



Integrating energy and industry: *Example Hydrogen in Germany*

HIGH LEVEL ROUNDTABLE: Sectorial Integration Supported By
Energy Storage And Hydrogen, BRUSSELS 01Mar2018

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Definitions & cautionary note

This presentation contains data from Shell's New Lens Scenarios. The New Lens Scenarios are a part of an ongoing process used in Shell for 40 years to challenge executives' perspectives on the future business environment. We base them on plausible assumptions and quantifications, and they are designed to stretch management to consider even events that may only be remotely possible. Scenarios, therefore, are not intended to be predictions of likely future events or outcomes and investors should not rely on them when making an investment decision with regard to Royal Dutch Shell plc securities.

It is important to note that Shell's existing portfolio has been decades in development. While we believe our portfolio is resilient under a wide range of outlooks, including the IEA's 450 scenario, it includes assets across a spectrum of energy intensities including some with above-average intensity. While we seek to enhance our operations' average energy intensity through both the development of new projects and divestments, we have no immediate plans to move to a net-zero emissions portfolio over our investment horizon of 10-20 years.

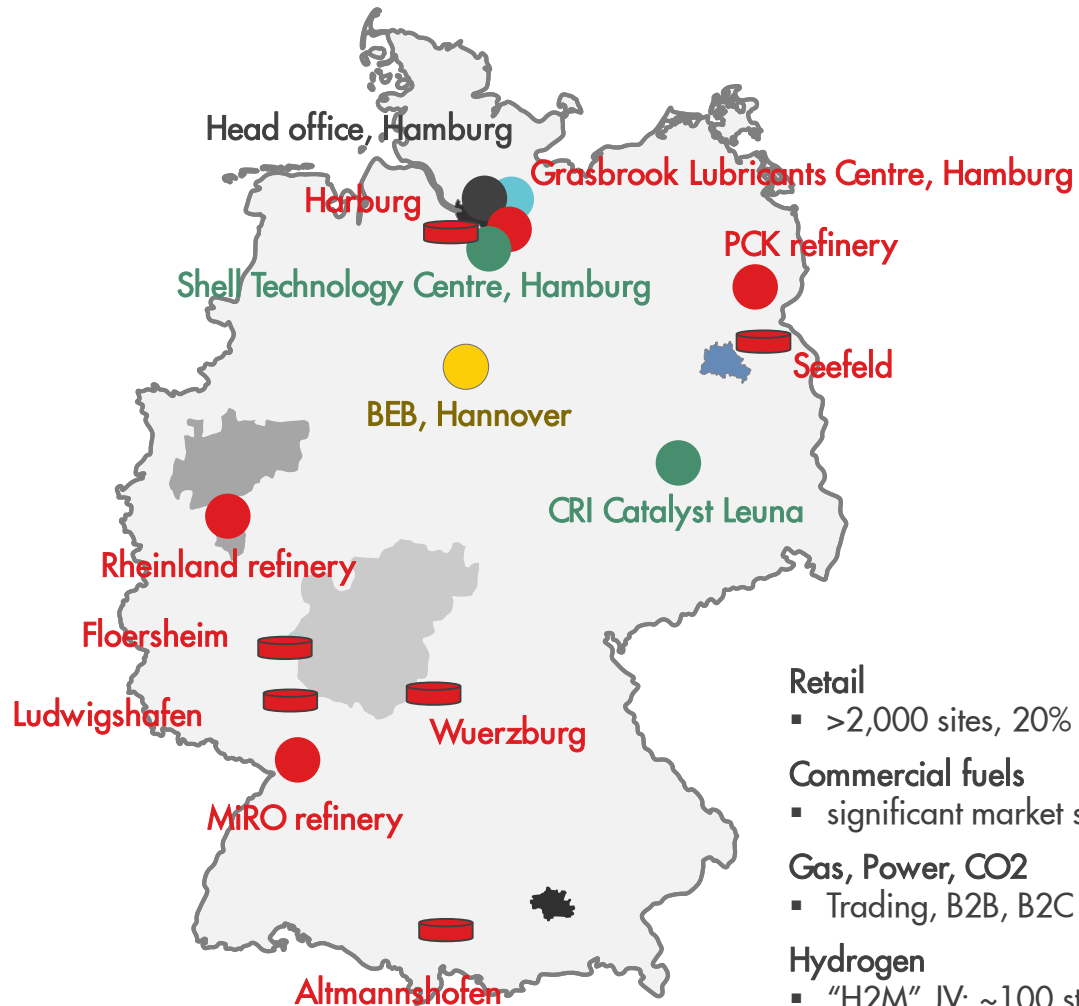
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Shell in Germany – *Energiewende very relevant*



