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# Energiewende – More than a word?

*Perspectives on the Energy Transition in Germany*

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Hydrogen Economy Workshop  
14. May 2020, virtual

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# AGENDA: Energy Transition in Germany

1 Data and History

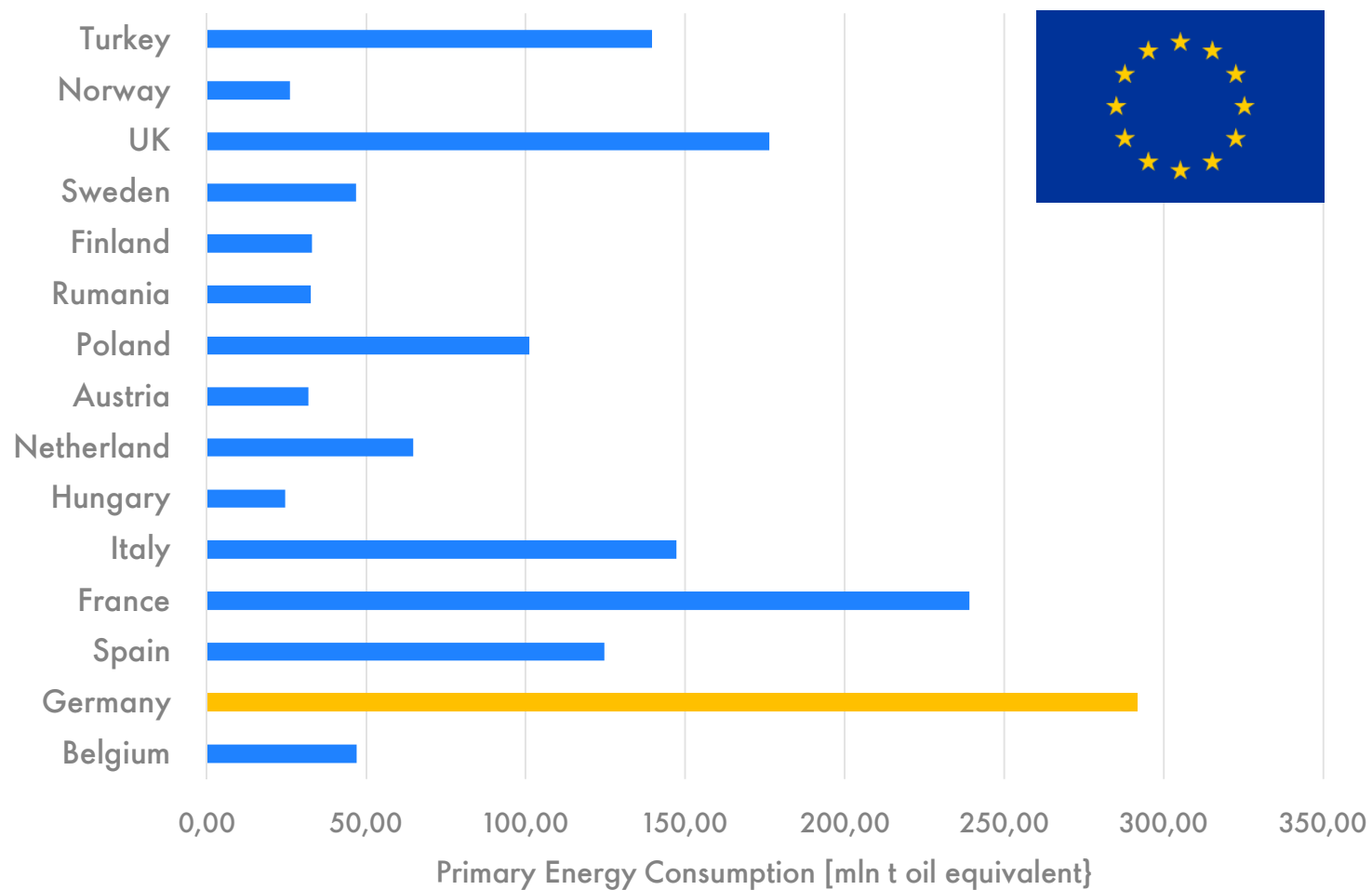
2 Policy development & „Real Labore“

3 Hydrogen Initiatives



# Primary energy consumption 2018

## Top 15 Countries EU28

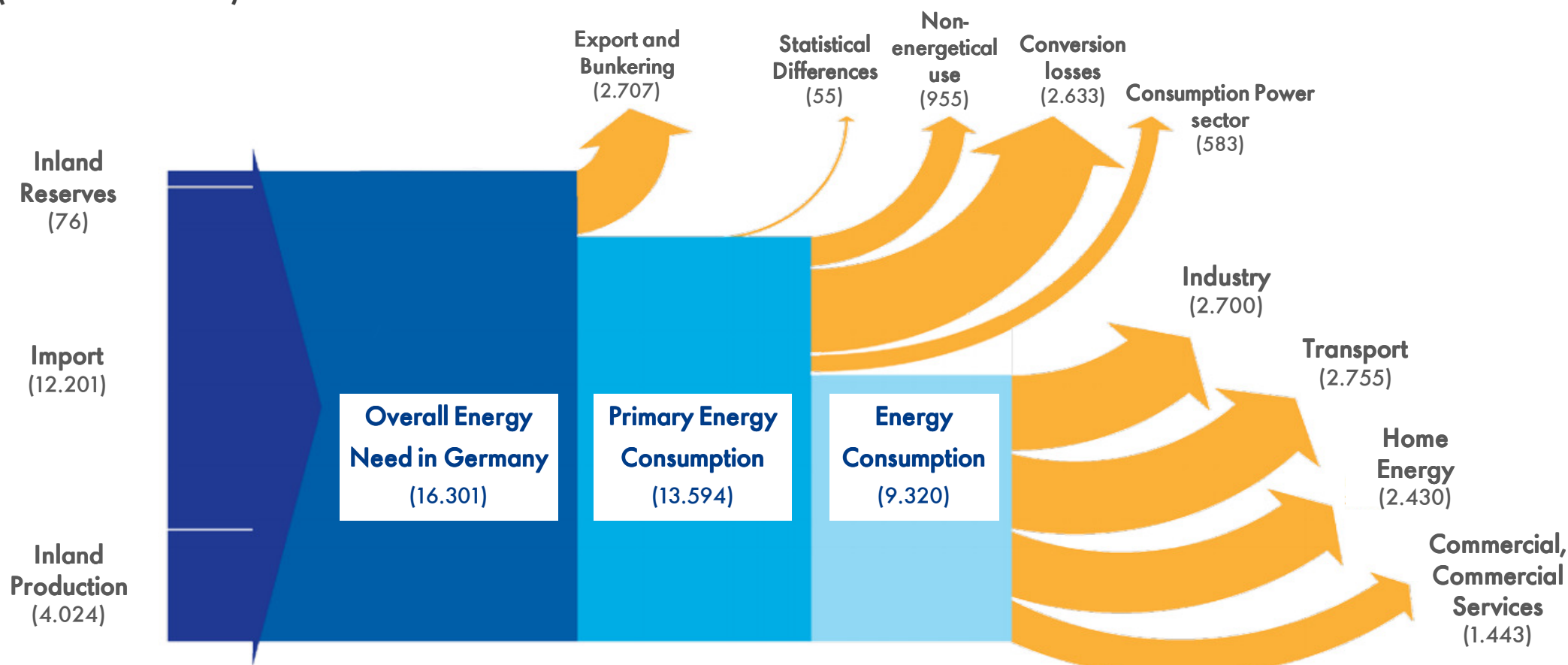


Source: eurostat Feb2020

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# Primary energy consumption in Germany

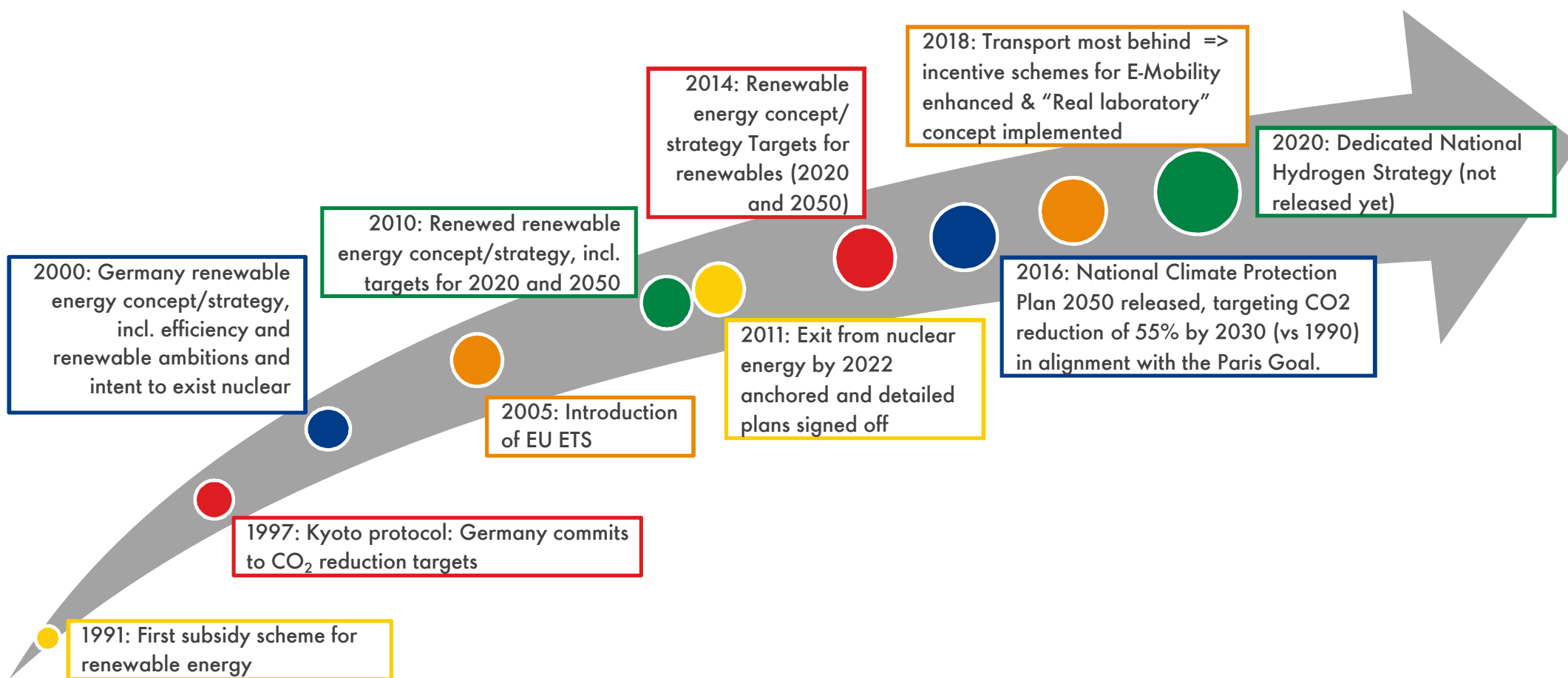
(2017 data in PJ)



