



**ENERGY DELTA
INSTITUTE** *Energy Business School*

End use of hydrogen, mobility, industry, built environment

Leon Stille

Energy Delta Institute, part of New Energy Coalition

Hydrogen summer school



**ENERGY DELTA
INSTITUTE** *Energy Business School*

Energy Delta Institute

'Being the transitional knowledge bridge between traditional and new energy actors'

- Business School founded 2001
- Part of New Energy Coalition
- Focus:
 - Open market programs, courses, incompany training and networking events
 - Yearly training of over 1000 energy professionals
 - Supported by (in-house) academia and expert lecturers
- 50 FTE (13FTE EDI), 6M revenue/yr

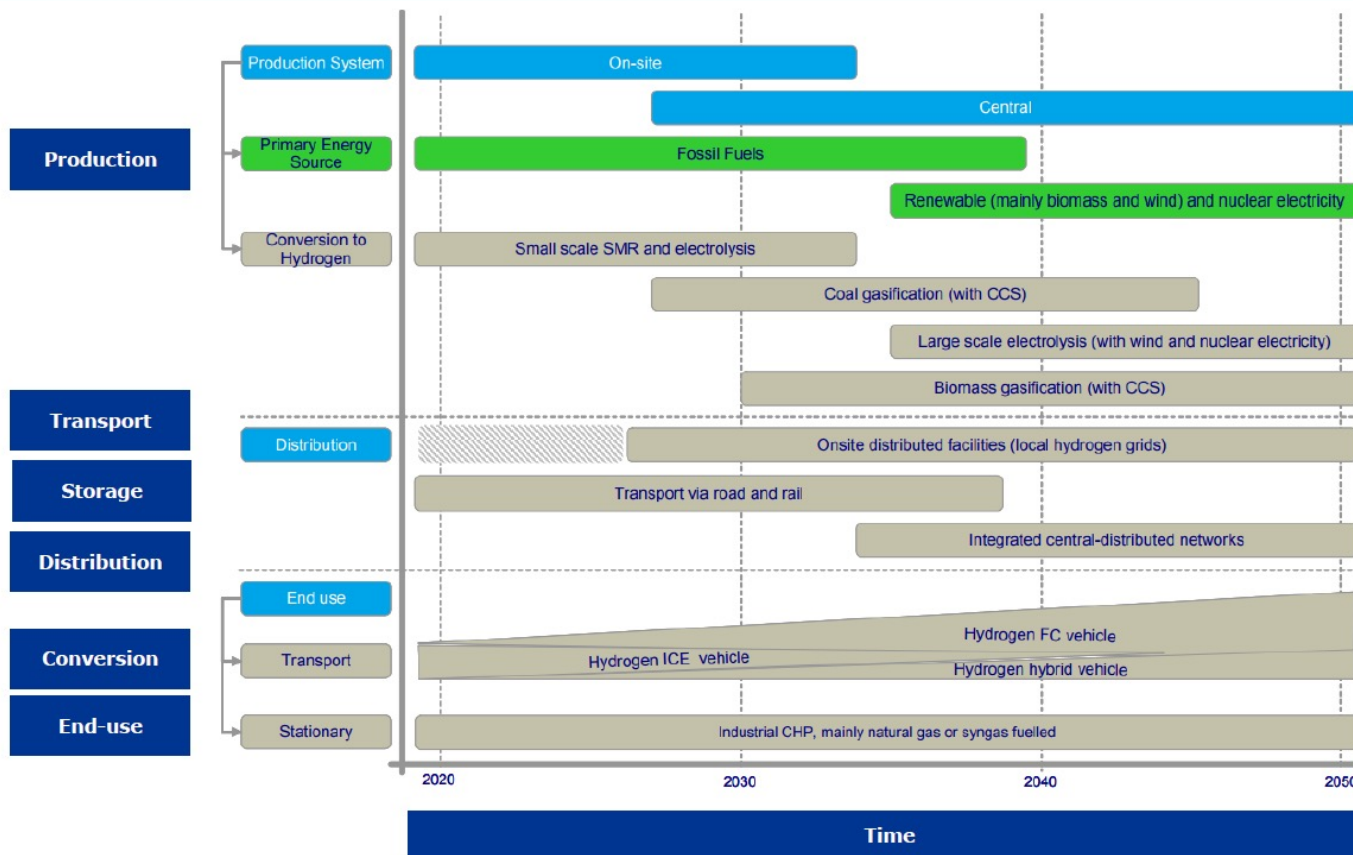


Leon Stille

General Manager Energy Delta
Institute | Energy Transition |
Innovation | Education | Hydrogen
| CCUS | Green Gas | Speaker |
Moderator

Hydrogen value chain

Development hydrogen value chain



Currently 70 tonnes H₂ produced annually (global)

