



H₂Platform
OP WEG MET WATERSTOF

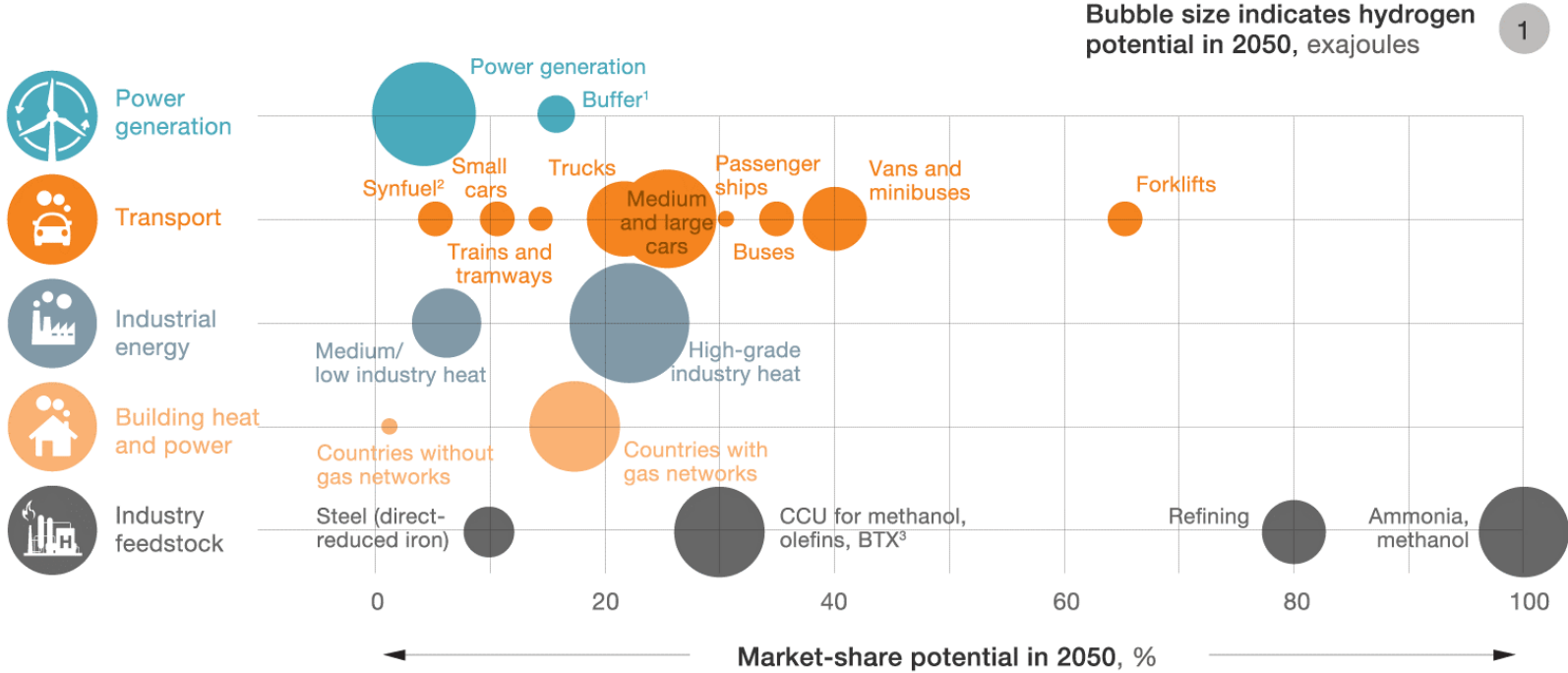
“CONNECTING THE DOTS”

■
NETWERKEVENT, 14 DECEMBER 2017

Robert Dencher

Hydrogen can play a critical role in the low-carbon technology portfolio.