- Retail**
 - >2,000 sites, 20% market share¹⁾
- Commercial fuels**
 - significant market share
- Gas, Power, CO₂**
 - Trading, B2B, B2C
- Hydrogen**
 - "H2M" JV: ~100 stations end 2018

SHELL ENERGIE SZENARIEN DEUTSCHLAND



Shell Energy scenarios for Germany, Summary

Winning the Marathon



- Stable population via immigration (80 mio)
- Resilient economy, new industries; GDP +1,6% p.a.
- Strong and stable governments; climate consensus with support from society and industry; coal phased out by 2040; CCS/U applied post 2030
- Strong and consolidated EU; rise of China benefits Germany due to past investments
- Germany testing ground for new technologies
- Highest rate of electrification in all sectors
- All levers pulled and stretched to maximum



- **80% CO₂ reduction**

Slowing Momentum



- Population declining to 75 mio by 2050
- GDP + 0.5% p.a.
- Lower urbanisation
- Diversified political landscape, less consensus, coal still in the mix in 2050
- Less aligned EU and global cooperation
- Increased resistance to new technologies; industry looks towards more vibrant places
- Speed of change is slower



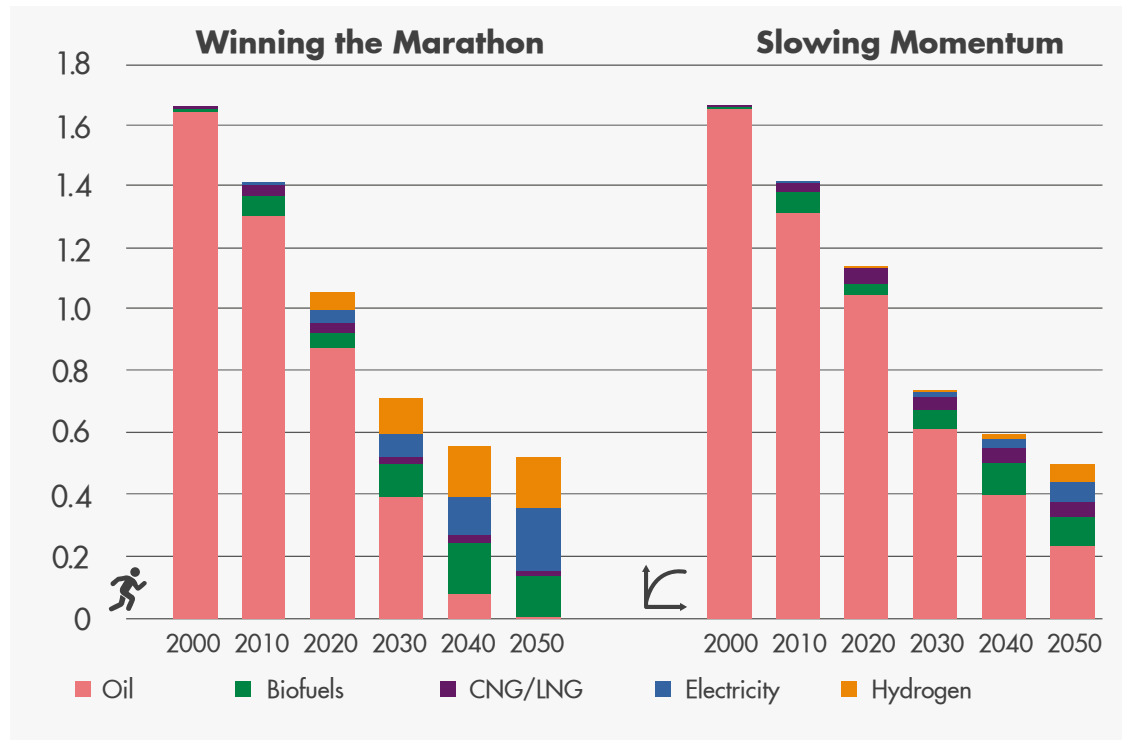
- **70% CO₂ reduction**

Road Transport: *significant role for new fuels, including Hydrogen*

Germany – Total Final Consumption

By Carrier

Passenger Transport Road – EJ/year (Energy carrier)

