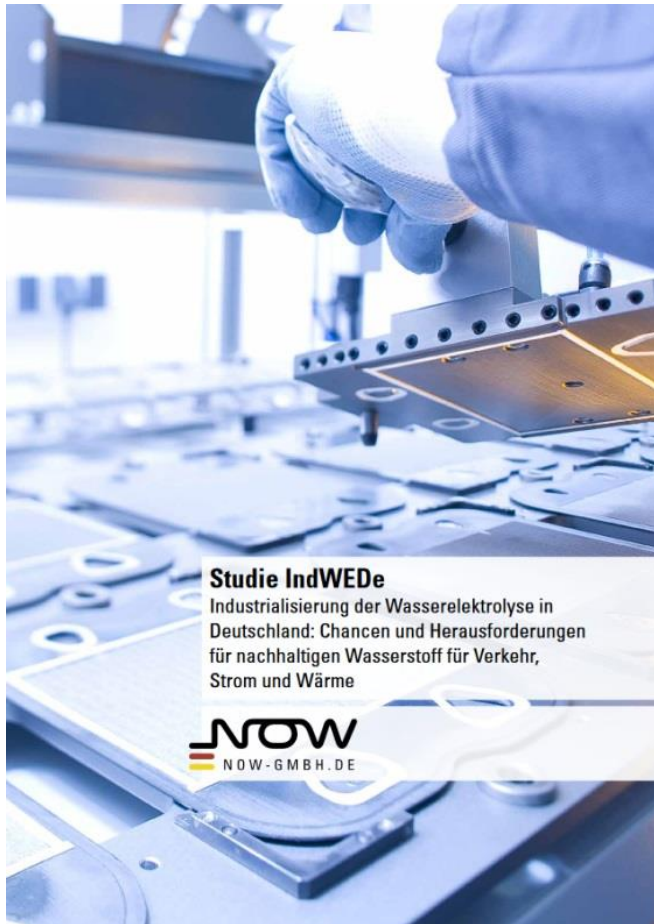
# Integrated energy system – Water electrolysis as key technology



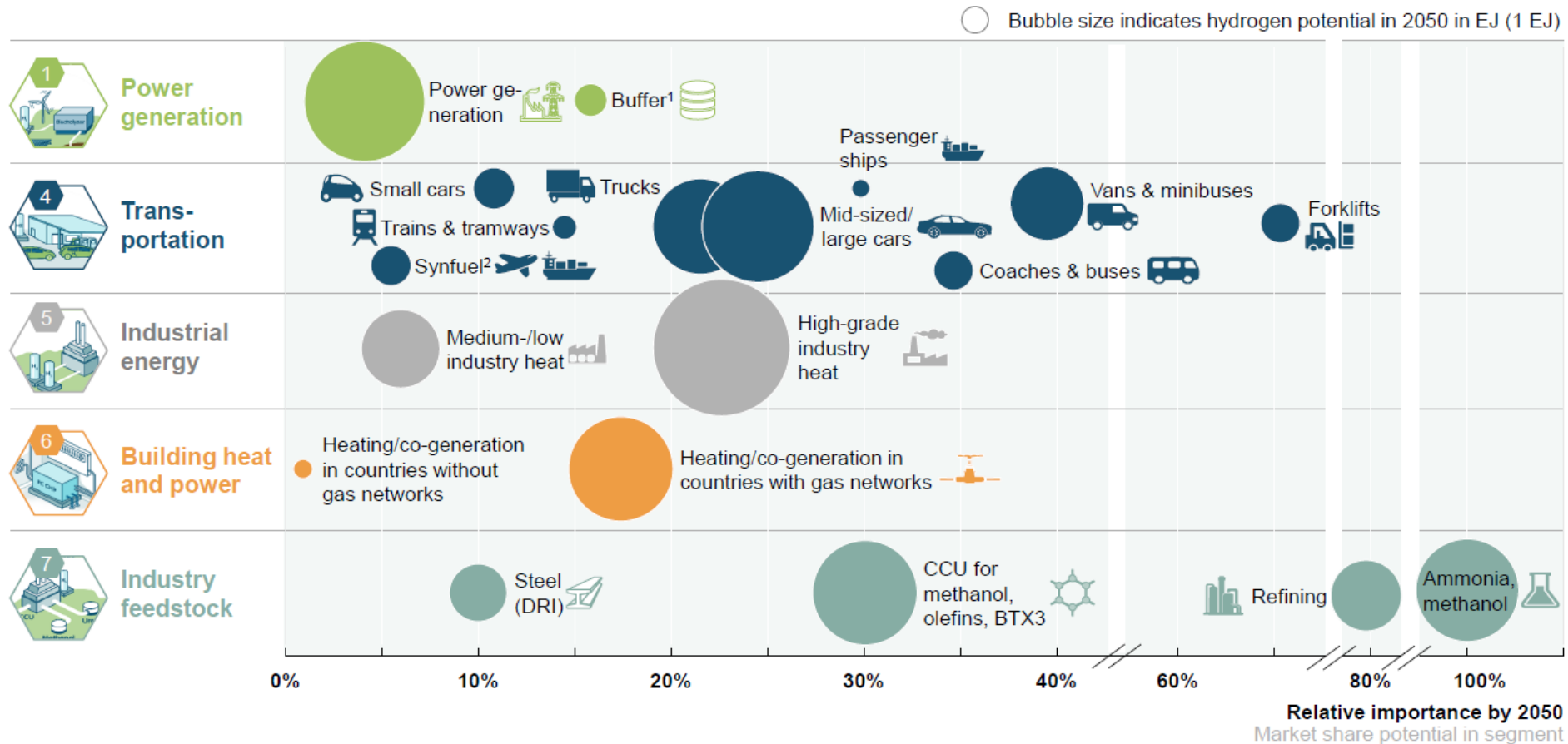
- Renewable, emission-free production of hydrogen with water electrolysis technology
- Hydrogen as feed stock for the production of synthetic fuels (i.e. Kerosene, syn. Diesel)