Hydrogen potential by market share in 2050, %, exajoules



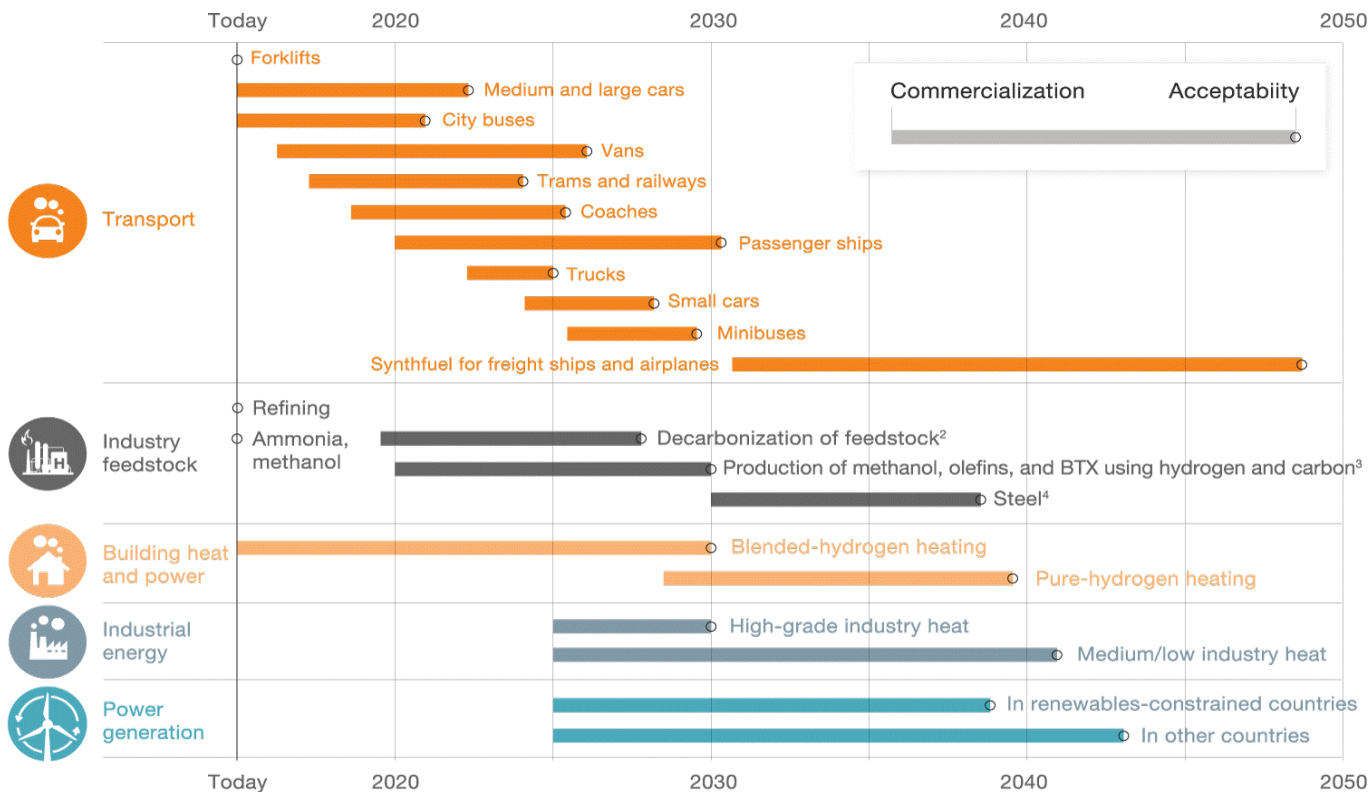
¹% of total annual growth in hydrogen and variable renewable-power demand.

²For aviation and freight ships.

³Carbon capture and utilization; % of total methanol, olefin, and benzene, toluene, and xylene (BTX) production using olefins and captured carbon.

Hydrogen adoption could start with passenger cars and buses.

Hydrogen use from initial commercialization to mass-market acceptability, years



¹Defined as sales >1% within segment in priority markets.

²Market share refers to the amount of feedstock that is produced from low-carbon sources.

³BTX refers to benzene, toluene, and xylene. Market share refers to the amount of production that uses hydrogen and captured carbon to replace feedstock.

⁴Direct-reduced iron with green hydrogen, iron reduction in blast furnaces, and other low-carbon steelmaking processes using hydrogen.

Policy ambition of “20 stations in 2020” → advanced plans by operators with FID ‘s expected early 2018 for 10 to 15 H₂ Filing Stations



From Ambitions to Actions

Impediments

- Lack of cars \leftrightarrow Lack of HRS 's: "Demand Aggregation" concept amongst OEM 's, HRS Operators, Fleetowners and Lease Cie 's gives more confidence.
- Costs: German H₂ filling station halved but further reduction required
- Vehicle costs need to come down with mass production
- Cost of H₂ critical for use in (HD & Bus) mobility: need for industrial scale production, either "Green" or "Blue".

Opportunities

- Convert H₂ mobility into an industrial activity opportunity similar to offshore wind power: Benelux OEM 's and SME 's have the expertise; create living-lab opportunities
- Opex is the issue in H₂ mobility: Create financial instruments like CFD for e.g. filling stations as per offshore wind parks.
- Innovation includes financing, business model and risk management
- Seduce the customer !!

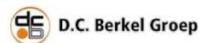
The Dots towards 2030

- 2018/2019: FID's H₂ filling stations, "Demand Gathering" to boost confidence and break "chicken and egg" deadlock
- 2018: NL Climate Act: THE opportunity to state our wishes and provide input for incentive-policies and long-term, stable policy frameworks.
- 2018/2019 : Create living labs with **all** players involved,
- 2019 and beyond: FCEV availability improves significantly
Benelux OEM 's & SME 's gain momentum
- 2025: H₂ a requirement for highway filling stations concessions ?
Zero Emission Busses & City Logistics Covenants kicks in
- 2030: Emission free new cars only: 10-15 % is FCEV → 40 – 60 k p.a. ?

**Does industry know what it wants ? Organized & sufficiently aligned?
Thinking big enough ?**

The industry will have to present the plan(s) to govts.; vice-versa won't happen.

H2 Platform



Verkenning waterstofinfrastructuur

Ministerie van Economische Zaken

Report No.: OGNL151886, Rev. 2

Date: November 2017



DNV GL published a report on options for transporting H₂ through the existing natural gas systems .

“..... it can be concluded that this (natural gas) network offers good opportunities for transport of 100% H₂ as well as methane-hydrogen mixtures.”

Points of attention & to study



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H₂-PLATFORM 2017-2018