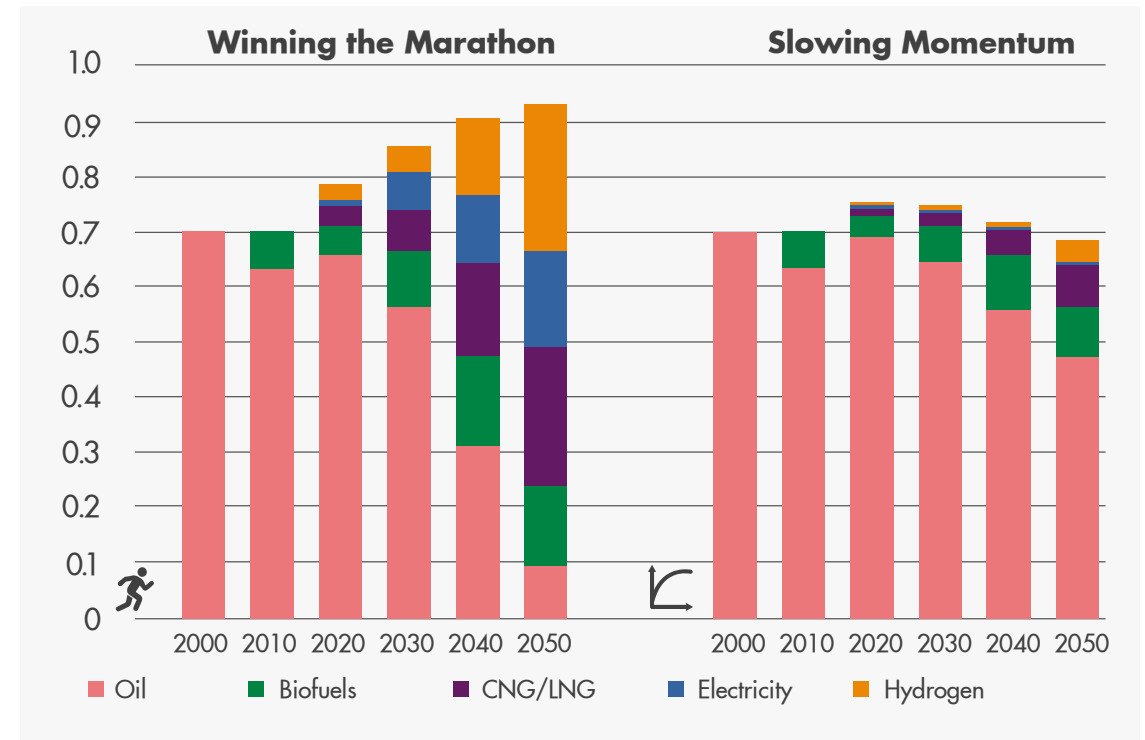


Source: Shell Analysis

Germany – Total Final Consumption

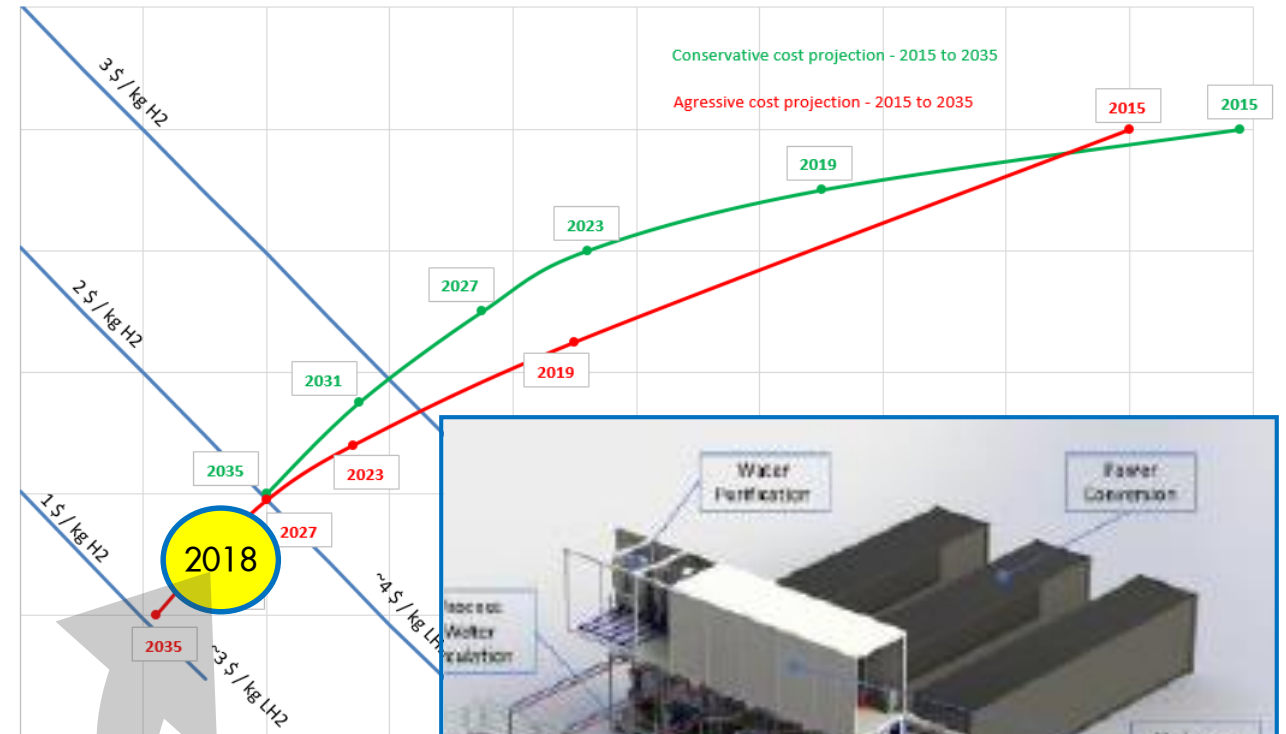
