

Elena Hof | Brussels | 17th May 2019

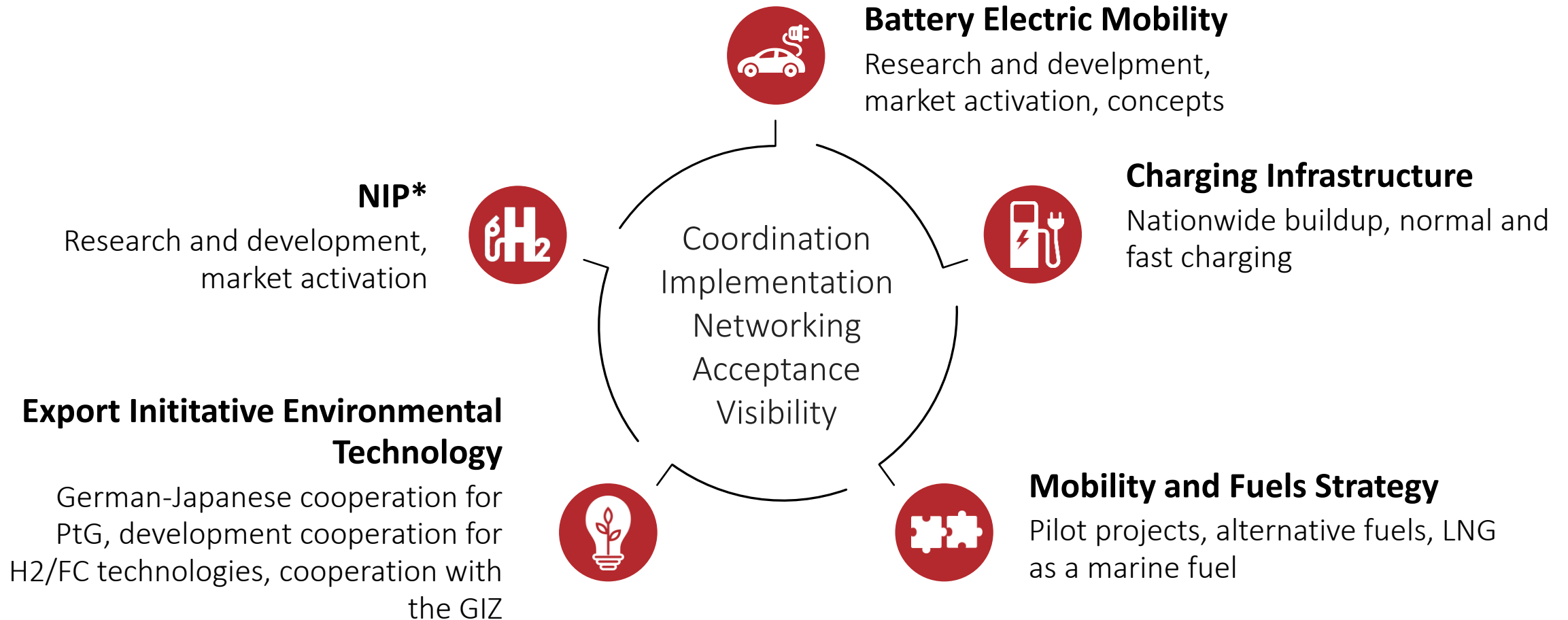
Germany's Perspective on Hydrogen Trains

- Political Perspective & Policy Landscape -

FCH JU Workshop on the use of hydrogen in the railway environment

SHAPING SUSTAINABLE MOBILITY

Integrated implementation of German national funding programmes



R&D PROJECTS

Fuel cell and battery electric trains



X-EMU

Siemens, RWTH
Aachen – Fuel cell
drive for hybrid EMU
trains



TALENT 3

Bombardier, TU
Berlin, NVBW, SWEG
– development of a
battery electric train



iLint

Alstom, DLR –
development &
validation of a fuel
cell electric train



EcoTrain

DB RegioNetz, TU
Chemnitz, TU
Dresden – modular
battery drive and
storage technology

NIP – VEHICLE AND INFRASTRUCTURE ACQUISITION



5 calls

241 Mio. € requested funding of which

191 Mio. € are requested funding for trains

85 Mio. € granted



Cars	563
LDV	500



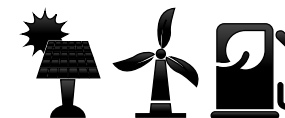
Busses	84
HRS	3
Ely	1



Trains	164
HRS	13
Ely	7



Ships	1
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HRS	47
Ely	11

ACQUISITION OF HYDROGEN TRAINS IN GERMANY

Defined projects



LNVG, LOWER SAXONY

Cuxhaven – Bremerhaven – Bremervörde – Buxtehude

14 trains + HRS in Bremervörde, acquisition until the end of 2021,
operation starting in early 2022

RMV/FAHMA, HESSE

RMV lines 11, 12, 15 & 16

28 trains + HRS in Frankfurt-Höchst, acquisition and start of operation in 2022



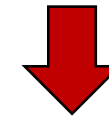
„FOR RAIL TRANSPORT WE INTEND TO ESTABLISH A COMPREHENSIVE FUNDING PROGRAM, WHICH COVERS BOTH THE ELECTRIFICATION OF TRACKS AND THE ACQUISITION OF VEHICLES AND THE RESPECTIVE CHARGING/REFUELING INFRASTRUCTURE. FURTHERMORE, REGIONAL RAIL TRANSPORT IS INTENDED TO BE SUPPORTED THROUGH INVESTMENT GRANTS FOR FUEL-CELL-HYBRID-RAILCARS INCLUDING FACILITIES & DEPOT MODIFICATIONS AS WELL AS THE CONSTRUCTION AND OPERATION OF HYDROGEN REFUELING STATIONS.“

