



Idrogeno e Tecnologie per la Generazione Energetica e la Propulsione nei Trasporti Green

Tavola rotonda

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January 25th, 2024

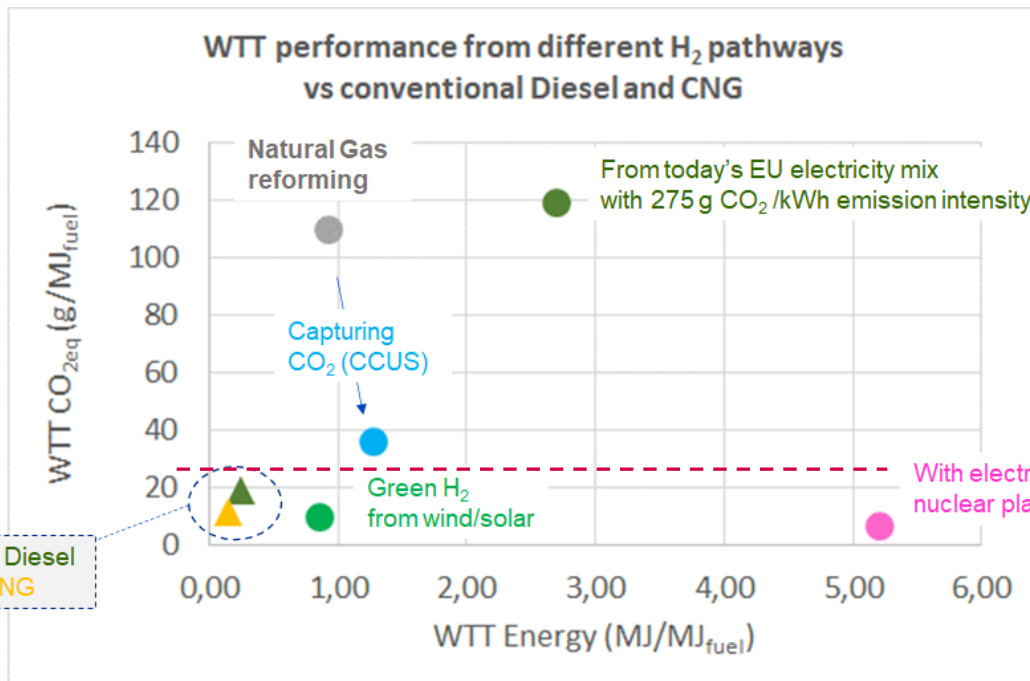
Using hydrogen as a fuel

Creating the necessary ecosystem for market uptake



Why hydrogen colors matter...

H₂ production CO₂ and energy footprint



Fossil Diesel and CNG

2022 IEA data

95 Mt H₂ produced worldwide

- 62% from NG SRM
- 21% from coal
- 16% from naphta reforming
- 1% as low emissions H₂, mainly through CCS

100kt as green hydrogen

32 kt consumed as transport fuel

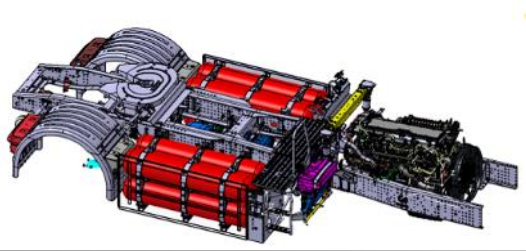
<https://www.iea.org/reports/global-hydrogen-review-2023>

Threshold from EU Delegated Regulation 2021/2139 (linked to Taxonomy) considers hydrogen "sustainable" if < 3 kgCO₂/kgH₂ (25 gCO₂/MJ)

Source JEC WtW Study v5 - <https://publications.jrc.ec.europa.eu/repository/handle/JRC121213>

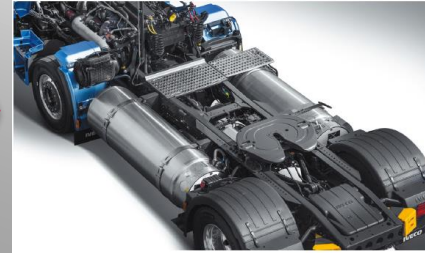
Replacing Diesel fuel...

