

Tokyo | February 25th, 2020

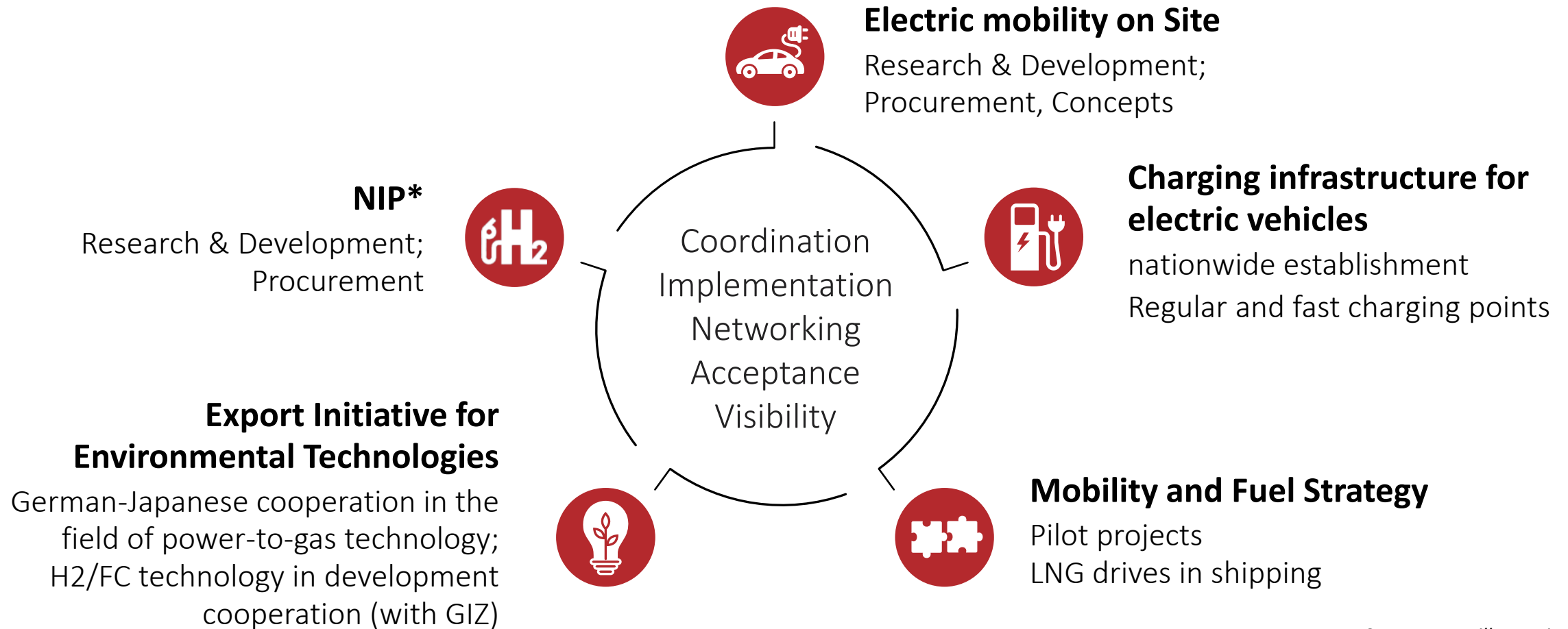
# The Current Status of Fuel Cell and Hydrogen Technology in Germany

8th FC International Meeting

Dr. Geert Tjarks | Head of Division International Cooperation, NOW GmbH

# TOWARDS ZERO EMISSION MOBILITY

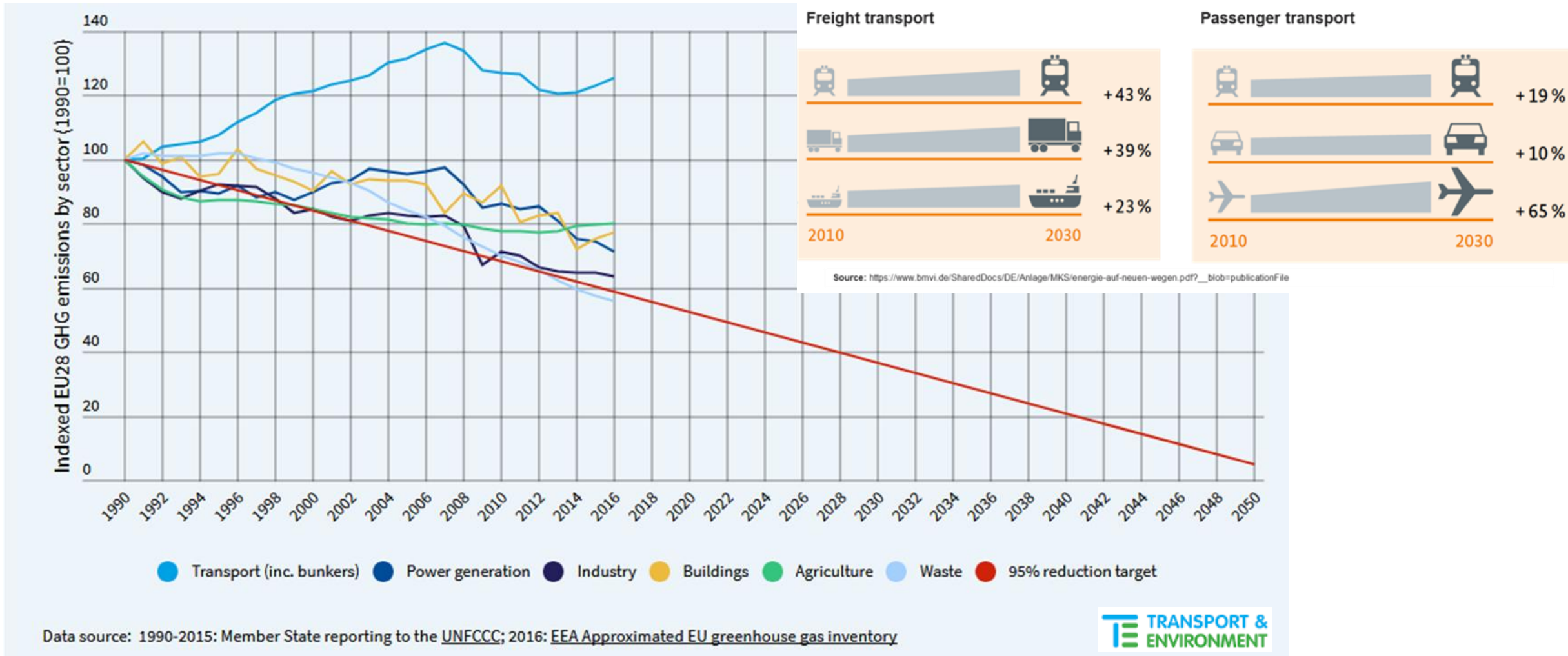
Integrated implementation of national funding programs by NOW GmbH