# Industrialization water electrolysis – Development of installed water electrolysis capacity



# Hydrogen as energy carrier – GW scale needed for the demand of all sectors



Hydrogen has significant potential across energy and industry sectors

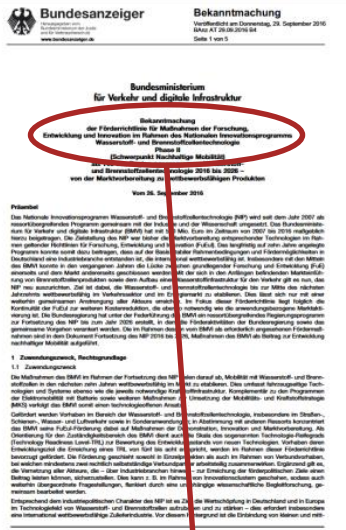
<sup>1</sup> Percent of total annual growth in hydrogen and variable renewable power demand

<sup>2</sup> For aviation and freight ships

<sup>3</sup> Percent of total methanol, olefin, BTX production using olefins and captured carbon

SOURCE: Hydrogen Council

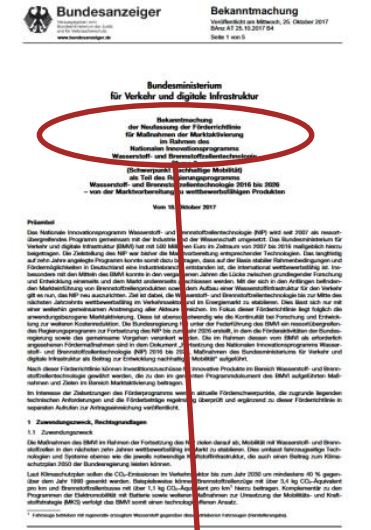
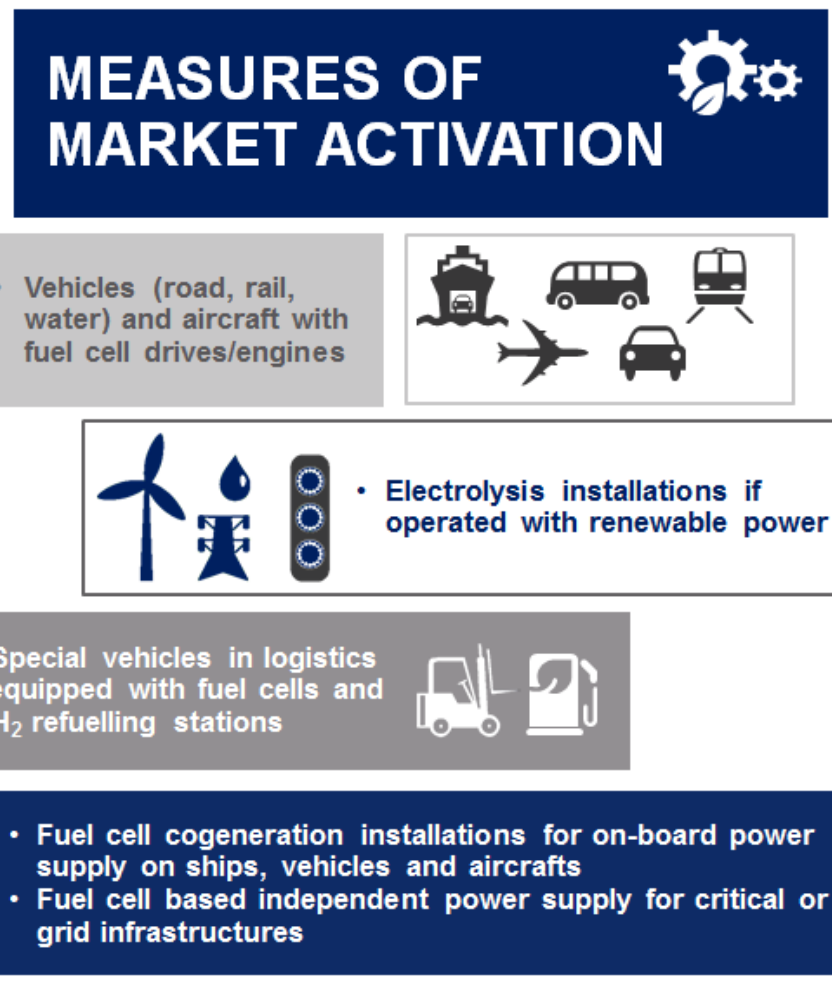
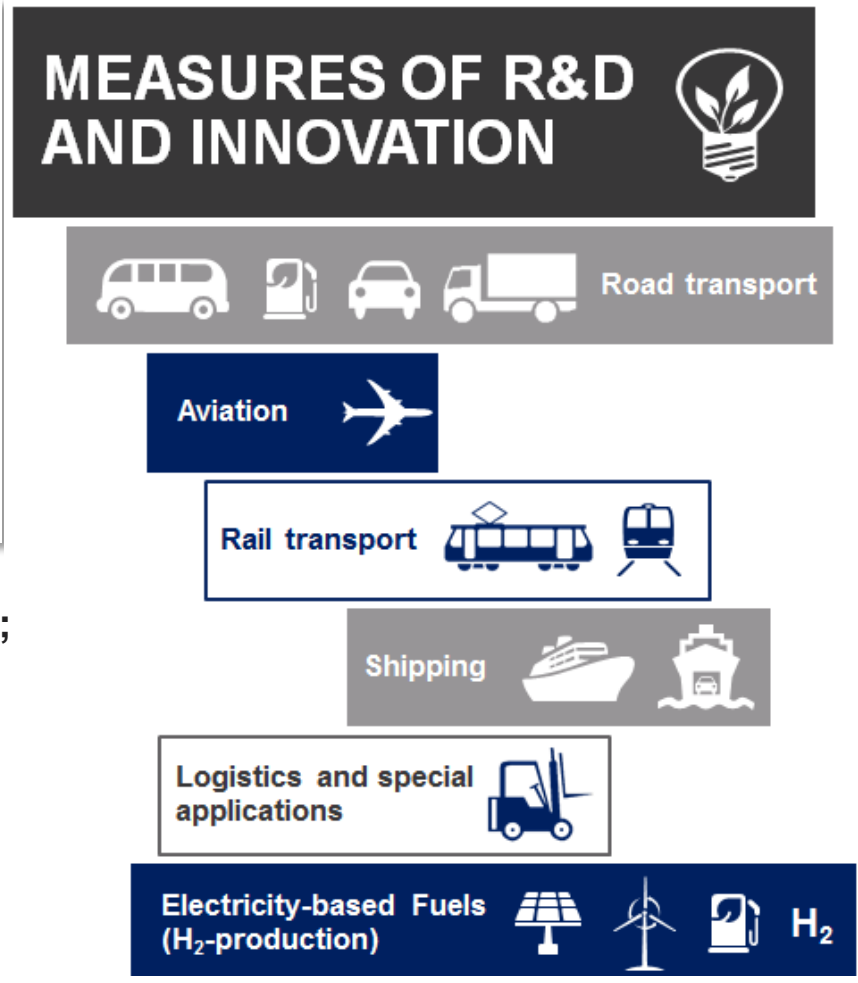
# Establishing a hydrogen and fuel cell market – The NIP II (2016 – 2026)



funding guideline; open call

Bundesministerium für Verkehr und digitale Infrastruktur

€ 250 million 2017 - 2019



funding guideline implemented via individual calls





# Train applications for regional projects – Development and deployment of Fuel Cell trains

## Technical Data:

- ALSTOM Coradia iLint
- Based on the diesel train Coradia Lint 54
- 2 fuel cell stacks
- 2 hydrogen tanks (each 130 kg)
- 2 x 272 kW power at the wheel
- Up to 1000 km range
- Maximum speed of 140 km/h
- Approximately 119 t total weight
- Approximately 55 m length



**Scope on regional, integrated concepts within the NIP in the future.**

# Renewable hydrogen production – Collaboration needed on a global scale



- Fuel Cell Technology Office (FCTO) of the DoE
- California Fuel Cell Partnership (CaFCP), California Air Resources Board (CARB)



- Government Support Group GSG, Sustainable Transport Forum STF
- Fuel Cell and H2 Joint Undertaking FCH JU
- French-German Workgroup E-Mobility



- New Technology Development Organisation NEDO & Ministry of Energy, Trade and Industry
- Bilateral Power-to-Gas-Project



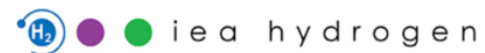
- China Automotive Technology and Research Center CATARC & Ministry of Science and Technology MoST
- Sino-German Electro Mobility Innovation and Support Center SGEC (bilateral projects)



GOVERNMENT SUPPORT GROUP



MISSION INNOVATION



giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH





**Thank you!**

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