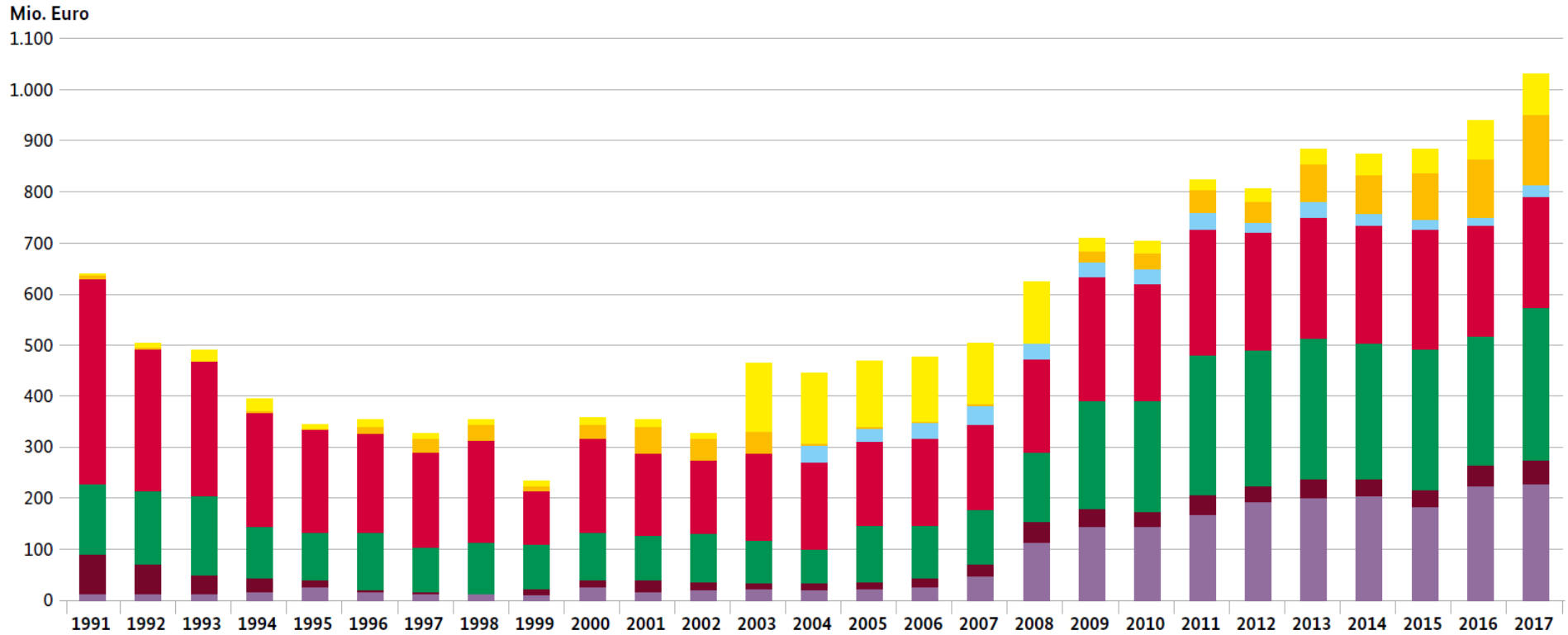
Source: AGE Arbeitsgemeinschaft Energiebilanzen e.V. – Energie in Zahlen (2. Auflage Januar 2019)

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## Energy Transition in Germany – some key milestones