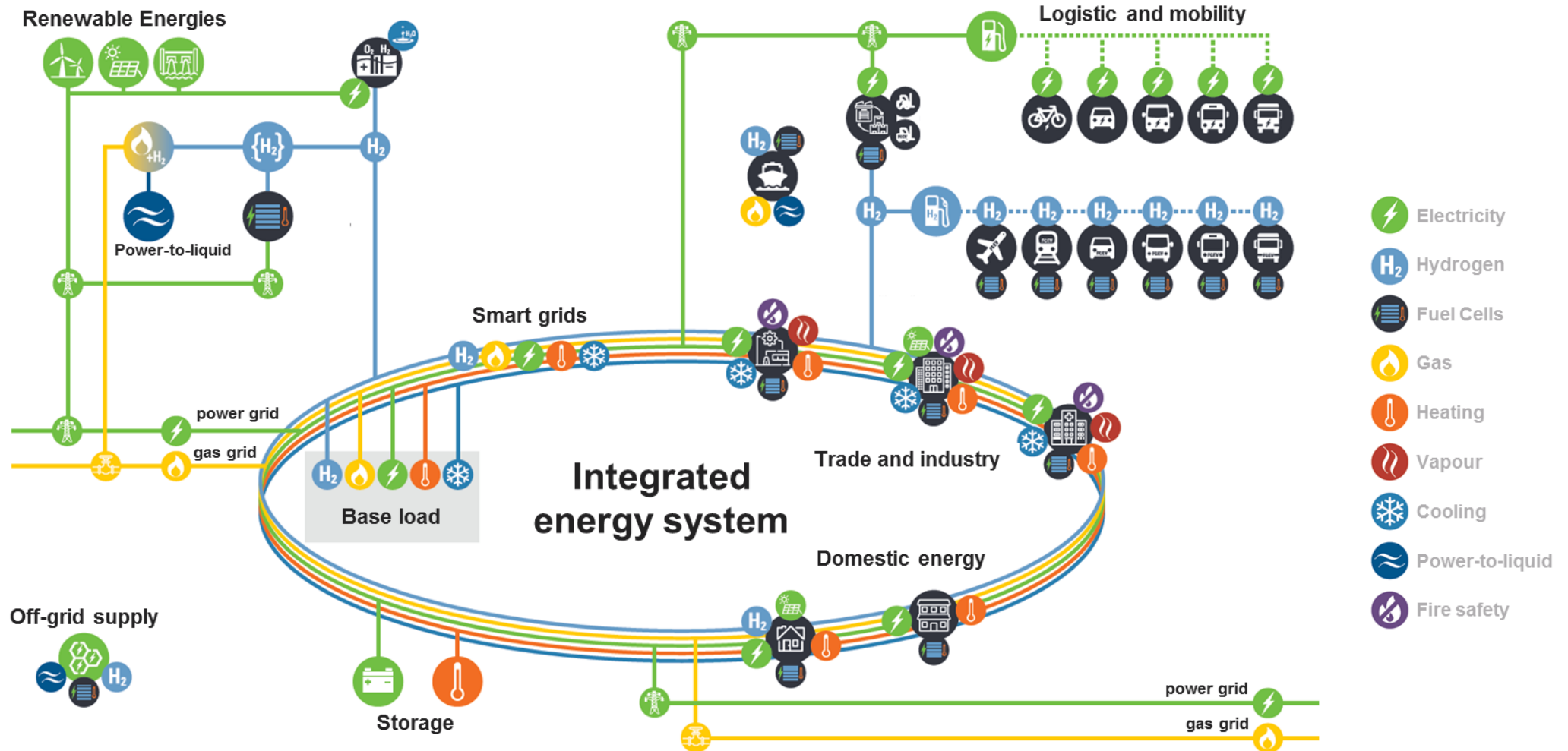
Source: own illustration

\* National Innovation program for hydrogen and fuel cell technology

# GHG REDUCTION CHALLENGE FOR TRANSPORTATION

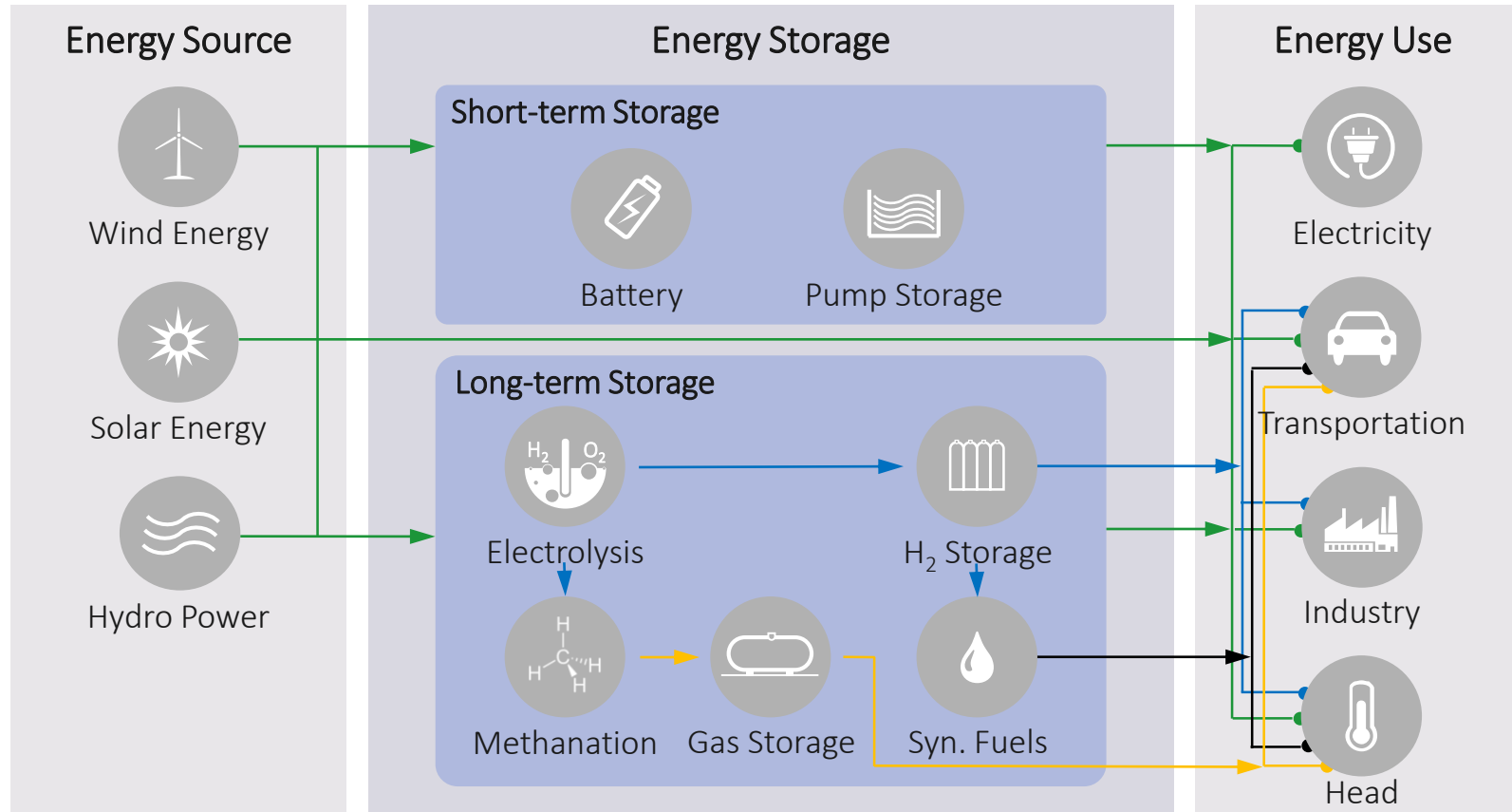


# THE INTEGRATION OF RENEWABLES INTO THE ENERGY SYSTEM



# FLEXIBLE TECHNOLOGY FOR INTEGRATED CONCEPTS

Use case of Hydrogen for different sectors

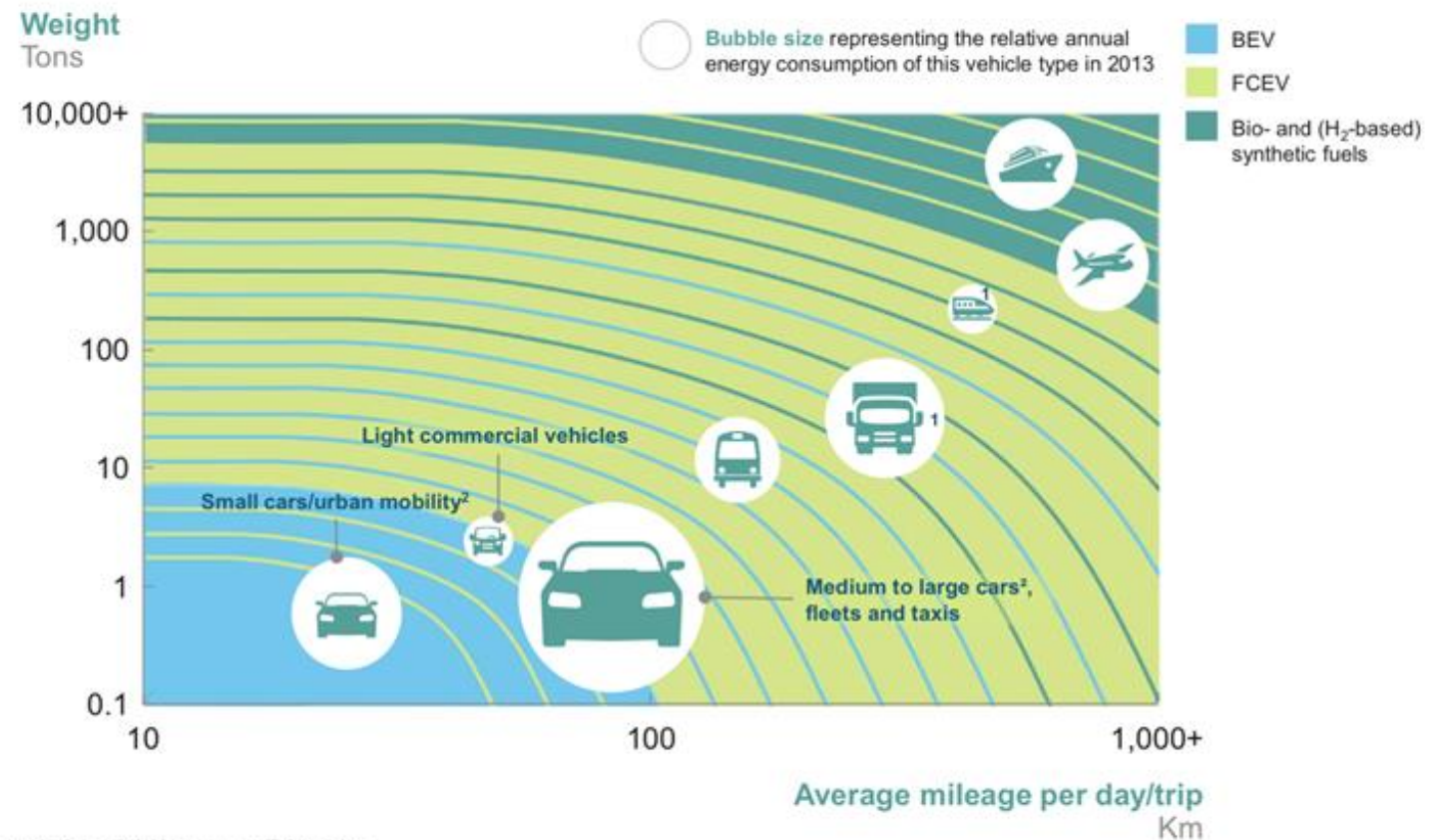


Source: NOW GmbH

# HYDROGEN IN THE TRANSPORTATION SECTOR

Technology mix required to achieve decarbonisation