- Refineries
- Chemical production

75% from natural gas, 23% coal gasification, 1-2% fossil electricity

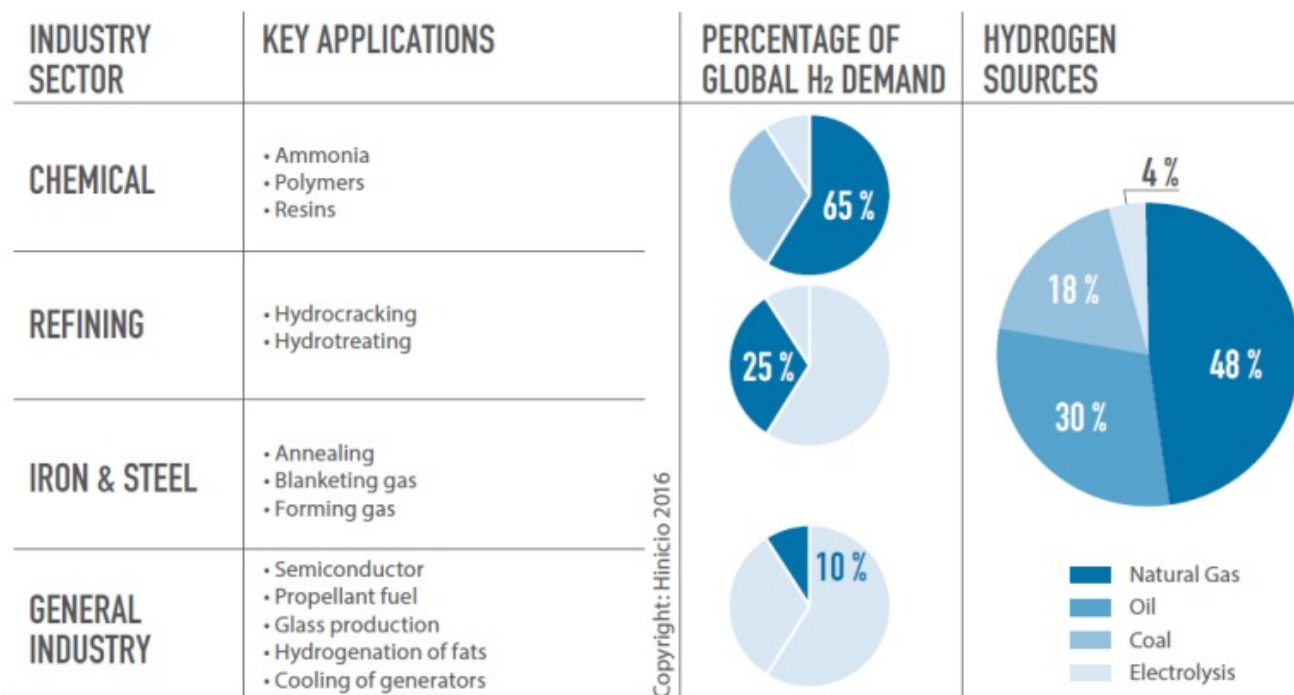
Source: IEA

Please note: Hydrogen is an energy carrier NOT a source



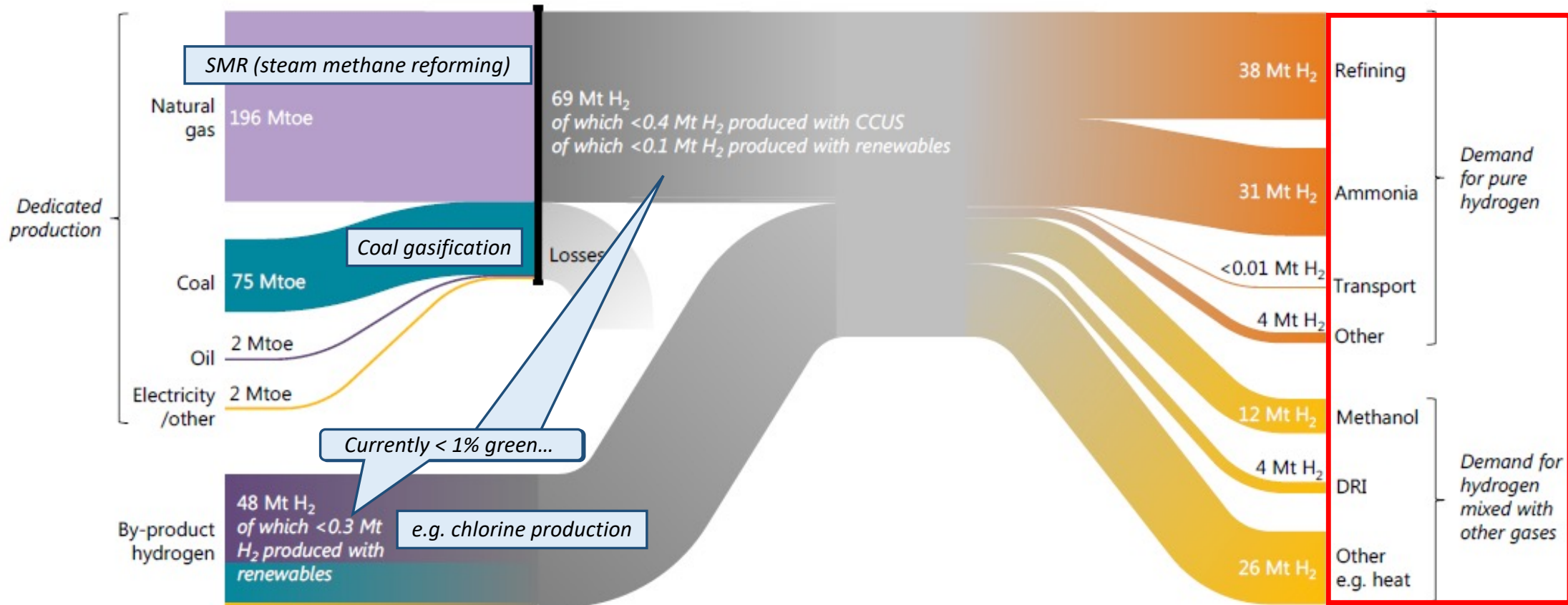
Hydrogen production and use → current