# Energy research funds by the federal government in Germany



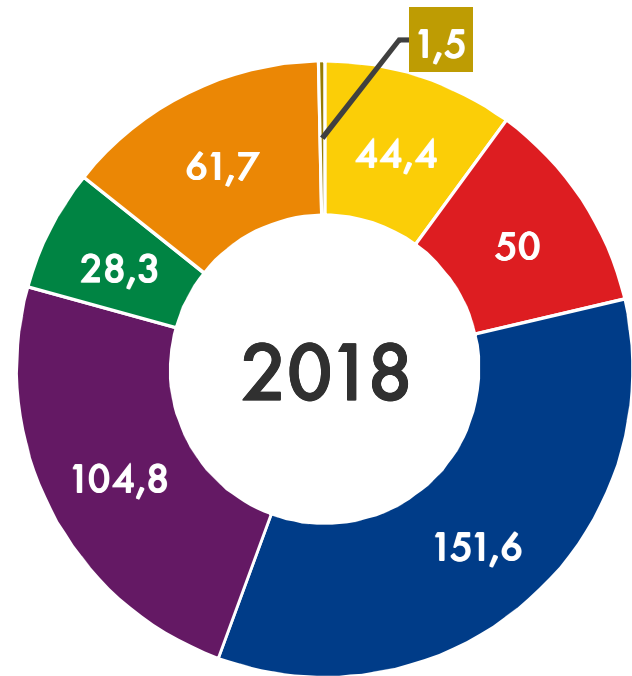
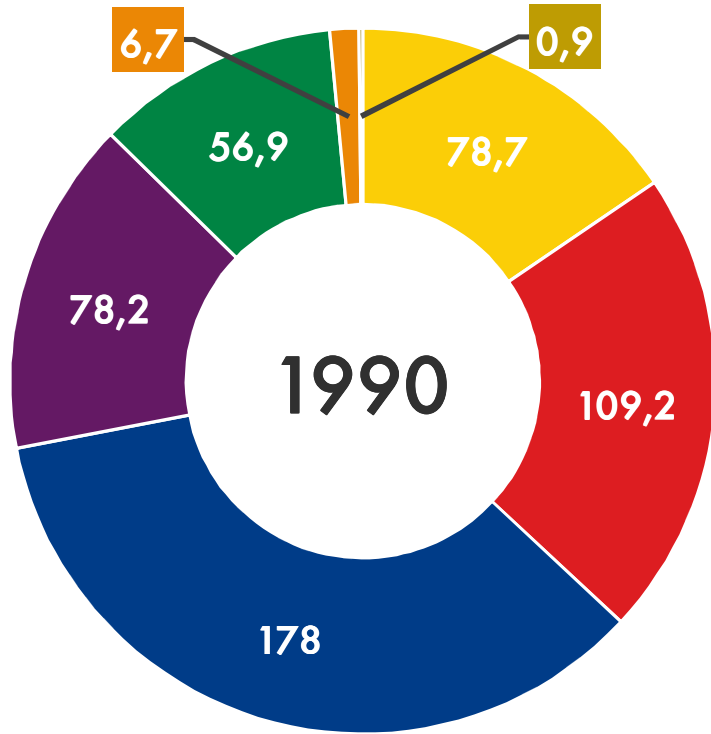
E. = Energy  
 ■ E. Efficiency ■ Fossil e. carriers ■ Renewable e. ■ Nuclear ■ Hydrogen & Fuel Cell ■ Other e. & e. storage  
 ■ Other overarching technologies

Source: German Federal Ministry for Economic Affairs and Energy – Energiedaten Gesamtausgabe (Okt 2019)

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# The energy system in Germany