- Fuel Cell Technology for Trains, Heavy Duty Applications, Buses and Passenger Vehicles for fleet operation or long-distances
- Deployment of fleets to achieve predictable hydrogen demand in the transport sector in the short- and mid-term
- Cost reduction of green hydrogen production enables synthetic fuels in the mid- and long-term



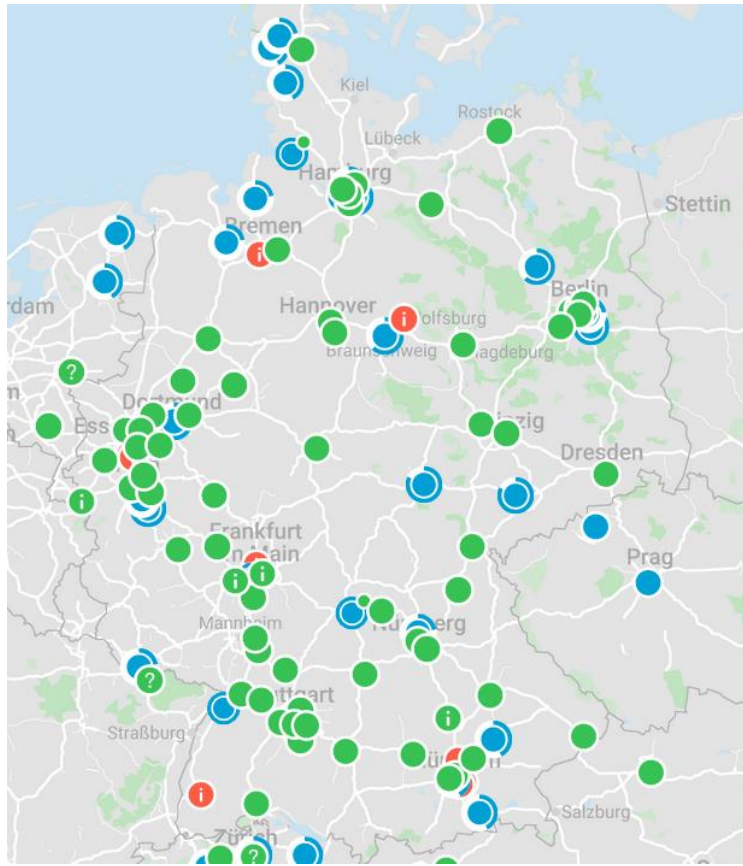
<sup>1</sup> Battery-hydrogen hybrid to ensure sufficient power.