Figure 4: Global hydrogen demand and production sources

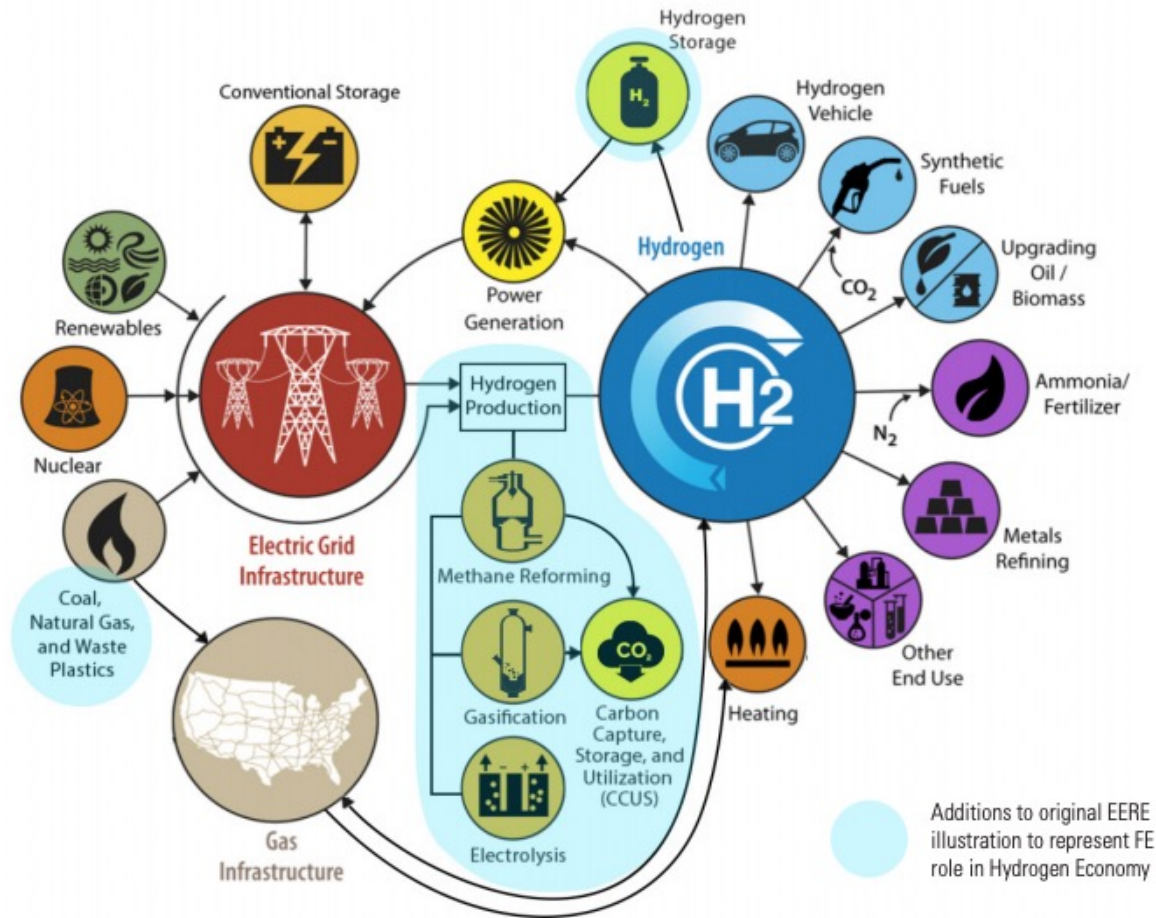


Source: IRENA based on FCH JU (2016).³

Hydrogen production and use → current



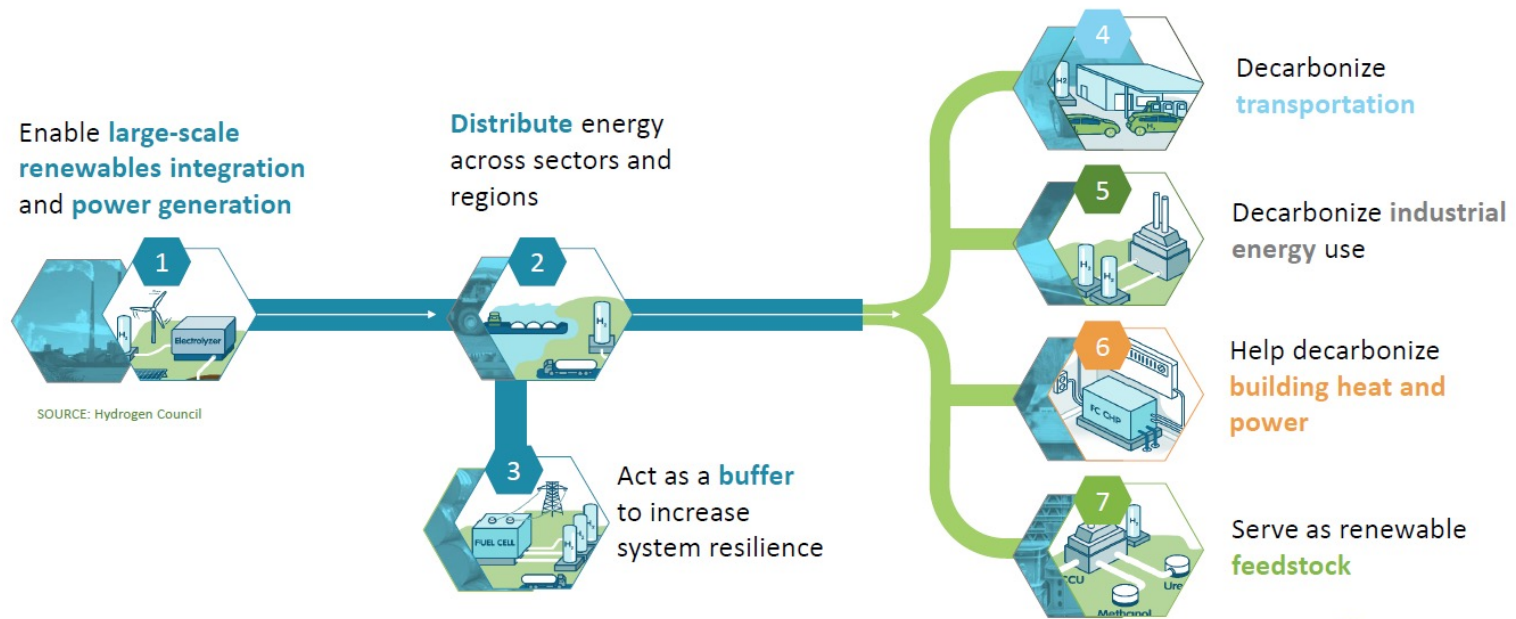
Hydrogen use → many possibilities



High flexibility and integration potential

Which market sectors are the most promising?