On board energy storage



1052 l tank capacity
160 kg CNG @ 200 bar
7800 MJ stored energy

CNG



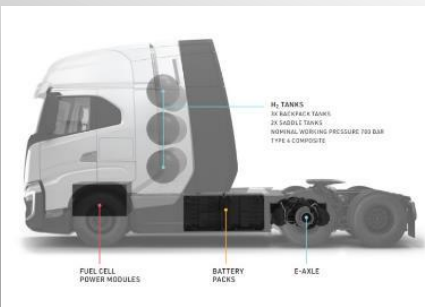
1196 l tank capacity
538 kg CNG
26400 MJ stored energy

LNG



1000 l tank capacity
830 kg Diesel
37400 MJ stored energy

Diesel



1800 l tank capacity
72 kg H₂ @ 700 bar
8640 MJ stored energy

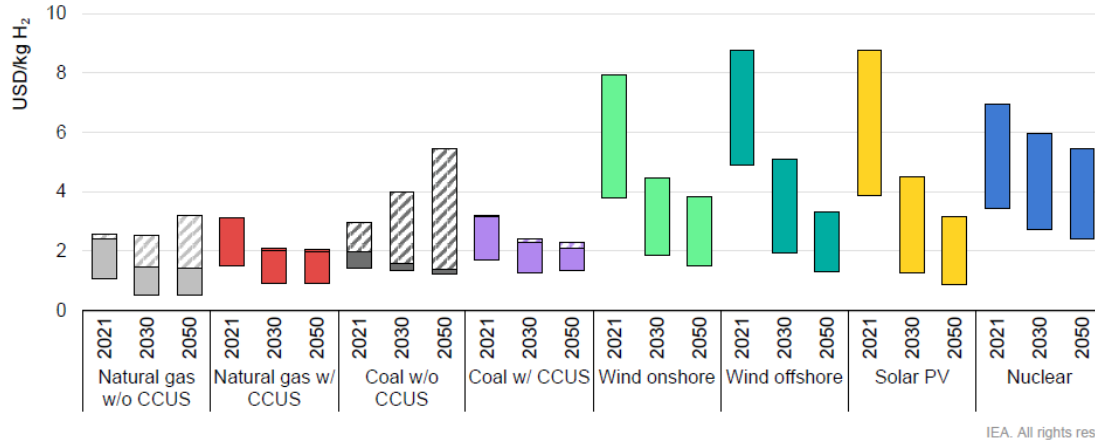
Hydrogen

Development of an adequate H₂ refuelling infrastructure is crucial

Need for affordable green hydrogen

Opportunities for cost reductions to produce low-emission hydrogen

Levelised cost of hydrogen production by technology in 2021 and in the Net Zero Emissions by 2050 Scenario, 2030 and 2050



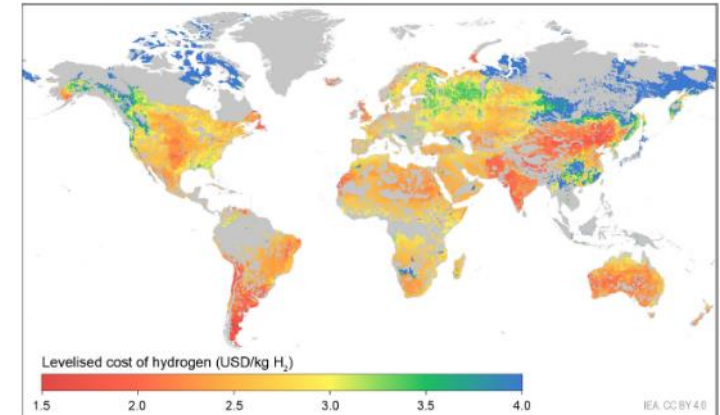
IEA. All rights reserved

Notes: Ranges of production cost estimates reflect regional variations in costs and renewable resource conditions. The dashed areas reflect the CO₂ price impact, based on CO₂ price ranging from USD 15/tonne CO₂ to USD 140/tonne CO₂ between regions in 2030 and USD 55/tonne CO₂ to USD 250/tonne CO₂ in 2050.

Sources: Based on data from McKinsey & Company and the Hydrogen Council; Council; IRENA (2020); IEA GHG (2014); IEA GHG (2017); E4Tech (2015); Kawasaki Heavy Industries; Element Energy (2018).