<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

# H2 HYDROGEN REFUELLING STATIONS IN GERMANY AND EUROPE

The German Government is implementing its strategic framework as part of the European Alternative Fuels Infrastructure Directive (AFID): 400 HRS by 2025

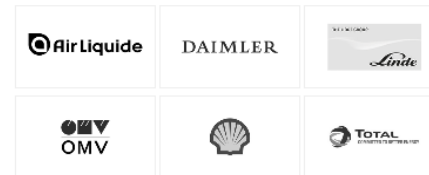


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98 ● 10 ● In operation 49 ● in progress



### The partners



### Associated partners and advisors



### Sponsors



<https://h2.live/>

# FUEL CELL TECHNOLOGY FOR TRAIN APPLICATIONS

Deployment on non-electrified tracks

**ALSTOM**

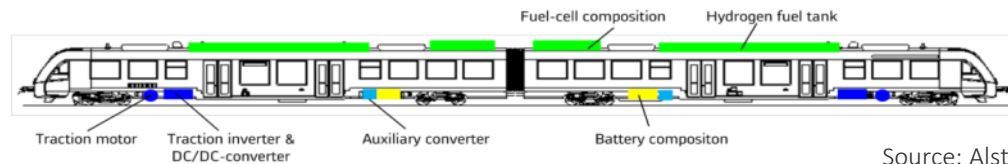


Source: Alstom

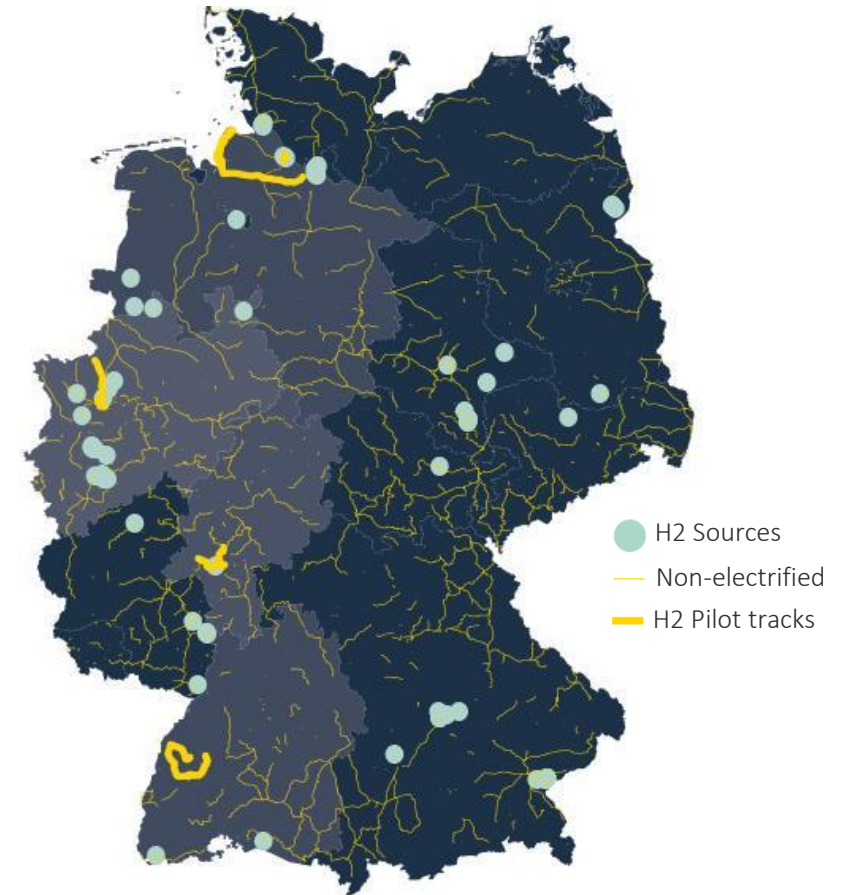
**SIEMENS**



Source: Siemens

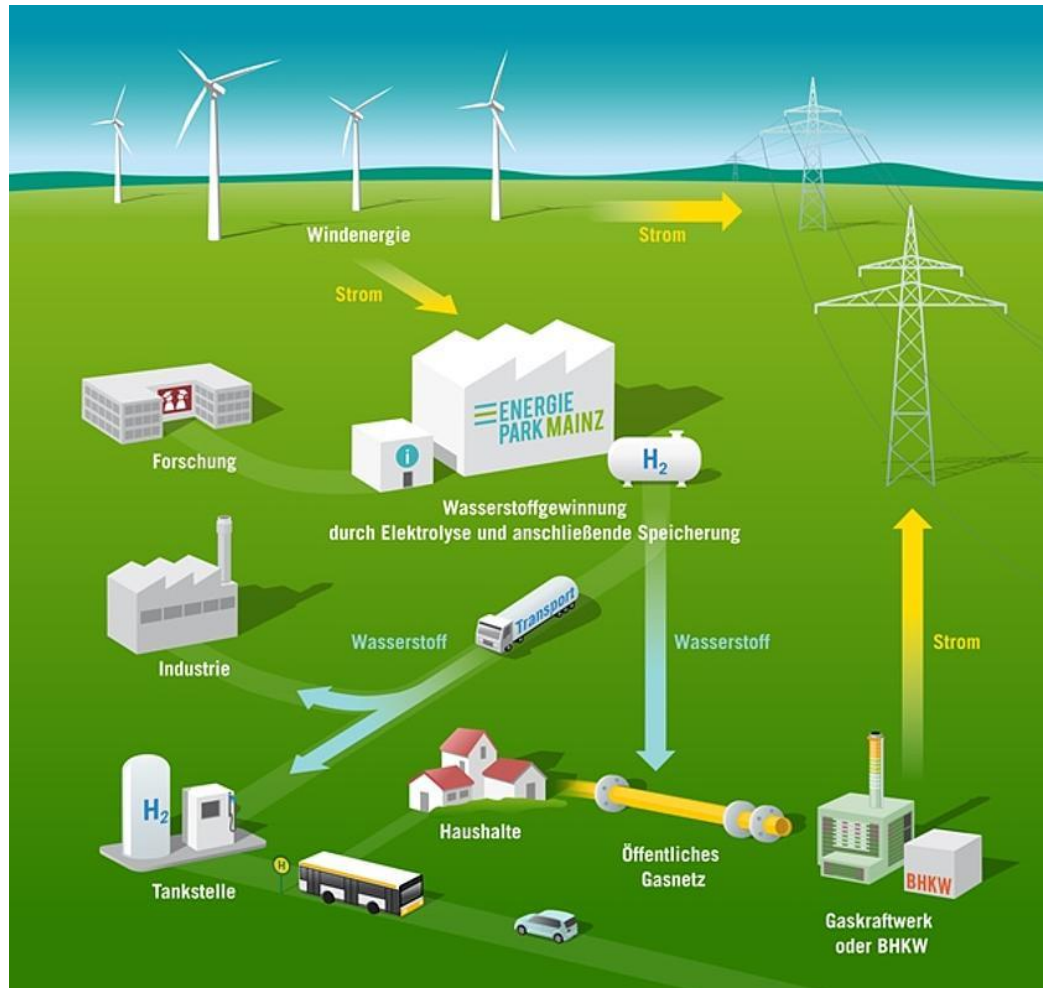


Source: Alstom





# POWER TO GAS AS KEY TECHNOLOGY



Source: [www.energiepark-mainz.de](http://www.energiepark-mainz.de)