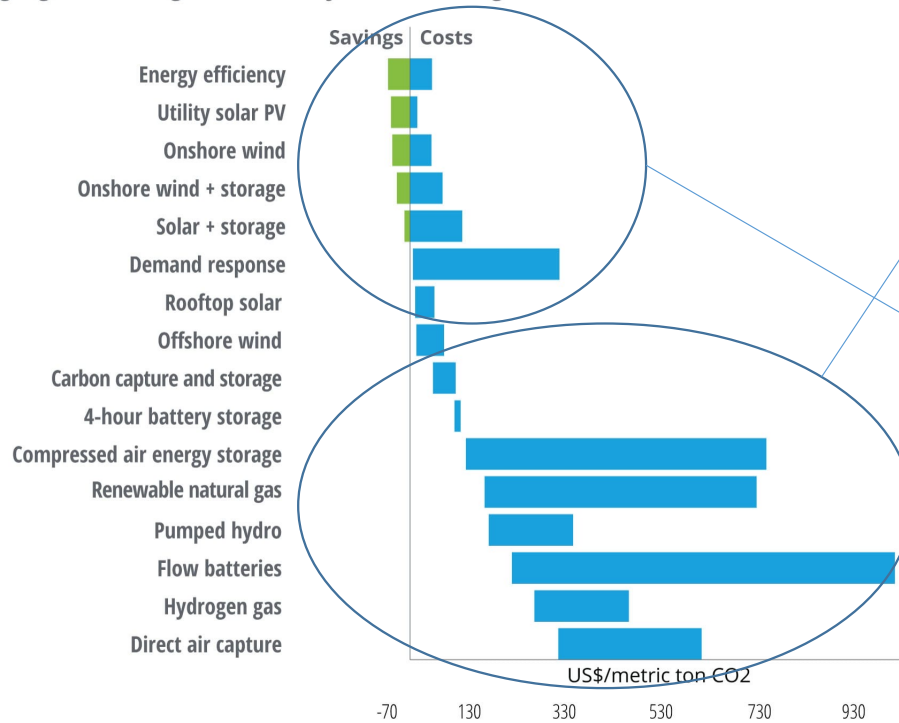
Enable the renewable energy system → Decarbonize end uses



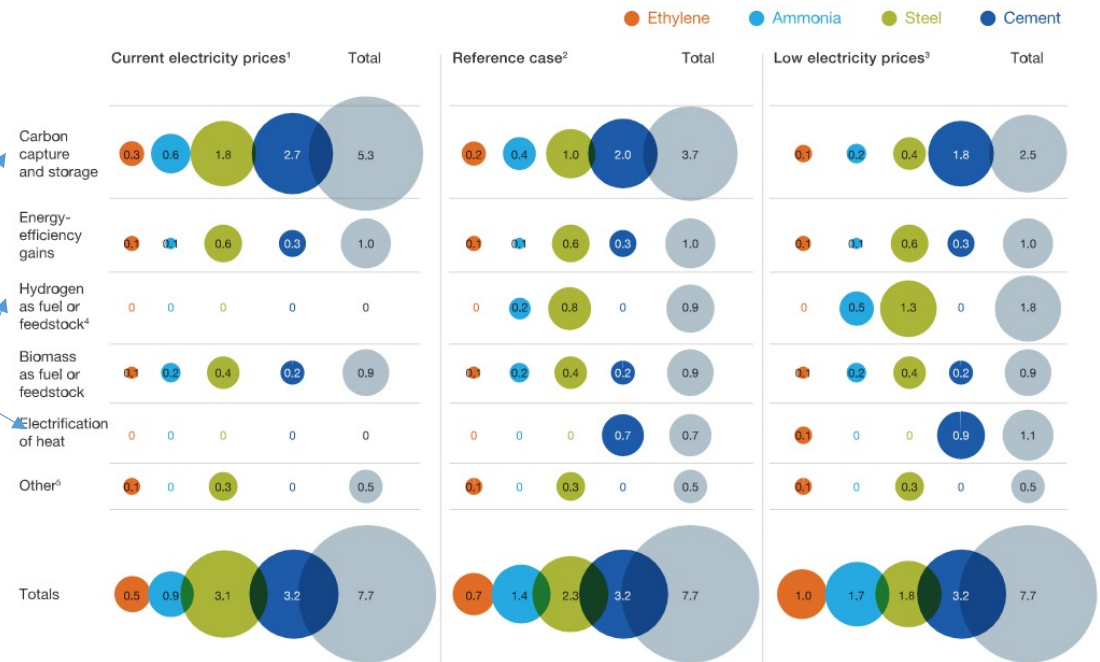
Hydrogen value chain – Industry

FIGURE 7

Carbon abatement values vary dramatically across technologies, and emerging technologies currently have the highest costs