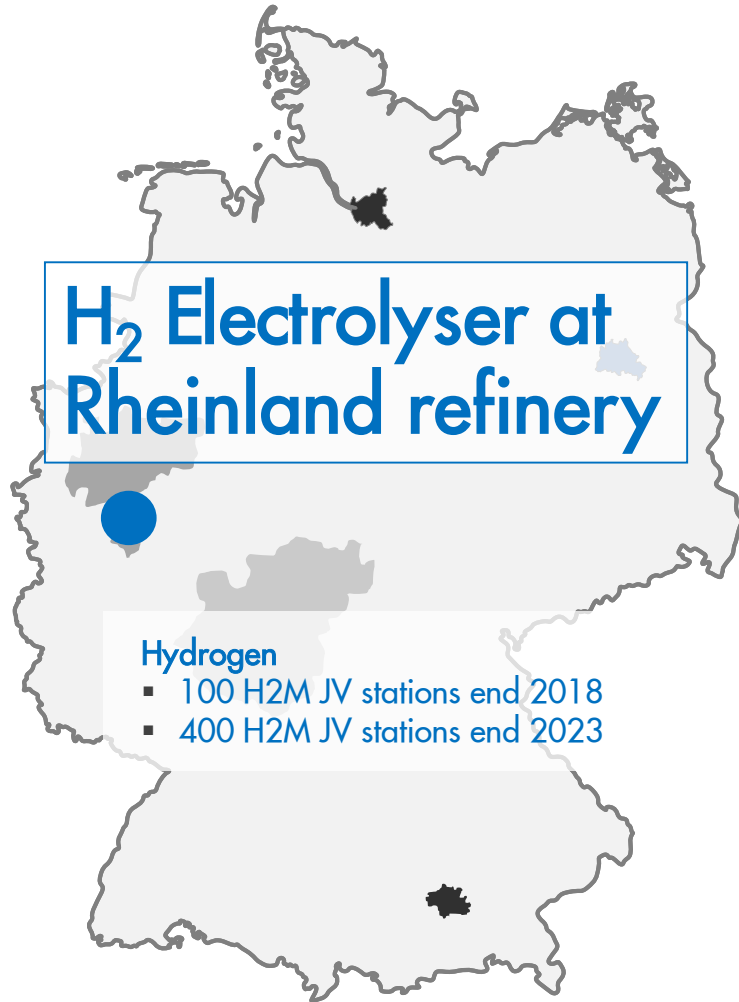
By Carrier

Freight Transport Road – EJ/year (Energy carrier)

