



Hydrogen Projects - Overview

John Oakey

October 2023

www.cranfield.ac.uk



Hydrogen Projects

R&D - Pre-commercial - Commercial

- Hydrogen production – water electrolysis, reforming of hydrocarbons (fossil/biogenic)+/- CCUS, naturally-occurring,
- Hydrogen storage – strategic (geological, etc.), local/buffer (HP, liquid, ...)
- Hydrogen distribution – pipelines (new or re-purposed), barges/road transport, shipping,
- Hydrogen use as a feedstock – for ammonia, methanol,
- Hydrogen use as a fuel – for industrial decarbonisation, power generation, heat,

Enabling projects

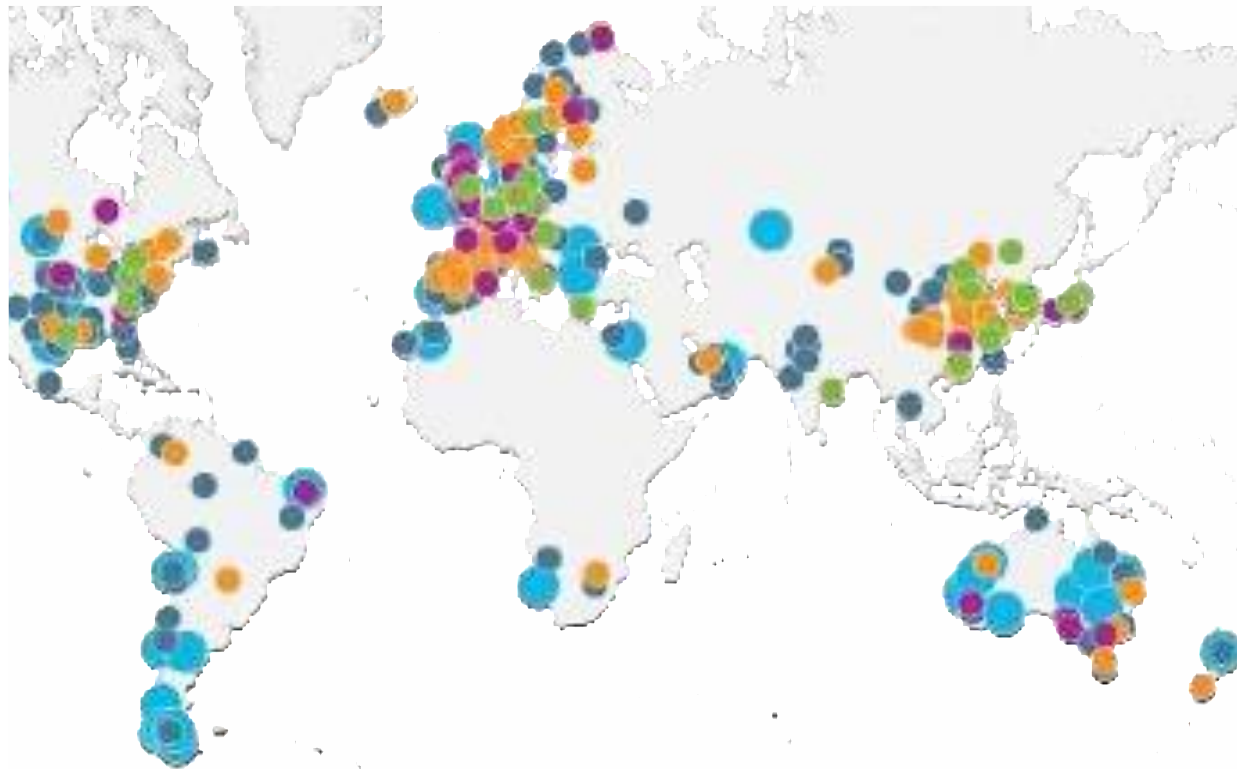
- National/international policy development and regulation
- Operating and safety standards
- Business case development
- Public perception/social awareness



Exhibit 3 – Global hydrogen project announcements

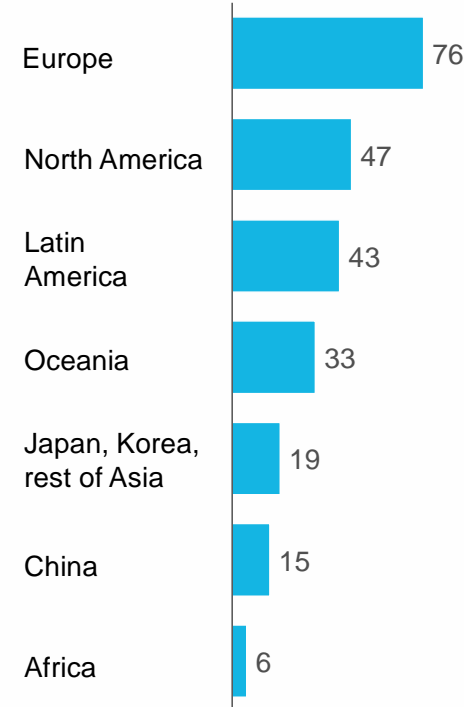
As of May 8, 2022

Out of 534¹ large-scale projects worth USD 240 bn announced globally ...