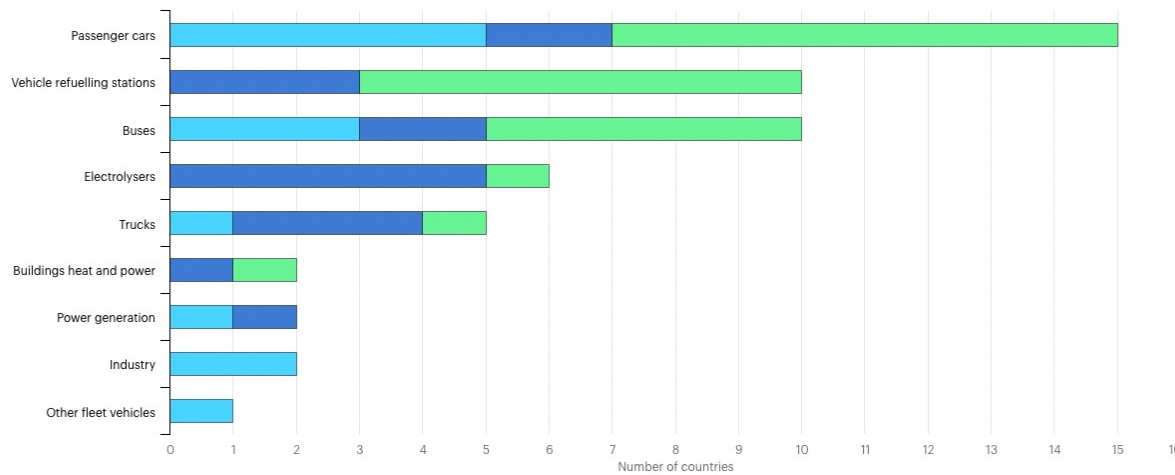
CO₂ emissions prevented by different decarbonization options by 2050, gigatons



Note: Figures may not sum, because of rounding.

Source: Deloitte analysis based on data from NREL, BloombergNEF, Lazard, ACEEE, American Gas Foundation and Columbia SIPA Center on Global Energy Policy.

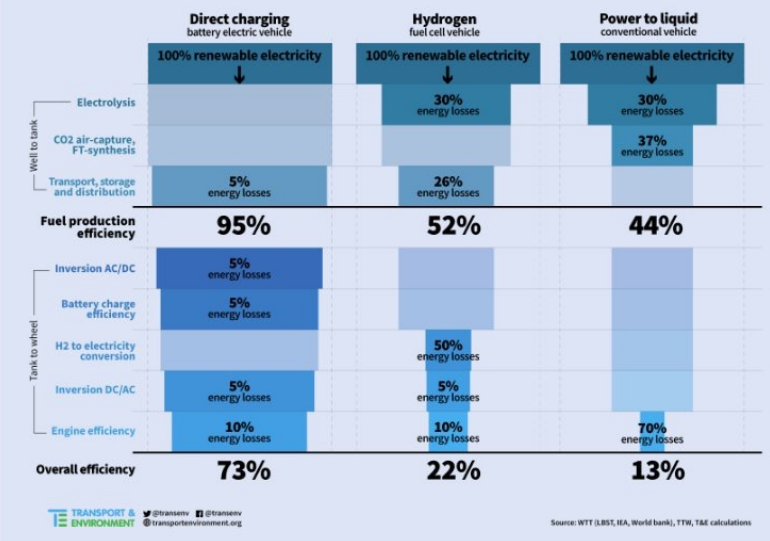
Hydrogen value chain – transport



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● Incentives without targets ● Targets without incentives ● Combined incentives with targets

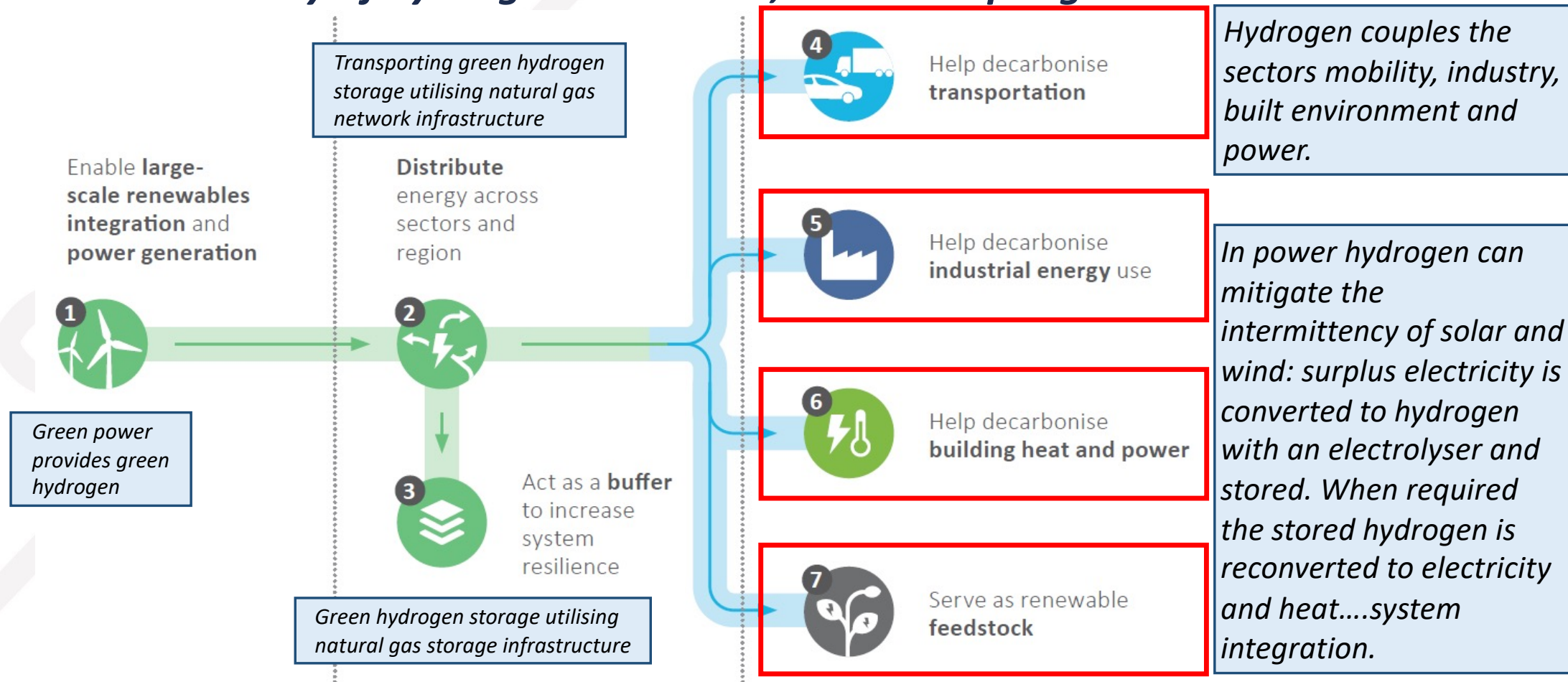
Cars: Battery electric most efficient by far