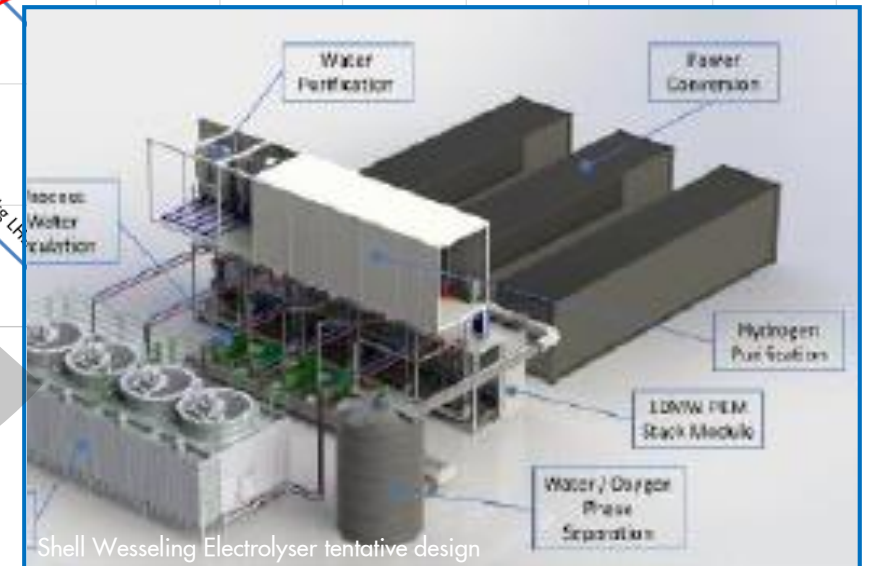


Source: Shell Analysis

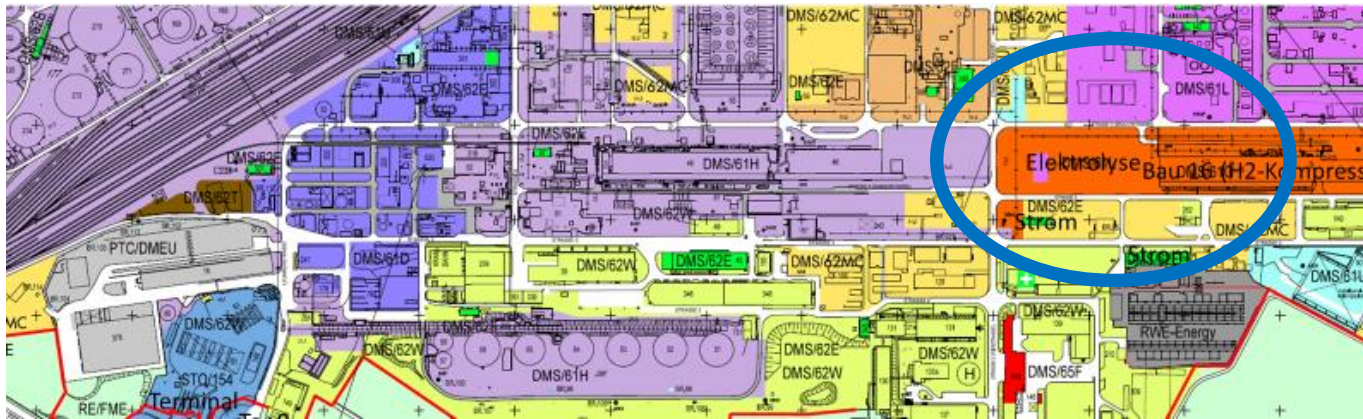
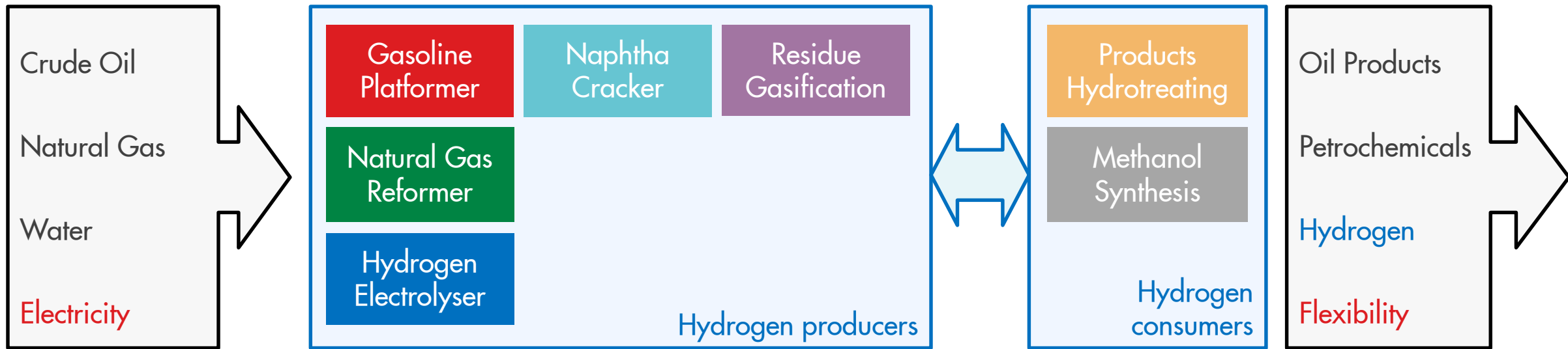
Cost of „Green Hydrogen“ has come down fast 10 MW electrolyser at Shell Rheinland is largest application to date



Source: Shell Analysis, Industry data



The "REFHYNE" project creates strategic value



Deutsche Shell Holding GmbH