<https://iea.blob.core.windows.net/assets/c5bc75b1-9e4d-460d-9056-6e8e626a11c4/GlobalHydrogenReview2022.pdf>

Figure 3.13 Hydrogen production costs and share of solar PV from hybrid solar PV and onshore wind systems, 2030

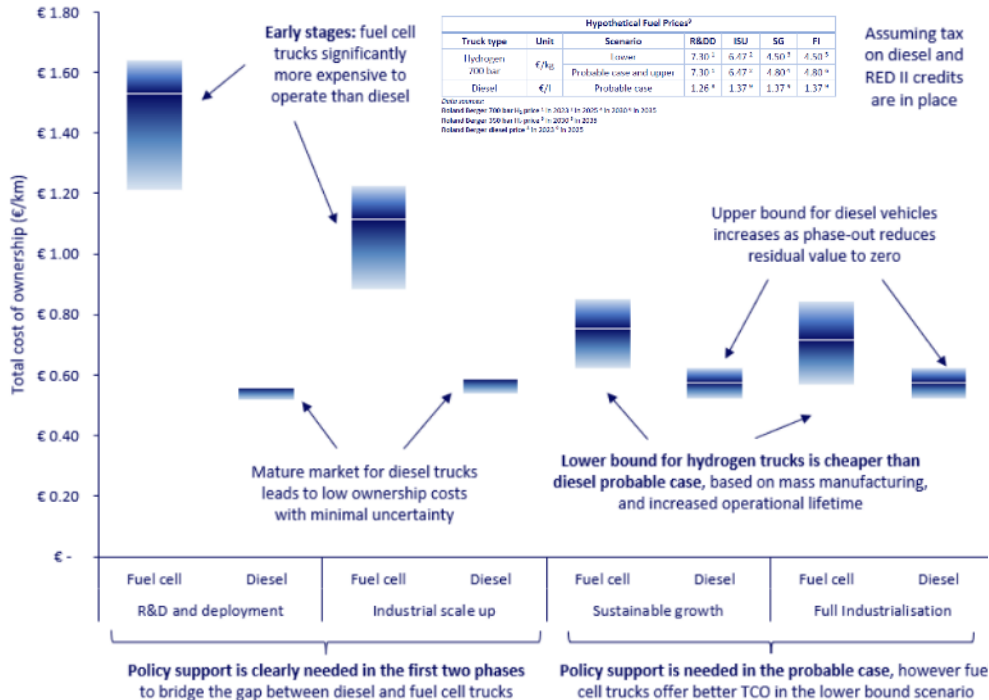


IEA: Global Hydrogen Review 2023

- H₂ production will move where solar&wind will enable cheaper renewable electricity production
- H₂ transport over long distance will open to LH₂, NH₃, methanol and other carriers

Pathway to competitive TCO figures

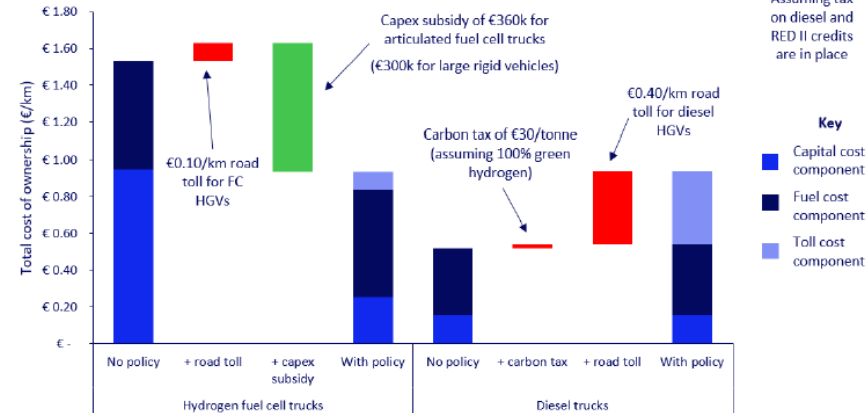
Range of possible total cost of ownership for fuel cell and diesel articulated trucks in progressive deployment phases