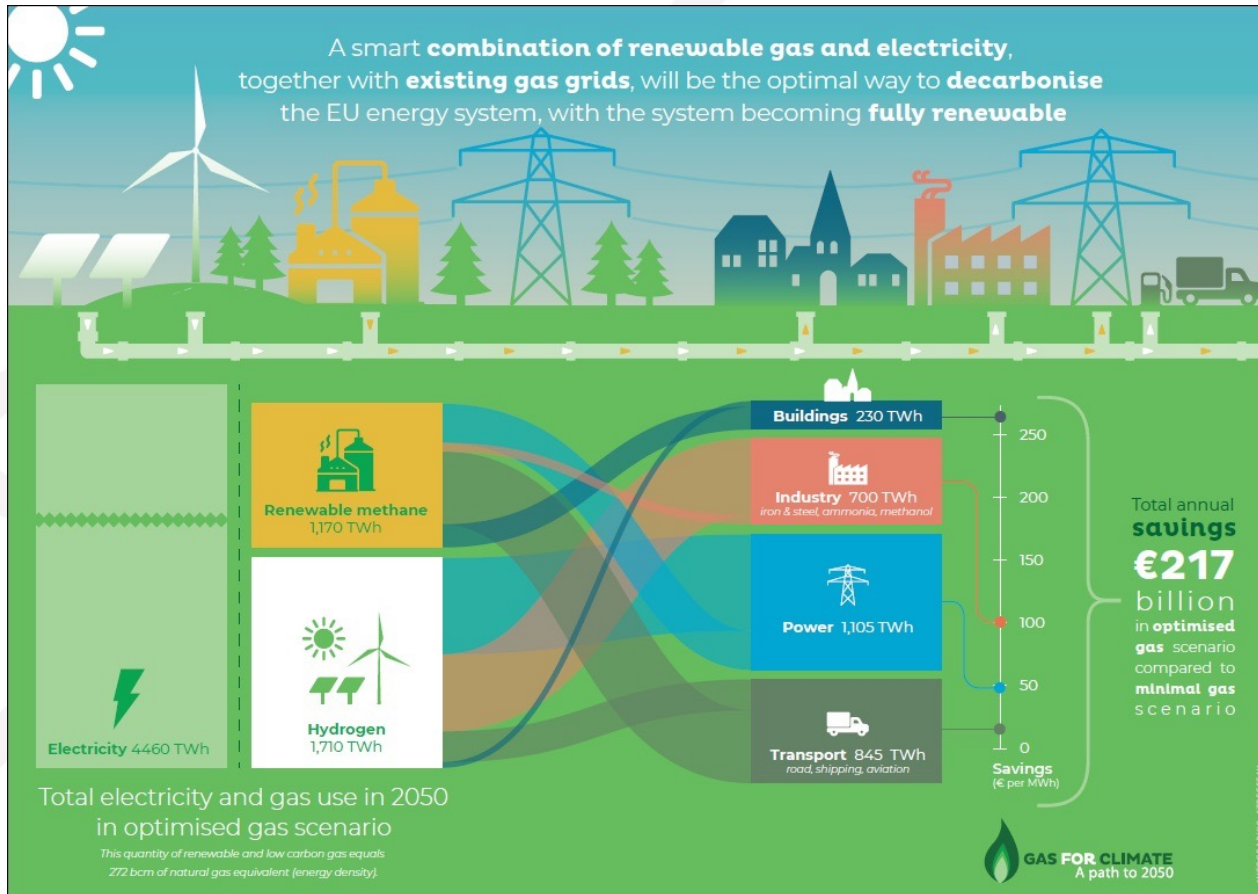
Heavy transport → yes and maybe
Consumer transport → electric only

Hydrogen value chain – sector coupling

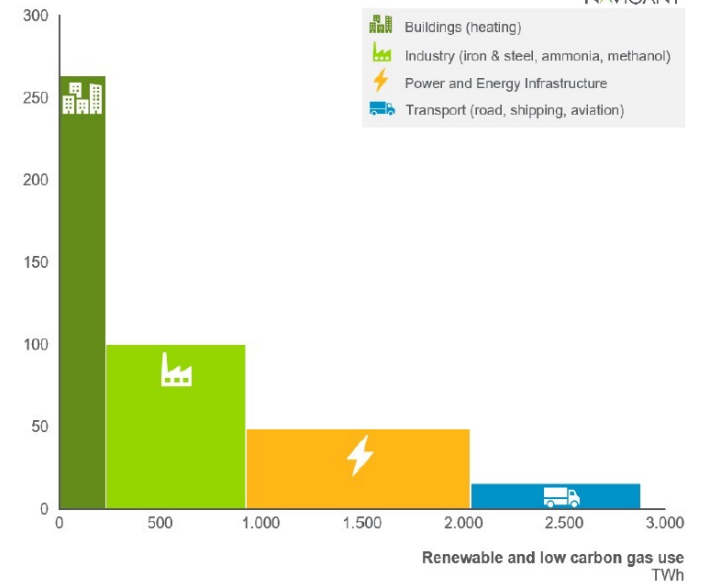
The versatility of hydrogen in end use, sector coupling