Primary energy consumption in Mio t SKE

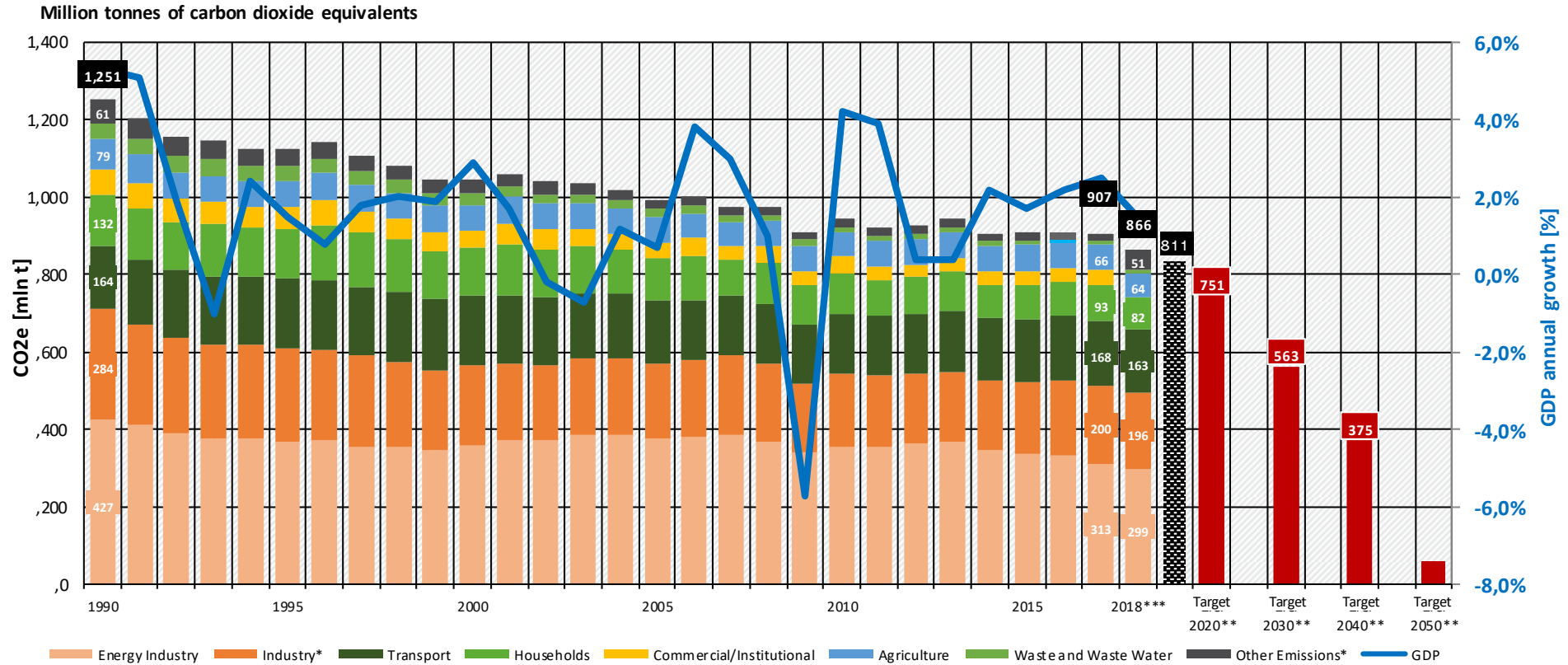


**0 by 2038** Intent (law not passed yet)

**0 by 2022** (anchored in law)



# Germany's CO<sub>2</sub>e emissions and future targets



Source: German Environment Agency, National Inventory Reports for the German Greenhouse Gas Inventory 1990 to 2017 (as of 01/2019) and estimate for 2018 from UBA Press Release 09/2019 (corrected)  
 Emissions by UN reporting category, without land use, land use change and forestry ; \* Industry: Energy and process-related emissions from industry (1.A.2 & 2) ; Other Emissions: Other combustion (rest of CRF 1.A.4, 1.A.5 military) & fugitive emissions from fuels (1.B) ; \*\* Targets 2020 to 2050: Energy Concept of the German Federal Government (2010) ; \*\*\* Short-term forecast for 2018, emissions from commerce, trade & services contained in Other Emissions

Source: Umweltbundesamt 2019 (<https://www.umweltbundesamt.de/en/indicator-greenhouse-gas-emissions>) ; <https://countryeconomy.com/gdp/germany>



# German Climate Package 2030: Overview

Klimaschutzprogramm 2030  
der Bundesregierung  
zur Umsetzung des  
Klimaschutzplans 2050



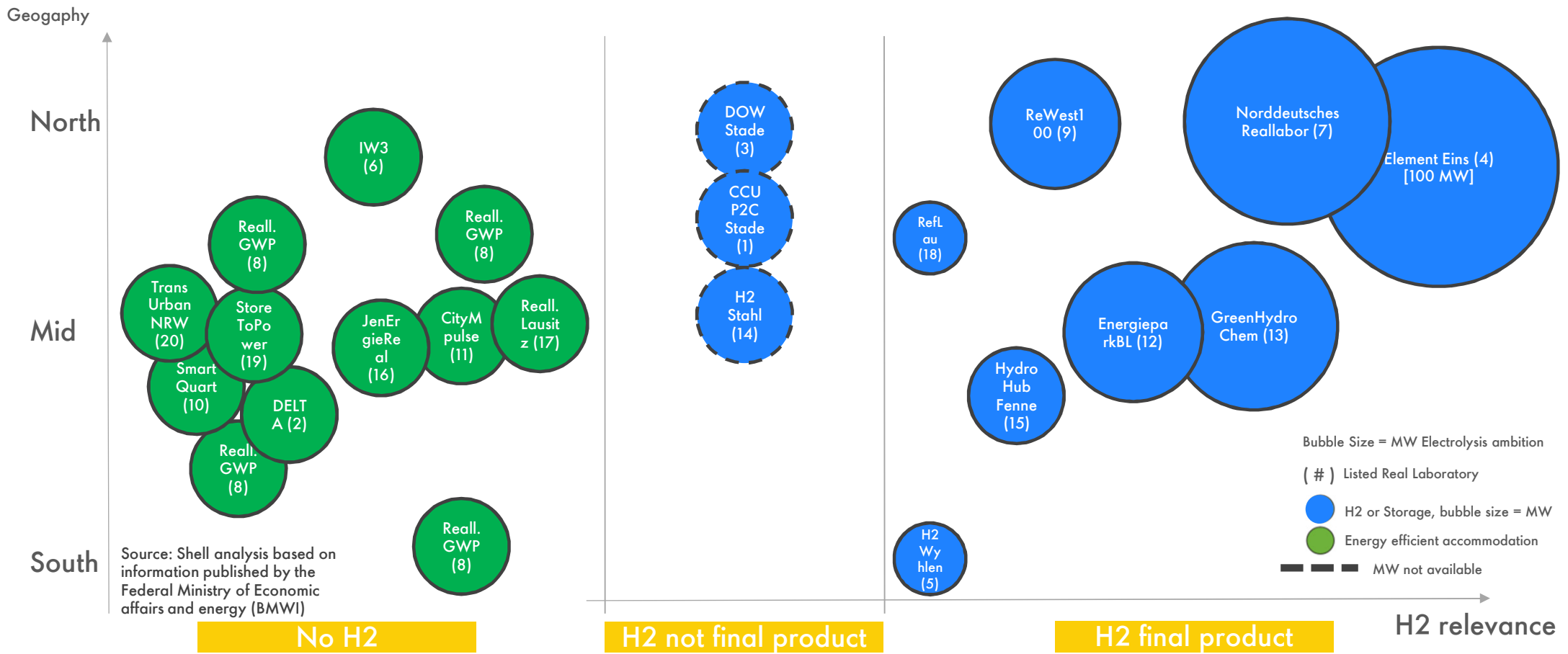
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**A)** Climate protection act (Klimaschutzgesetz)

€

**B)** Carbon pricing for fossil fuels (for home heating & road transport)**C)** Measures applicable to the households and buildings sector**D)** Measures applicable to the transportation sector**E)** Measures applicable to the power generating sector**F)** Measures for social compatibility