USD 240bn

investments required for announced projects until 2030



of projects

- 51** Giga-scale production
- 262** Large-scale industrial use
- 128** Transport
- 53** Integrated H₂ economy
- 40** Infrastructure projects

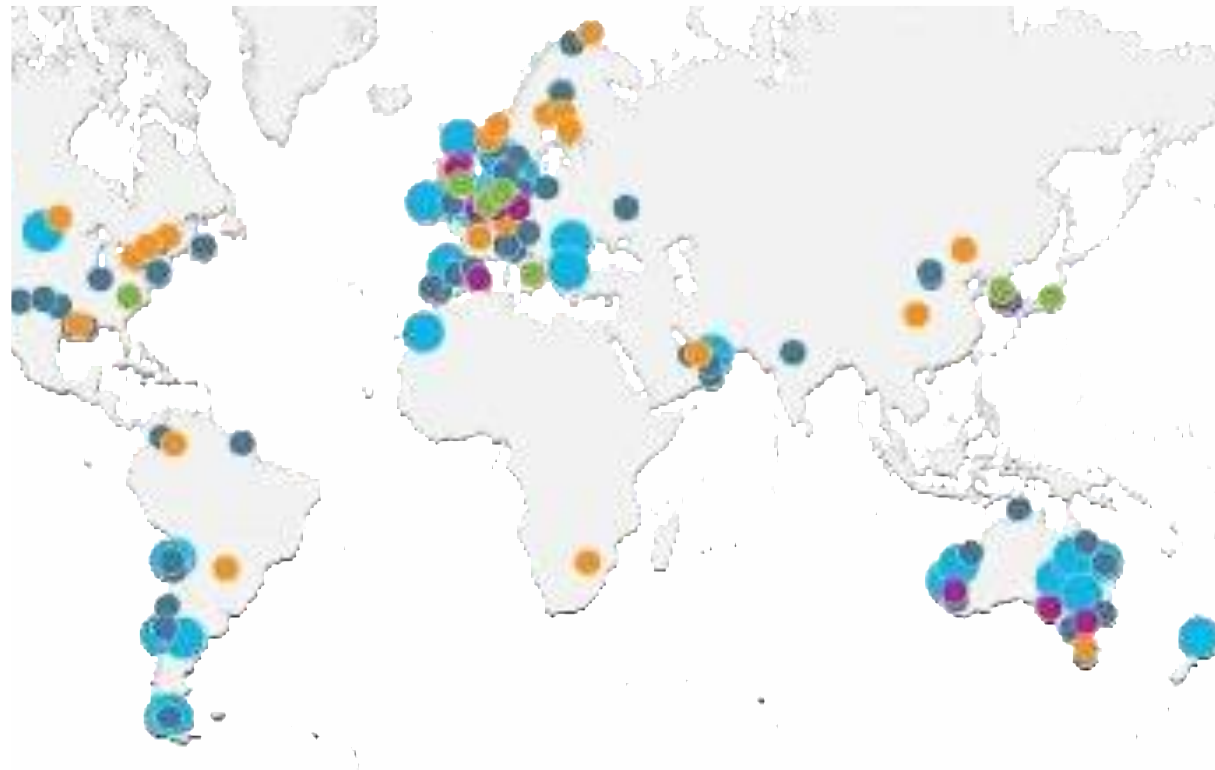




Exhibit 3 – Global hydrogen project announcements

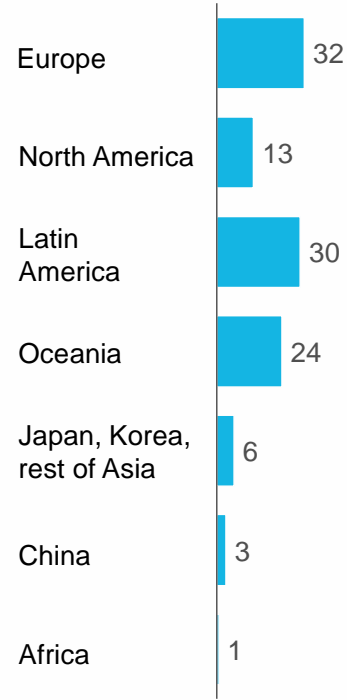
As of May 8, 2022

... 165 – about one third – are undergoing feasibility and FEED studies ...



USD 109bn

investments until 2030,
related to projects in planning



of projects

33

Giga-scale production

86

Large-scale industrial use

26

Transport

13

Integrated H₂ economy

7

Infrastructure projects





Exhibit 3 – Global hydrogen project announcements

As of May 8, 2022

... and only about 10% of investments have achieved final investment decision



USD 22bn

investments until 2030,
related to committed projects



of projects

- **3** Giga-scale production
- **77** Large-scale industrial use
- **61** Transport
- **29** Integrated H₂ economy
- **19** Infrastructure projects