Hydrogen value chain – potential



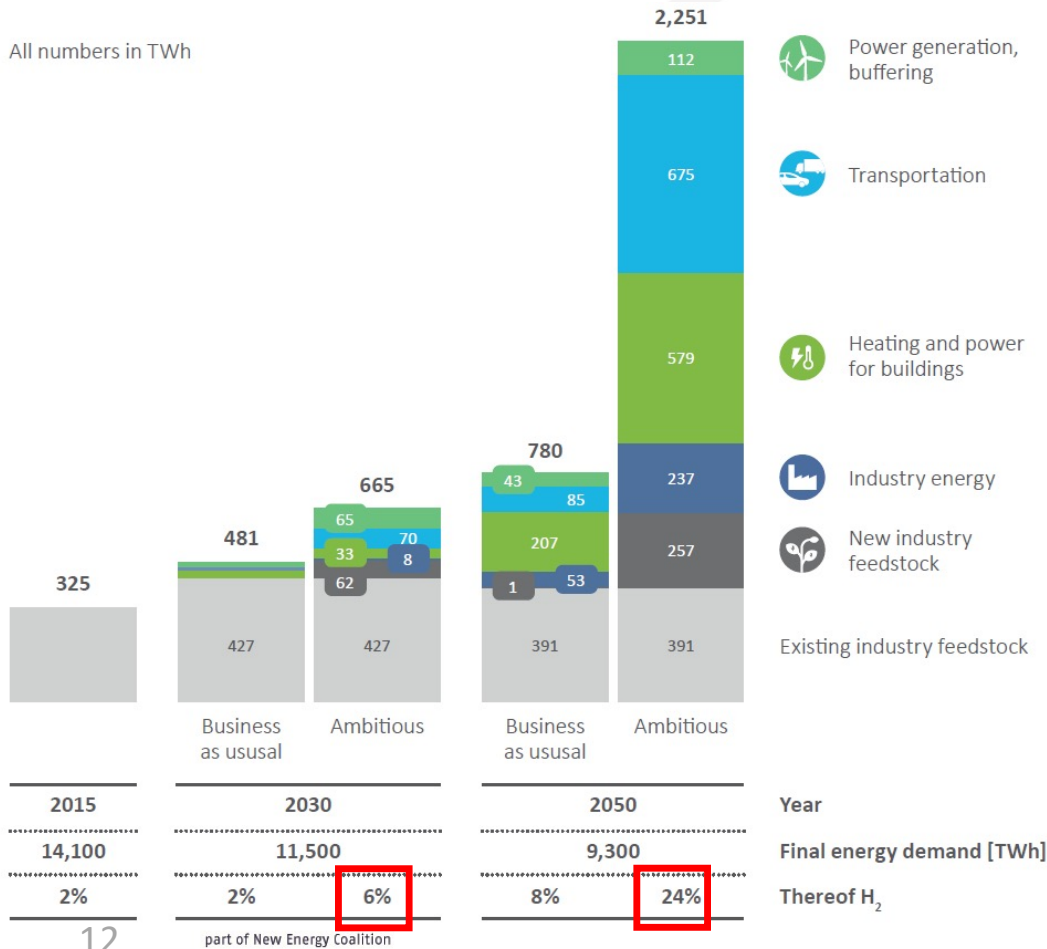
Cost savings per sector
€ per MWh



Hydrogen value chain – roadmap 2030-2050



All numbers in TWh



In the ambitious scenarios there is still a need for other sources among which renewables, nuclear and hydrocarbons: 94% in 2030 and 76% in 2050.....