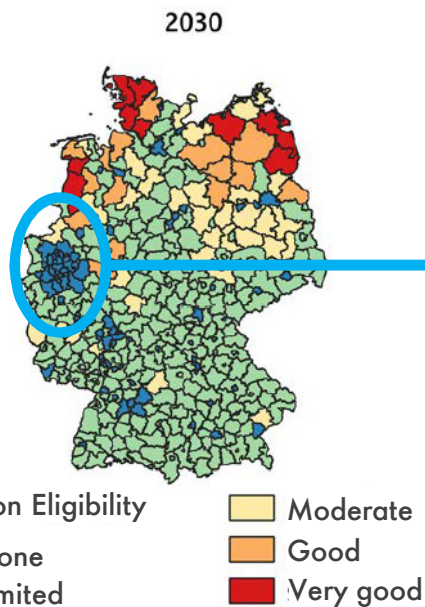
# Substantial investment in energy storage and hydrogen through “Real laboratory” concept in Germany



# Accelerate hydrogen as part of the energy transition requires integrated solutions

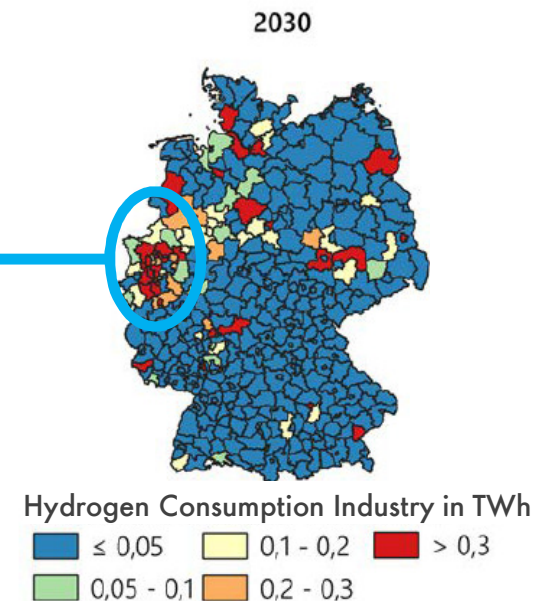
The „location dilemma“ in Germany for Hydrogen → cross country alliances are forming

## Good locations for Wind and PV



- 1) Industrial regions in Germany have demand for CO<sub>2</sub> reduced hydrogen but limited renewable resources.
- 2) Those industries are CO<sub>2</sub> intense

## Hydrogen Demand (Industry – Energy und Material Applications)

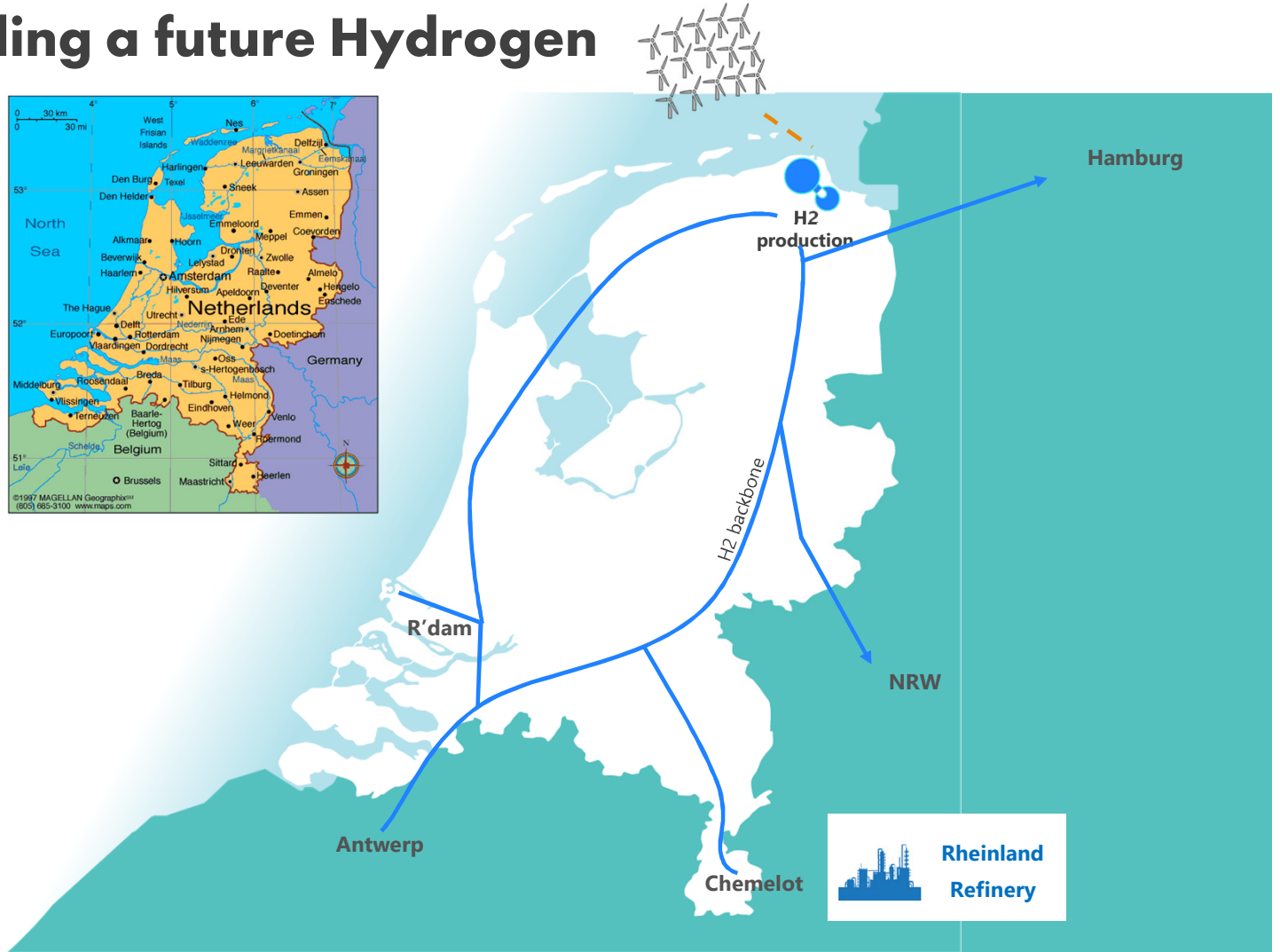
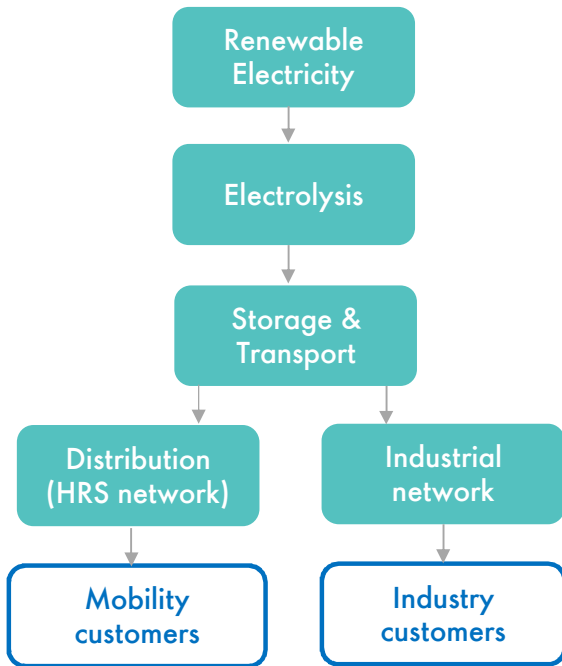