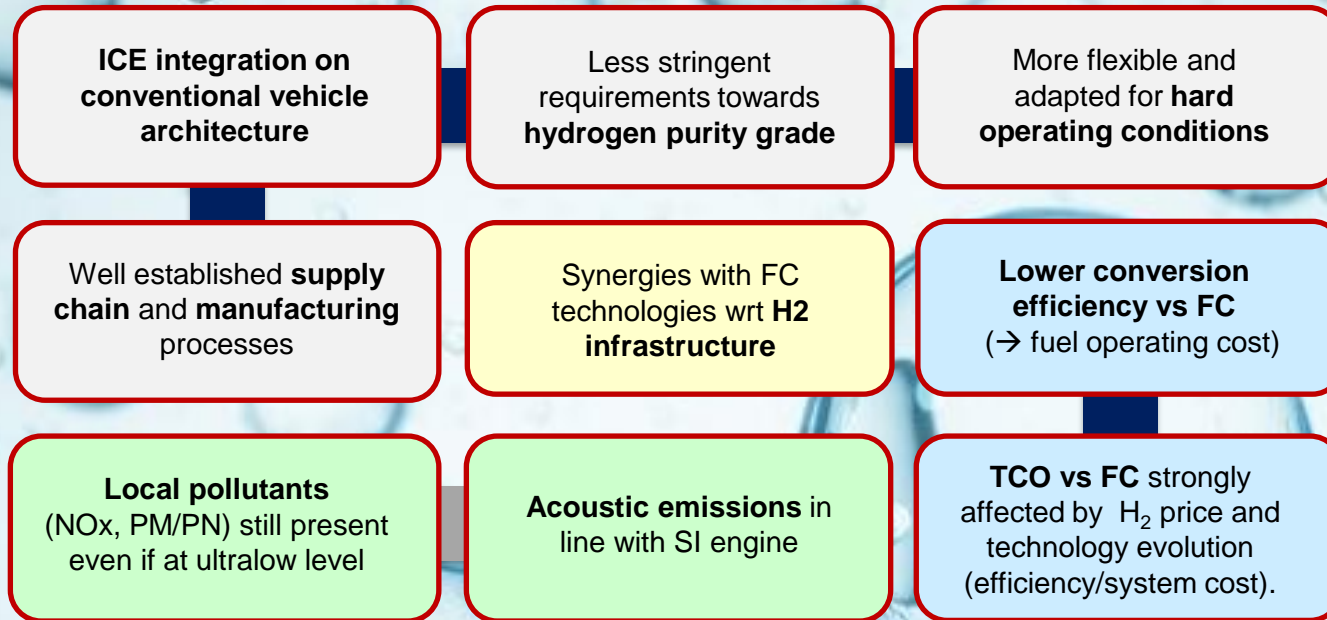
Whitepaper
 Analysis of cost of ownership and the policy support required to enable industrialisation of fuel cell trucks

<https://h2accelerate.eu/>

Policy support required to enable the financial case for zero emissions articulated vehicles in the R&D and deployment phase



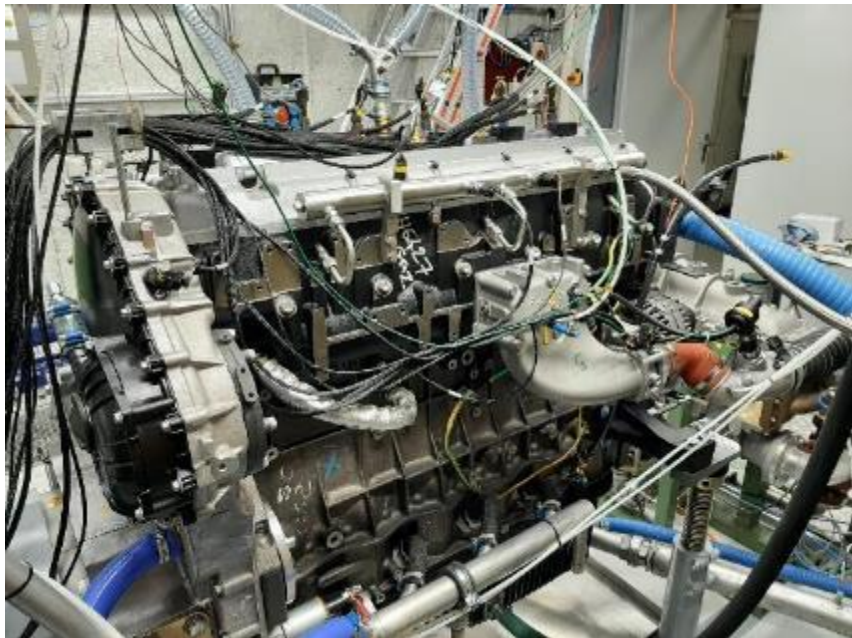
H₂ ICE – The “new” player



H₂ ICE vehicles also recognized as Zero Emissions Vehicles when CO₂ emissions < 3 g/t*km according to EU Commission

FPT H₂ ICE: from engine test bed to white fields

Proof of Concept of Cursor13 H₂ 460HP on Snowgroomer



Cursor13 H2 DI on engine dyno at FPT Arbon (CH)



Pinotti Snowgroomer powered by FPT C13 H2