Progress in Meeting Targets

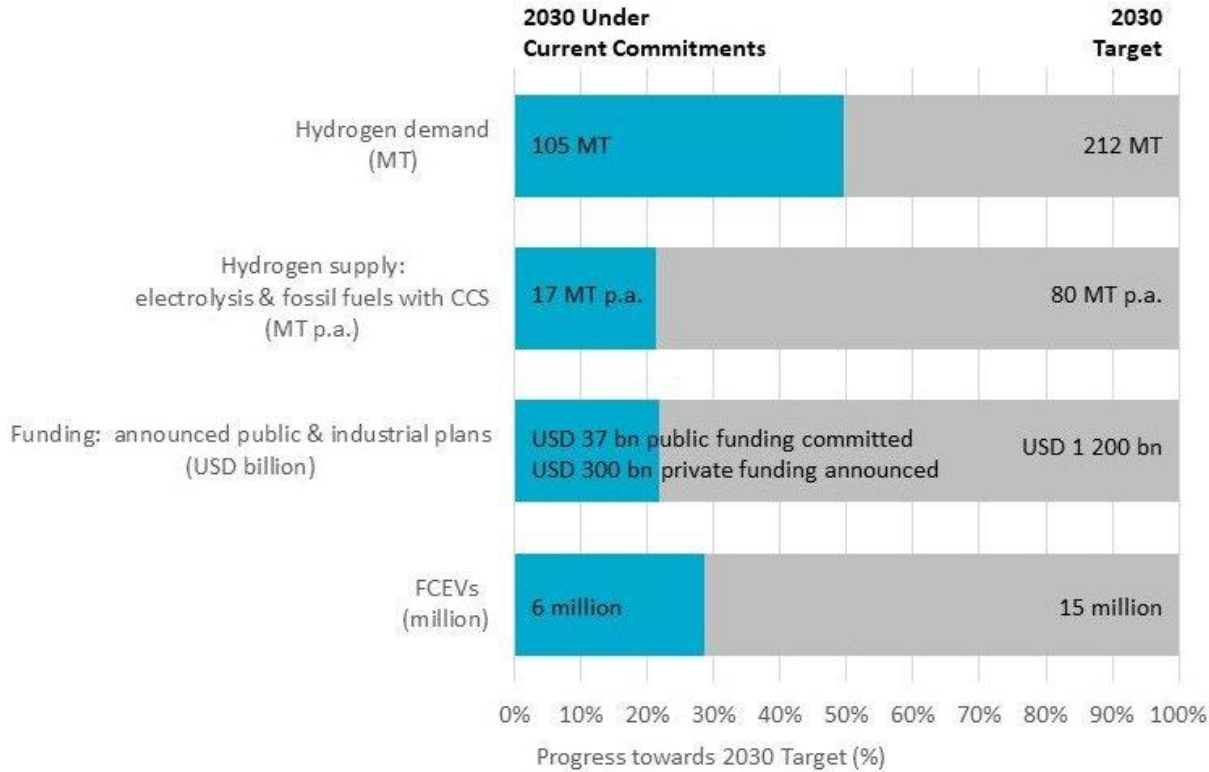
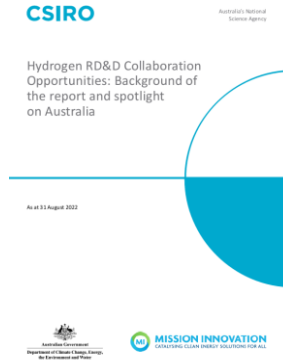


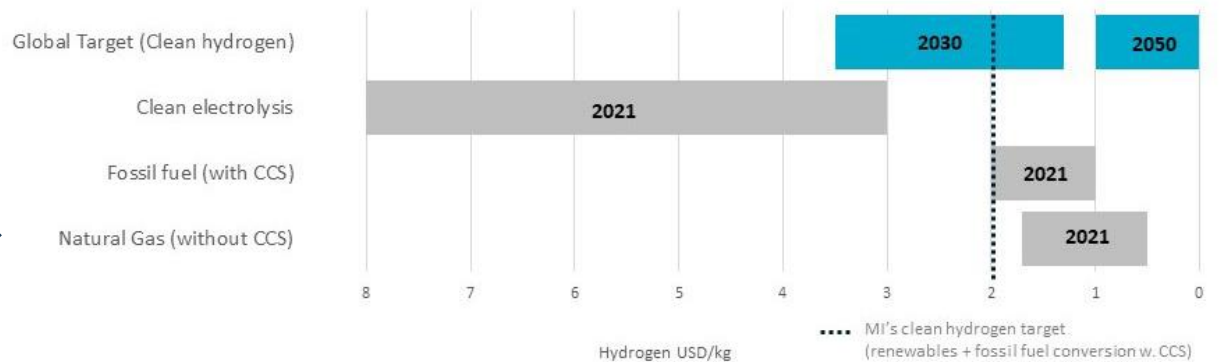
Figure 2: Global levelised cost of hydrogen (USD/kg) production in 2021 vs global 2030 and 2050 targets



Using data from:



Figure 1: Global progress towards achieving net zero by 2050



Derived from IEA (2021) Global Hydrogen Review 2021; IEA (2021) Net Zero by 2050 – A Roadmap for the Global Energy Sector, and Department of Industry, Science, Energy and Resources (2021) Technology Investment Roadmap.