Source: FFE Study "Studie zur Regionalisierung von PtG-Leistungen für den Szenariorahmen Gas 2020 - 2030" (2019)

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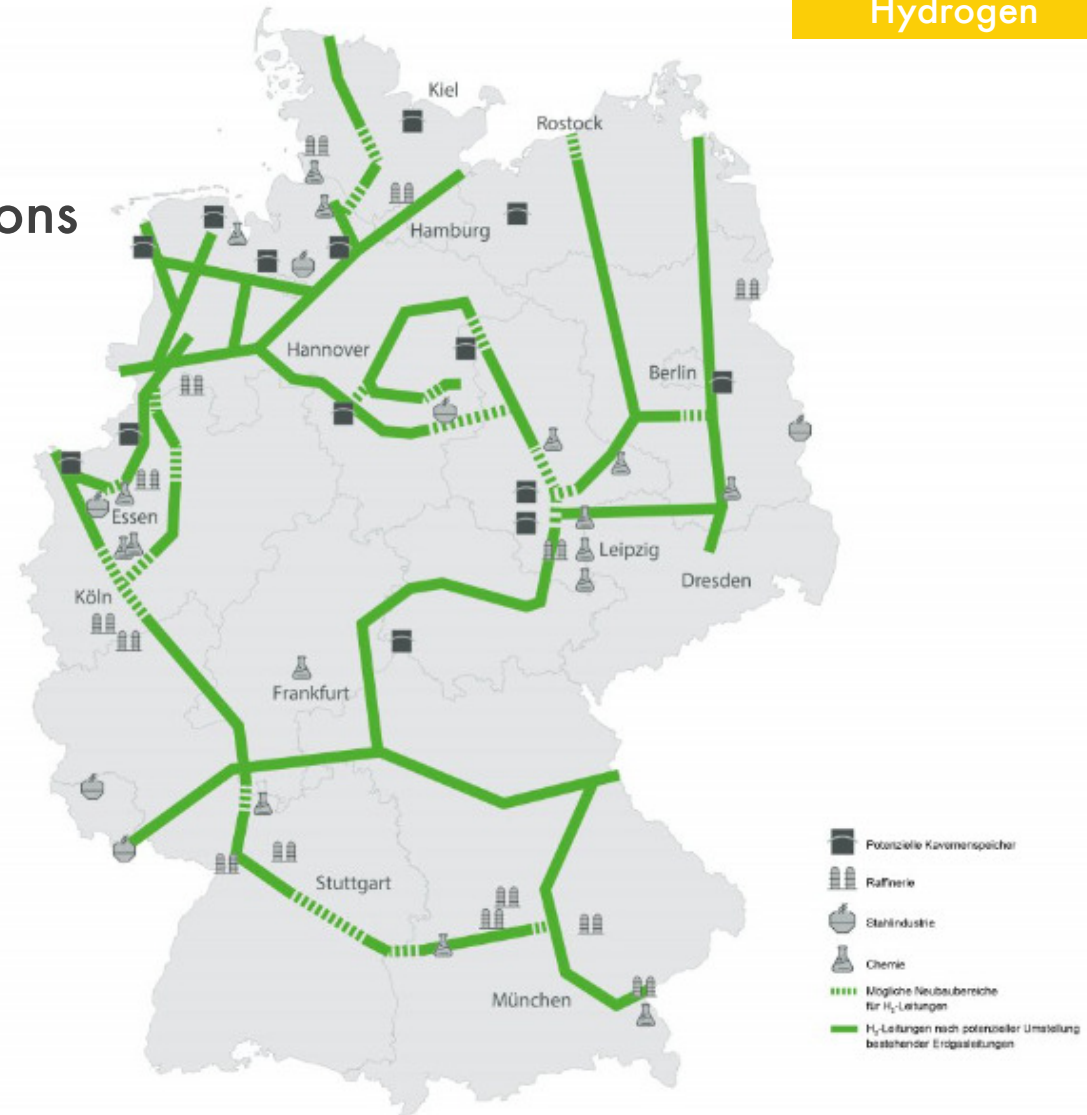
# Project NorthH2 building a future Hydrogen business at scale