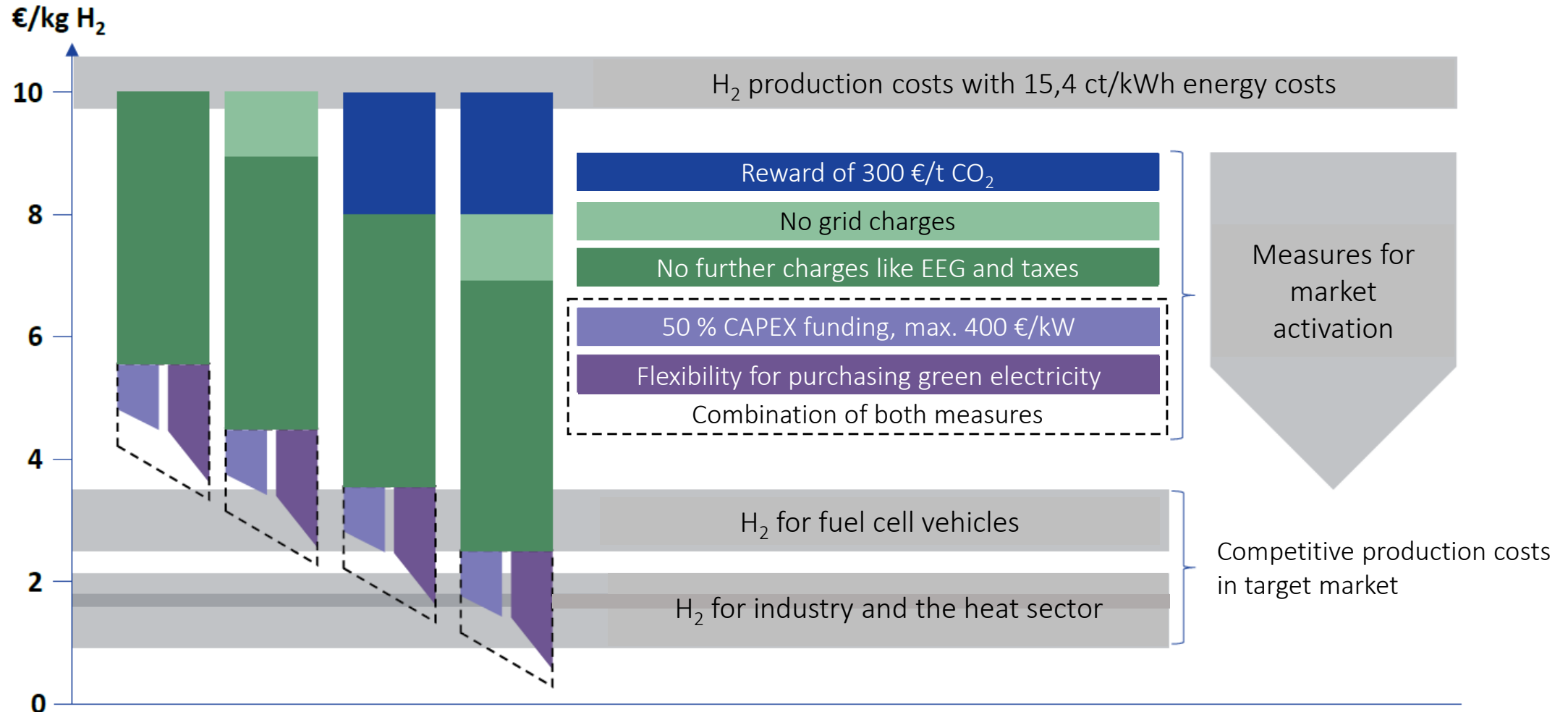
Source: [www.siemens.com/presse](http://www.siemens.com/presse)



Source: [www.siemens.com/presse](http://www.siemens.com/presse)

# SUITABLE REGULATORY FRAMEWORK IS NEEDED

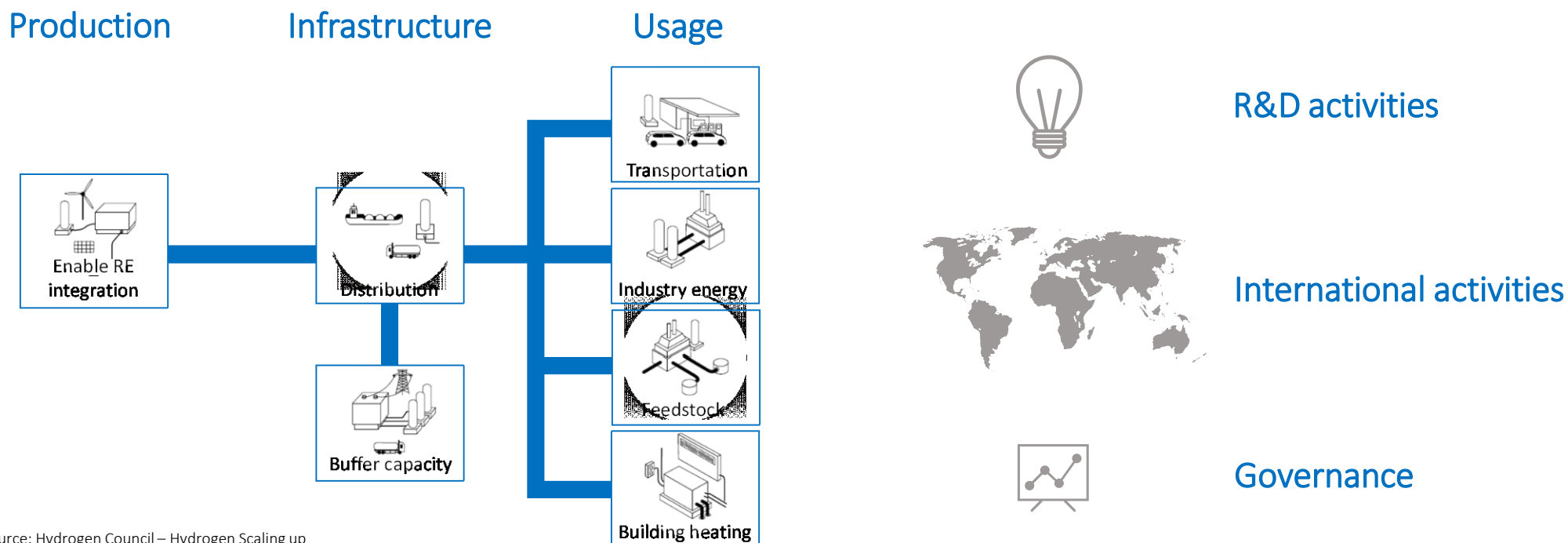
Different measures for achieving price competitiveness