– TRANSLATED FROM THE COALITION AGREEMENT BETWEEN CDU, CSU & SPD, 2018

NEW FUNDING GUIDELINE



- Applications for 164 fuel cell trains, 11 HRS and 4 onsite electrolyzers
- Expressions of interest for more than 300 battery and fuel cell electric trains until 2024



New funding programm for the acquisition of trains with alternative drives

- Announced budget 2019: 13.9 Mio € + 38.8 Mio € until 2024
- Funding guideline in preparation

THE GERMAN RAIL NETWORK



34.000 km of which
59% are electrified
(goal: 70% by 2025)

Regional rail
transport: 36% of
train-kilometres with
diesel traction

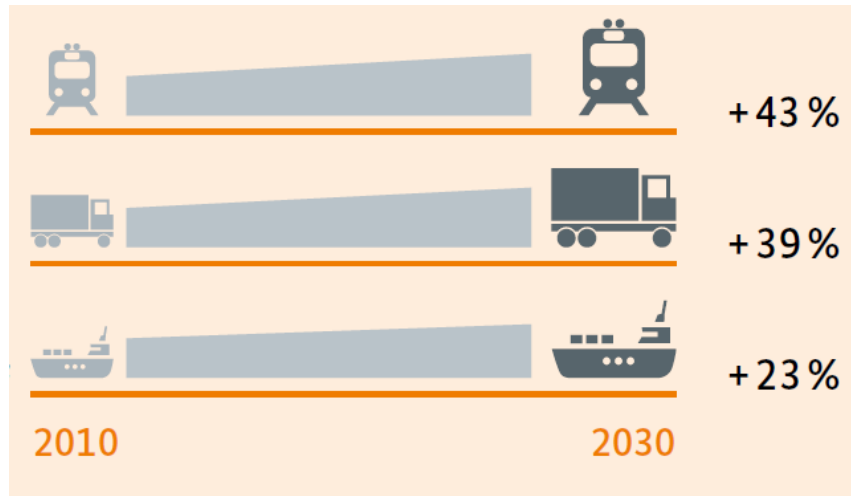
1 km electrification
costs 1-2 Mio €

- Electrification through catenaries
→ feasible for tracks with a high level of traffic
- Battery electric trains
→ lucrative for tracks with already existing catenaries in some parts
- Fuel cell electric trains
→ lucrative for longer tracks (up to 1.000 km range) without catenaries and with availability of inexpensive hydrogen sources

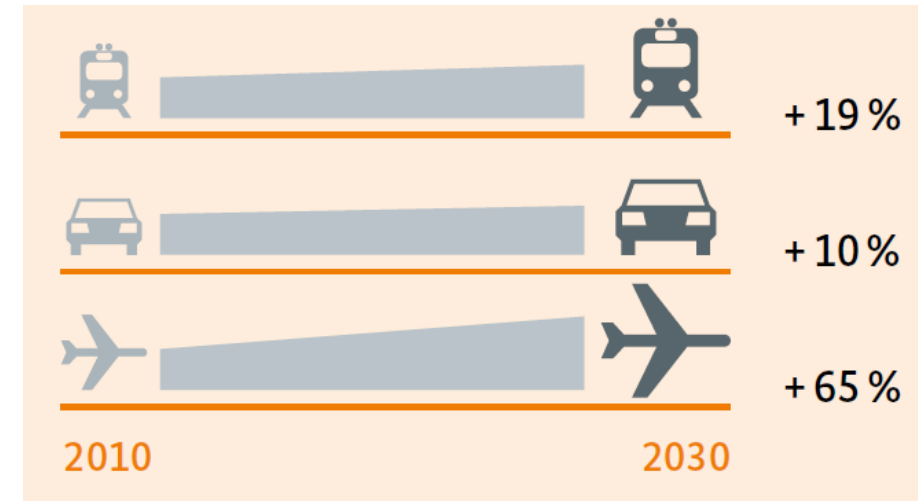
Conclusion: SIGNIFICANT POTENTIAL FOR BOTH BATTERY AND FUEL CELL ELECTRIC TRAINS IN GERMANY

TRAFFIC FORECAST GERMANY 2030

Freight transport



Passenger transport



Source: https://www.bmvi.de/SharedDocs/DE/Anlage/MKS/energie-auf-neuen-wegen.pdf?__blob=publicationFile

Great potential for fuel cells in rail & heavy duty!

MARKET ANALYSIS

ALTERNATIVE DRIVES IN REGIONAL RAIL TRANSPORT

1

Comparison of European countries

2

Technology comparison

3

Status-quo of the German rail network

4

Detailed analysis of specific tracks

5

Market potential for battery and fuel cell

6

Derivations concerning funding

CHALLENGES

- CAPEX & financing (e.g. risk surcharges)
- Usually high costs for „green“ hydrogen production through electrolysis due to **levies**
- **Responsibility** for infrastructure (costs, risks)
- **Access to infrastructure** owned by the „DB Netz AG“
- **Legal aspects** of tendering procedures
- Lengthly **approval procedures**

POTENTIALS

- Raising hydrogen demand significantly
 - **economies of scale**
 - strengthening hydrogen as **sector coupling enabler**
- Raising **awareness**
- Proving **market maturity**
- Reducing overall **rail grid electrification costs**

Challenges & Potentials

NOW

NOW-GMBH.DE



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