Hydrogen in the green deal



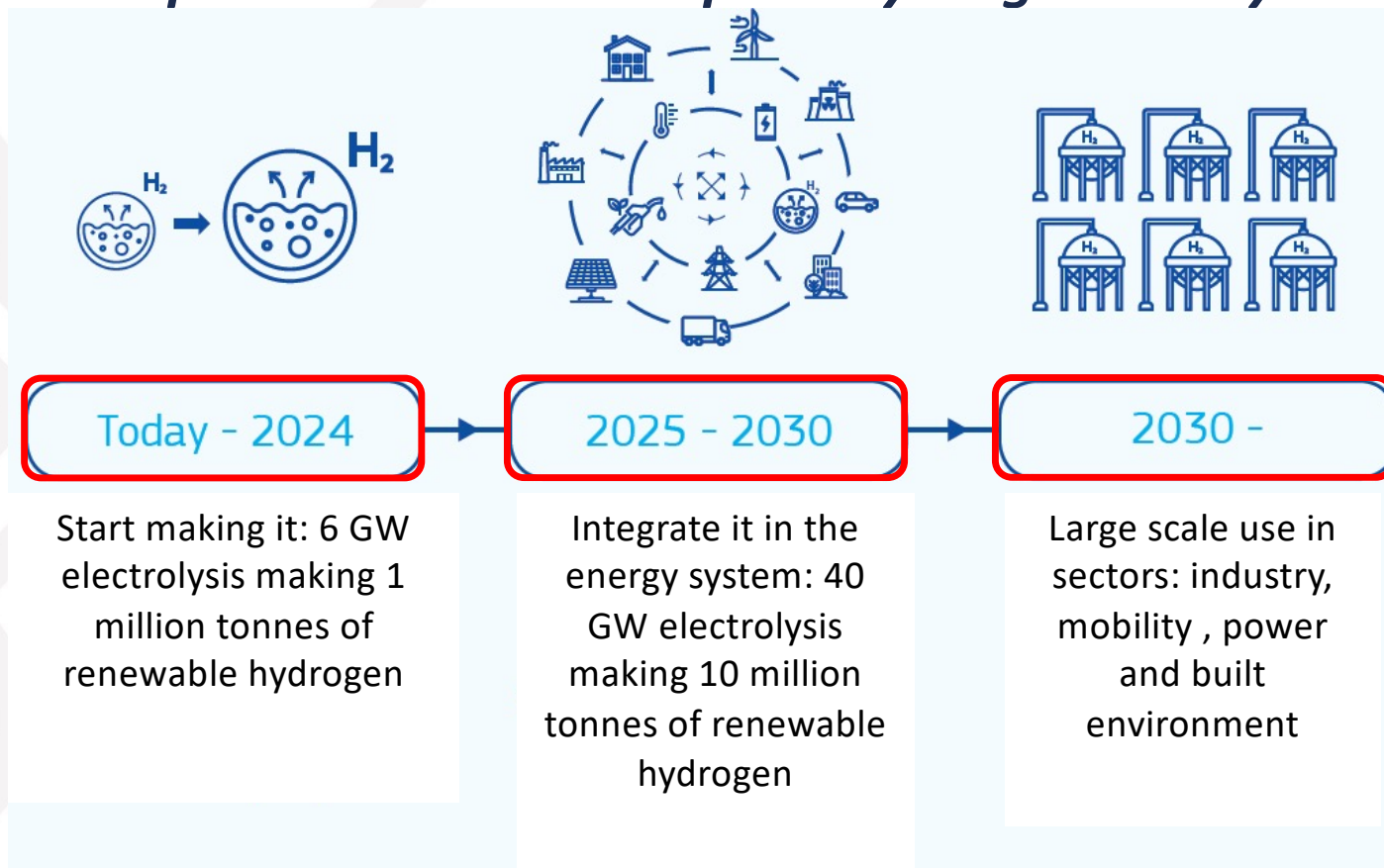
*Green deal energy carriers:
green electrons and green hydrogen.*



Video on hydrogen plans EU:
<https://www.euronews.com/2020/07/10/explainer-why-is-the-eu-commission-betting-on-hydrogen-for-a-cleaner-future>

Hydrogen in the green deal

Massive plans: the path towards a European hydrogen eco-system step by step



Objectives and strategy are clear, now the plans to realise this....depending on the economics.

Hydrogen projects

Investments into hydrogen are gathering momentum

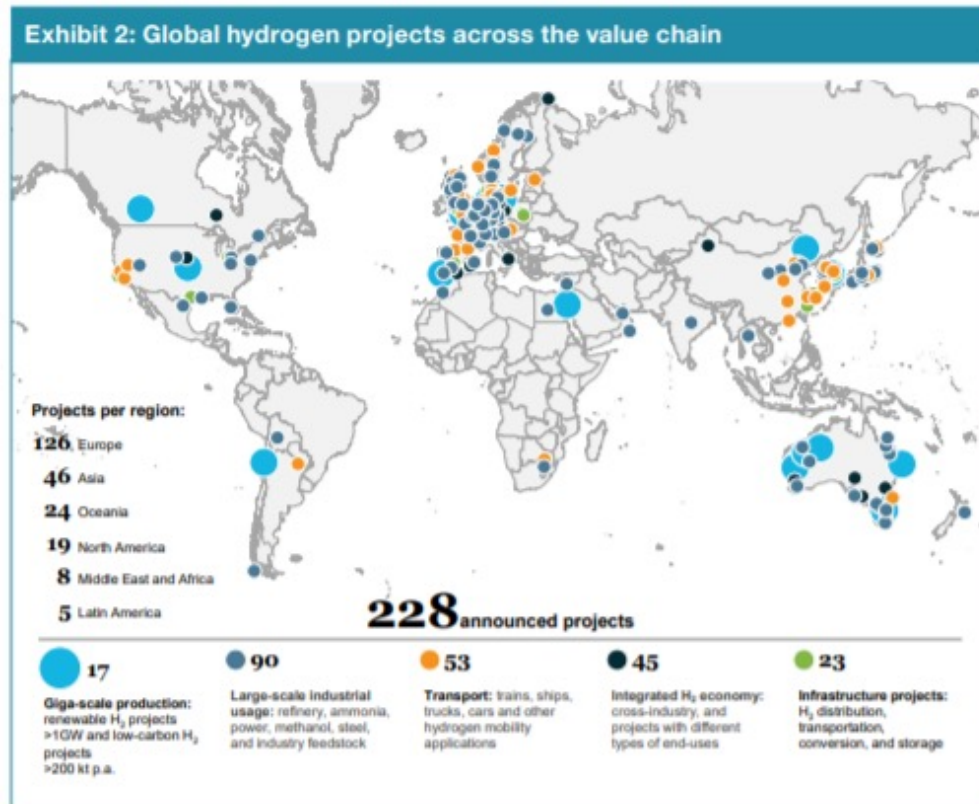


>200

projects have been announced globally with

>80 bn

in mature hydrogen investment



<https://hydrogencouncil.com/wp-content/uploads/2021/02/Hydrogen-Insights-2021.pdf>



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Thank you!

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