Source: Study IndWEDE, [www.now-gmbh.de](http://www.now-gmbh.de)

# THE GERMAN HYDROGEN STRATEGY

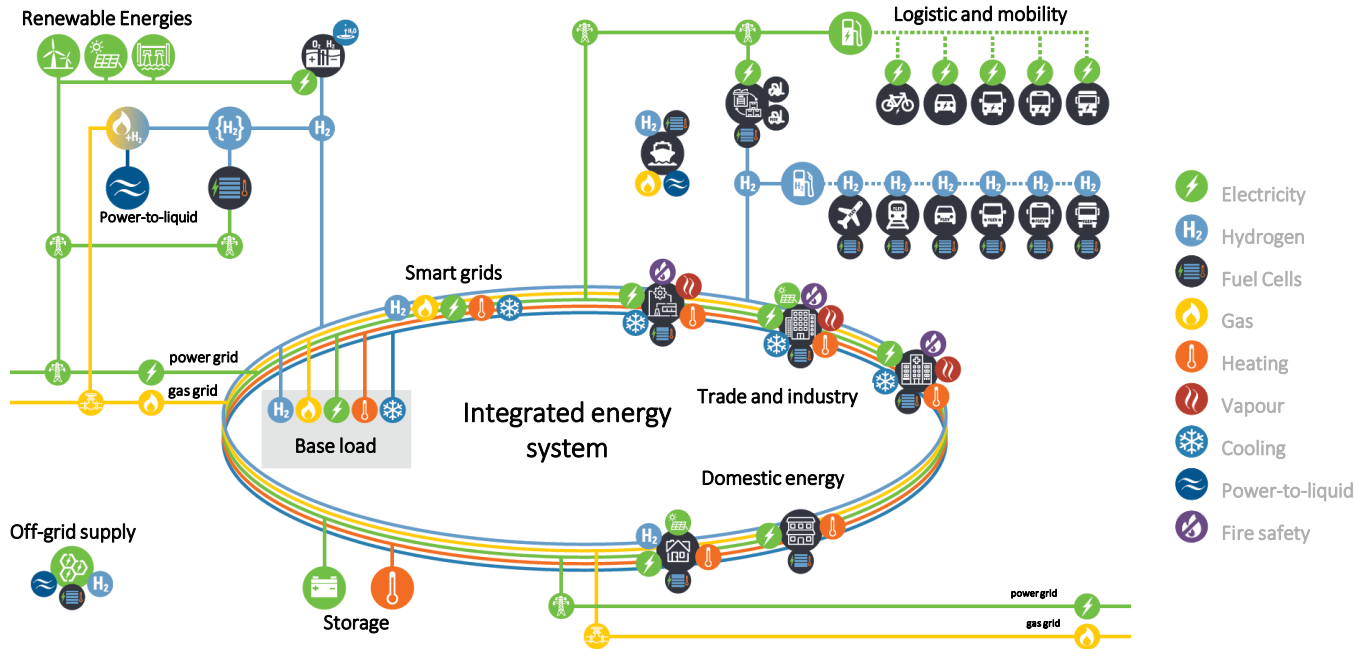
A **National Hydrogen Strategy** is under development by four ministries: BMWi, BMVI, BMBF and BMZ. The National Hydrogen Strategy will be introduced in **March 2020** and will contain the **framework for further activities** of the German Government towards hydrogen technologies until 2030 including around **30 measures** to enable a hydrogen economy.



Source: Hydrogen Council – Hydrogen Scaling up

# FLEXIBLE FUNDING FRAMEWORK FOR INTEGRATED PROJECTS

HyLand Projects within the National Innovation Program



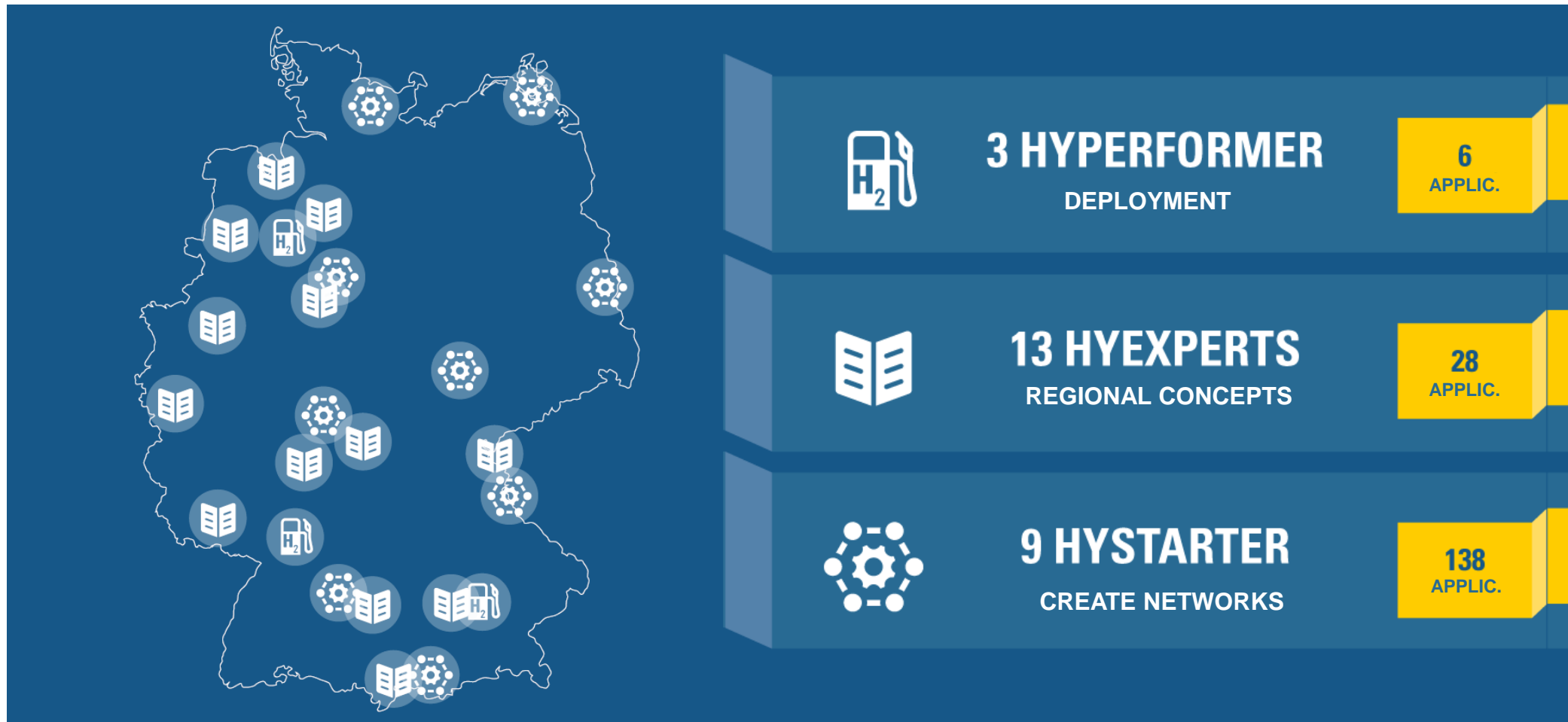
Flexible funding framework within the NIP for regional, integrated projects with support of