Consortium partners:  
Gasunie, Groningen Seaports and Shell Nederland



Source: Shell Material  
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# Vision for hydrogen pipeline grid by the German transmission grid operations

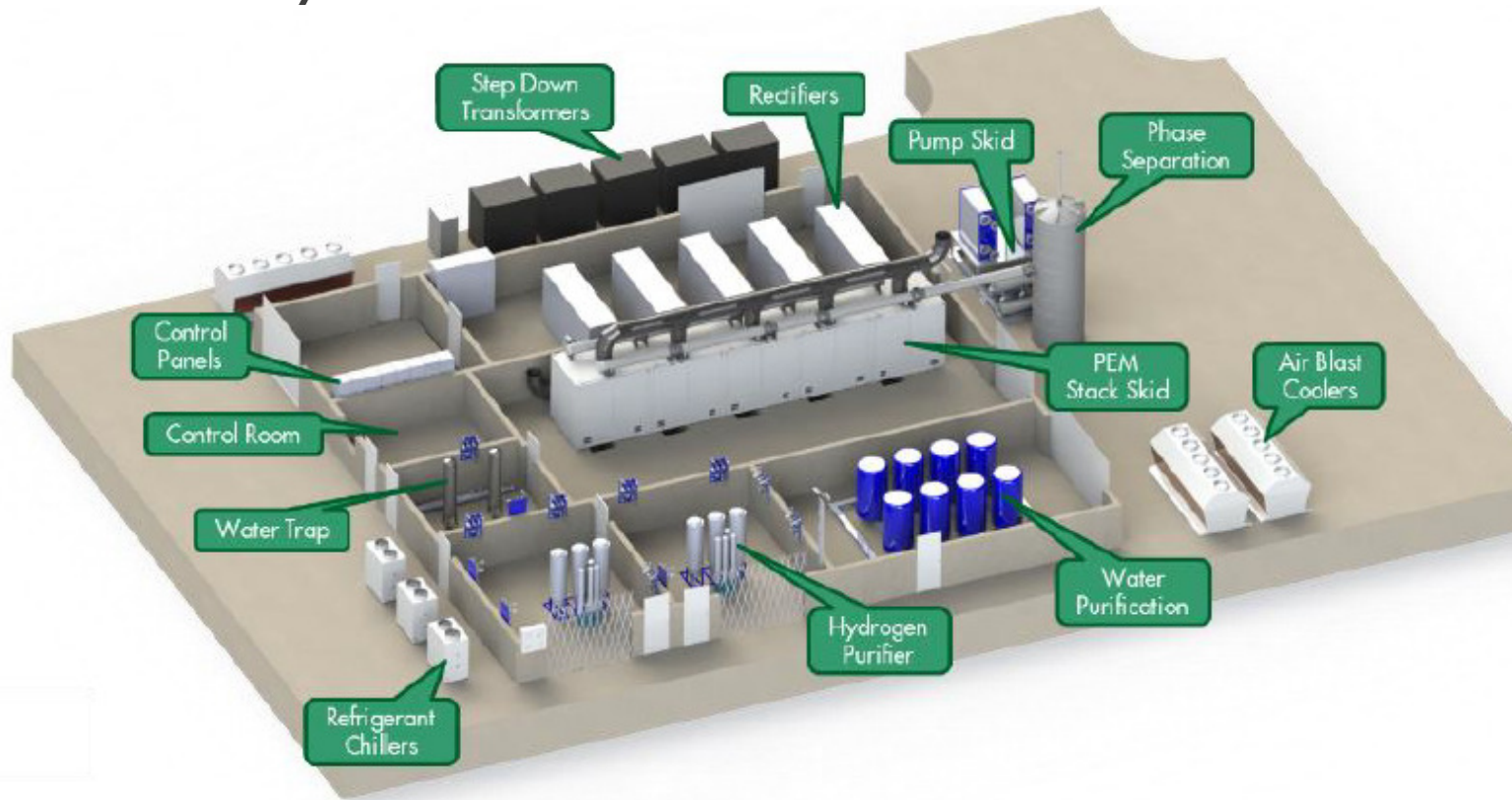


Source: Press Release Fernleitungsnetzbetreiber (FBN Gas) – January 2020  
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**Disclaimer:** Bei der Karte handelt es sich um eine schematische Darstellung, die hinsichtlich der eingezeichneten Speicher und Abnehmer keinen Anspruch auf Vollständigkeit erhebt.

# Hydrogen Electrolysis in Refineries – Project REFHYNE

## Shell Rhineland Refinery



**Integration of a 10 MW PEM Electrolyser – the largest of its kind when starting operations**



# H2 Mobility in Germany – up and running

## Founding Partners



DAIMLER



- Joint Venture company formed in January 2015
- Overall investment of ~ €350mln
- Example of industry partnership that shares the risks across the value chain, supported by Government

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