HyStarter: Concept development

HyExperts: Stakeholder network

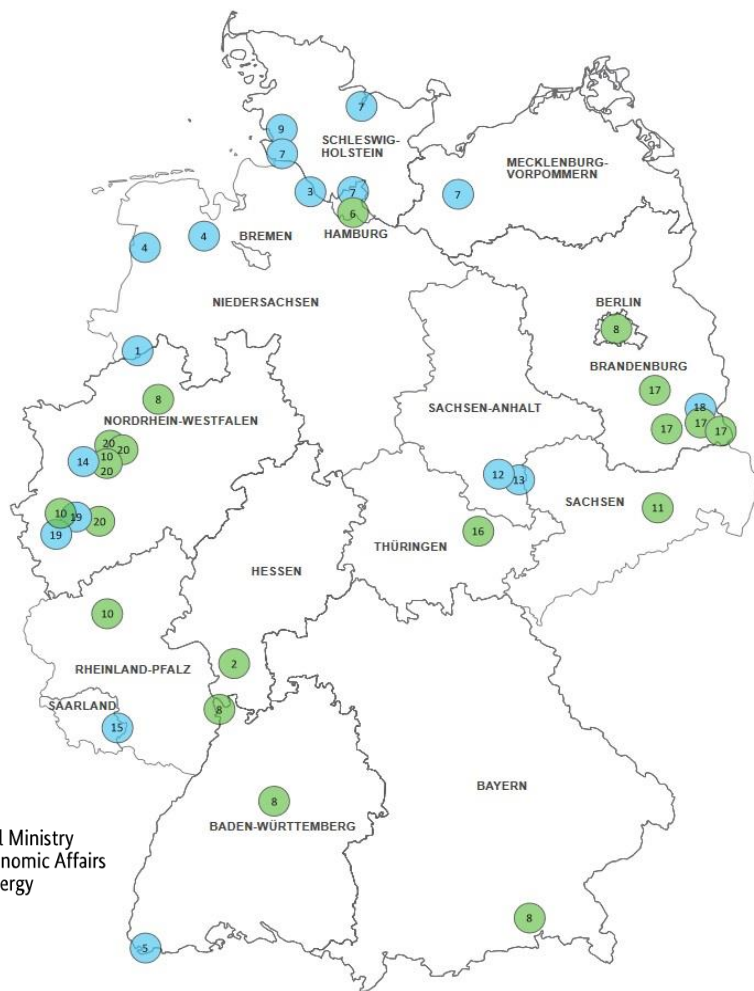
HyPerformer: Subsidies for deployment





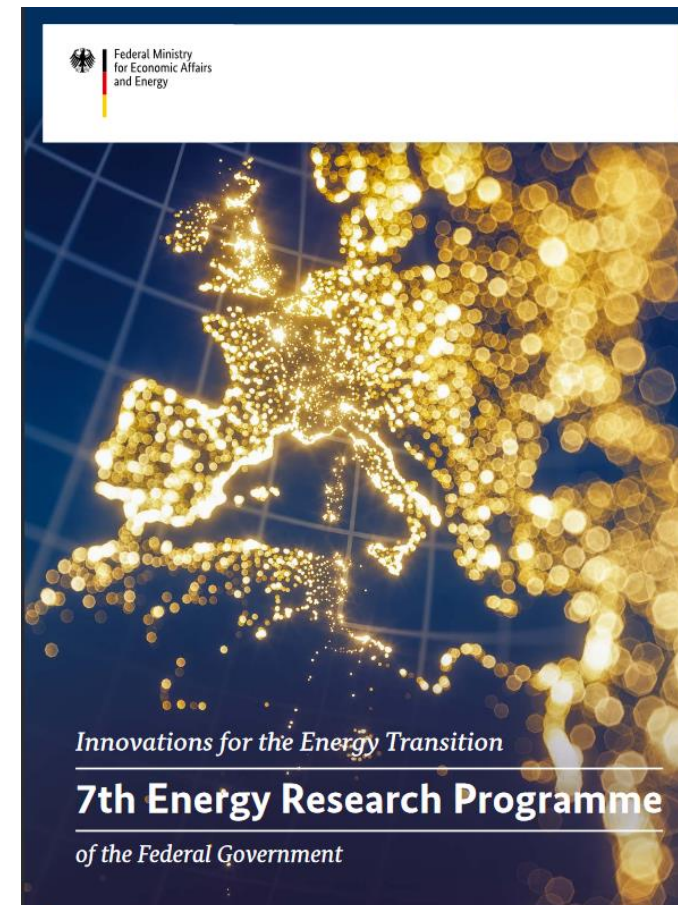
# LIVING LABS FOR LARGE-SCALE HYDROGEN PRODUCTION

Integration of large-scale green hydrogen production as Innovation



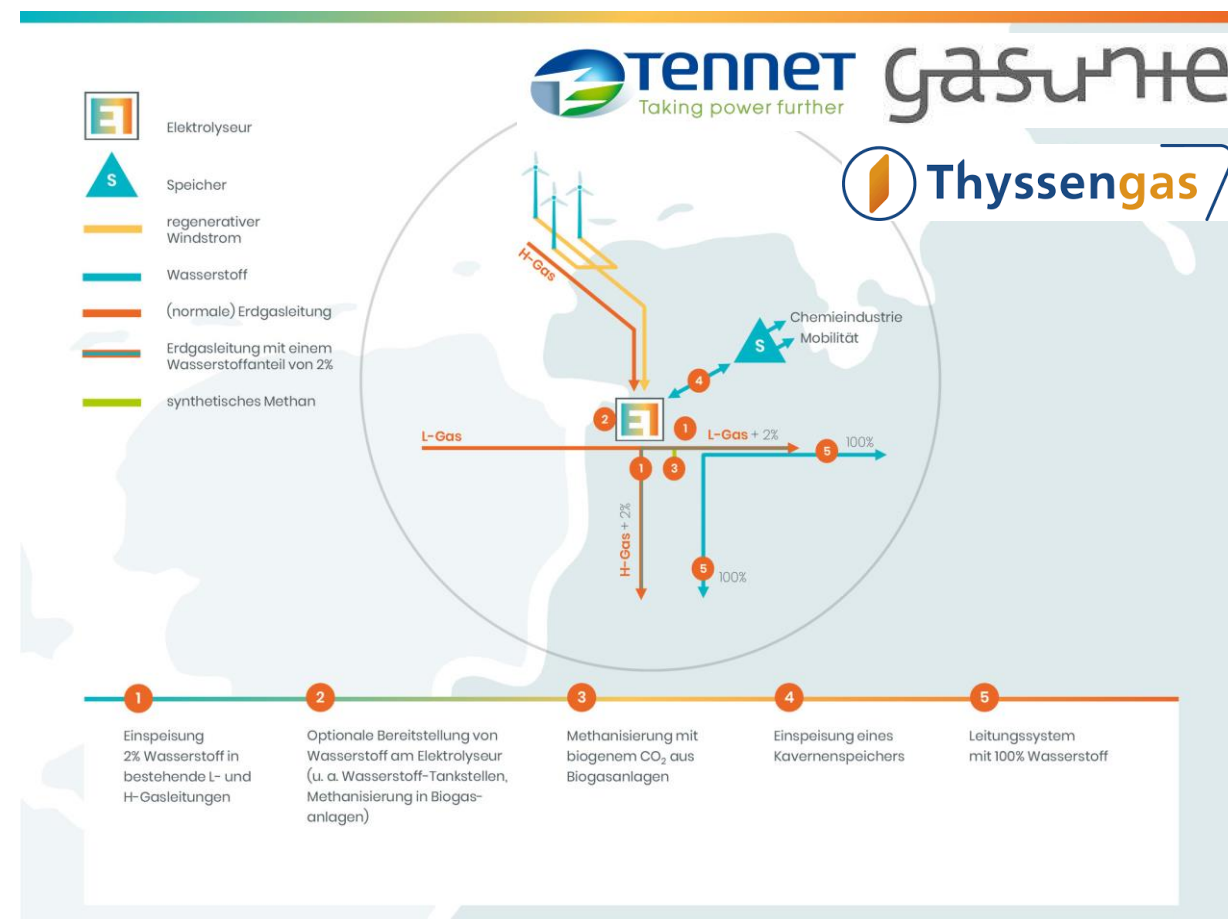
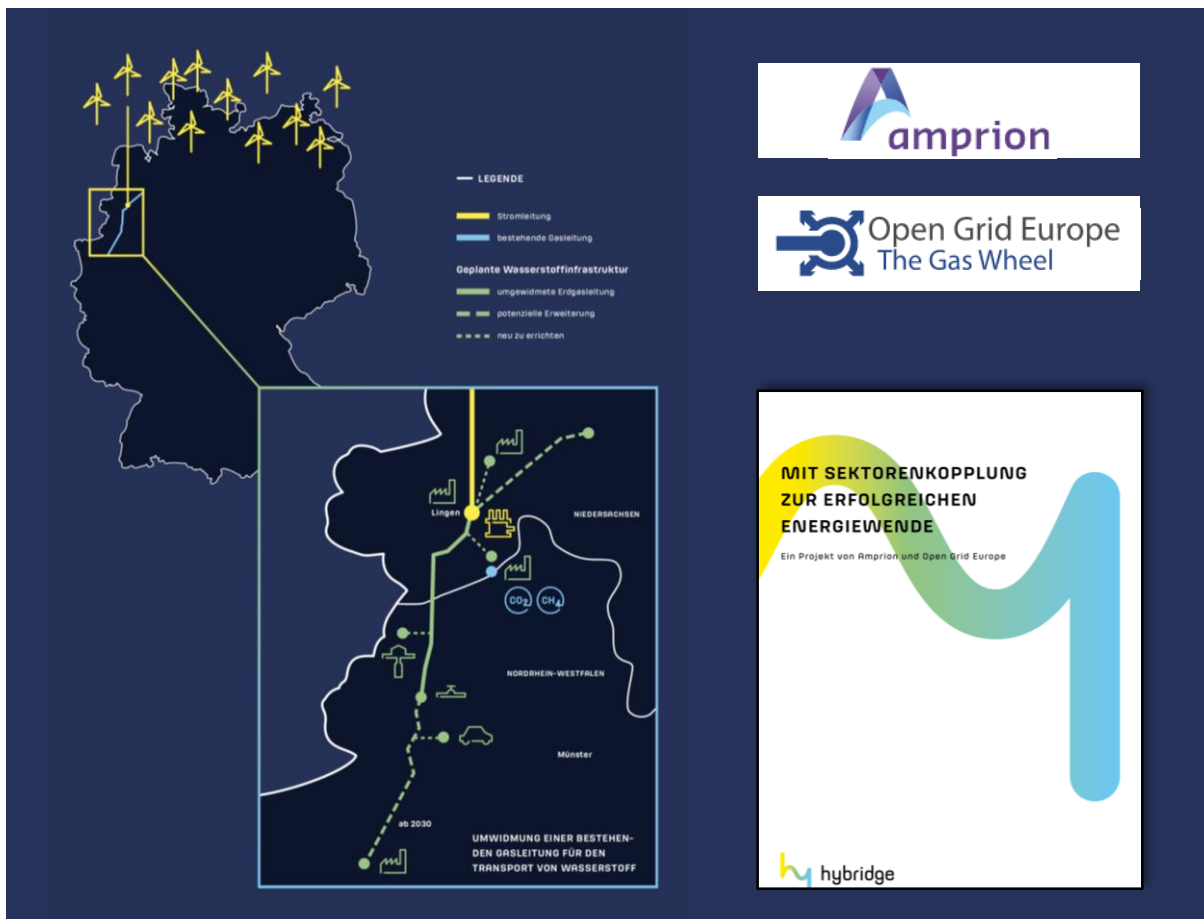
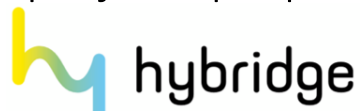
## Living Labs: 11 H<sub>2</sub> Projects

- 1 | CCU P2C Salzbergen
- 3 | DOW Stade – Green MeOH
- 4 | Element Eins
- 5 | H2 Wyhlen
- 7 | Norddeutsches Reallabor
- 9 | ReWest100
- 10 | SmartQuart
- 12 | EnergieparkBL
- 13 | GreenHydroChem
- 14 | H2Stahl
- 15 | HydroHub Fenne
- 18 | RefLau



# EXAMPLES FOR LARGE-SCALE PROJECT IDEAS

e.g. 100 MW projects proposed to manage increase of renewable energies



# NATIONAL ACTIVITIES IN THE INTERNATIONAL CONTEXT

Regional and integrated programs for first large scale deployment



**Reallabore /  
HYLAND**

**H2 Valley**

**Mission Innovation  
IC#8 / CEM H2I**

## Potential of the initiatives

- First market near projects for green hydrogen production
- Stakeholder network and best-practice
- Including national stakeholders in international activities
- Link between national and international activities



# INTERNATIONAL COOPERATION AS ENABLER FOR HYDROGEN



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

■ Partners both within networks and strong bilateral relations

■ Partners within networks



- 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 SGEN (bilateral projects)



Thank you for  
your attention!



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