

Hydrogen supply vs demand development

What's the way forward?

UK Nordic Baltic Hydrogen Conference

10th February 2022

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an ERM Group company

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The need for deep decarbonisation has never been more evident or urgent than right now...

Climate change: Warmth shatters section of Greenland ice shelf

By Jonathan Amos
BBC Science Correspondent

14 September 2020

Greenland ice loss

US wildfires fuelled by climate change, California governor says

12 September 2020

California wildfires

Climate change: Australia fires will be 'normal' in warmer world

By Matt McGrath
Environment correspondent

Climate change: Siberian heatwave 'clear evidence' of warming

By Justin Rowlatt
Chief environment correspondent

15 July 2020

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Climate change: 'Unprecedented' ice loss as Greenland breaks record

By Matt McGrath
Environment correspondent

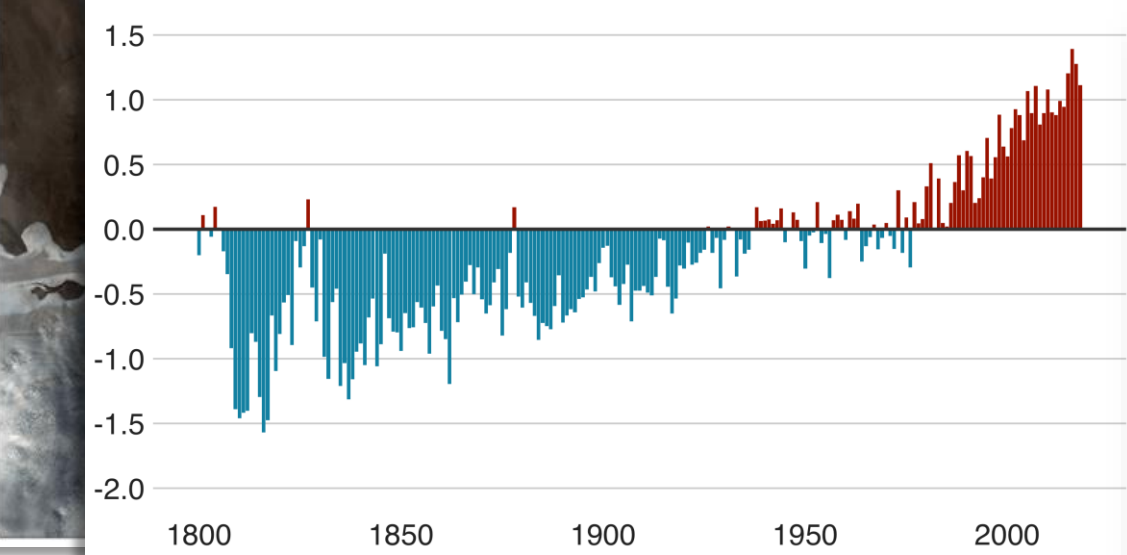
20 August 2020

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NE Greenland: Spalte G

The world has been getting warmer

Annual mean land temperature above or below average (°C)



Note: Average is calculated from 1951-1980 land surface temperature data

Source: University of California Berkeley

BBC

Climate change: IPCC report is 'code red for humanity'

By Matt McGrath
Environment correspondent

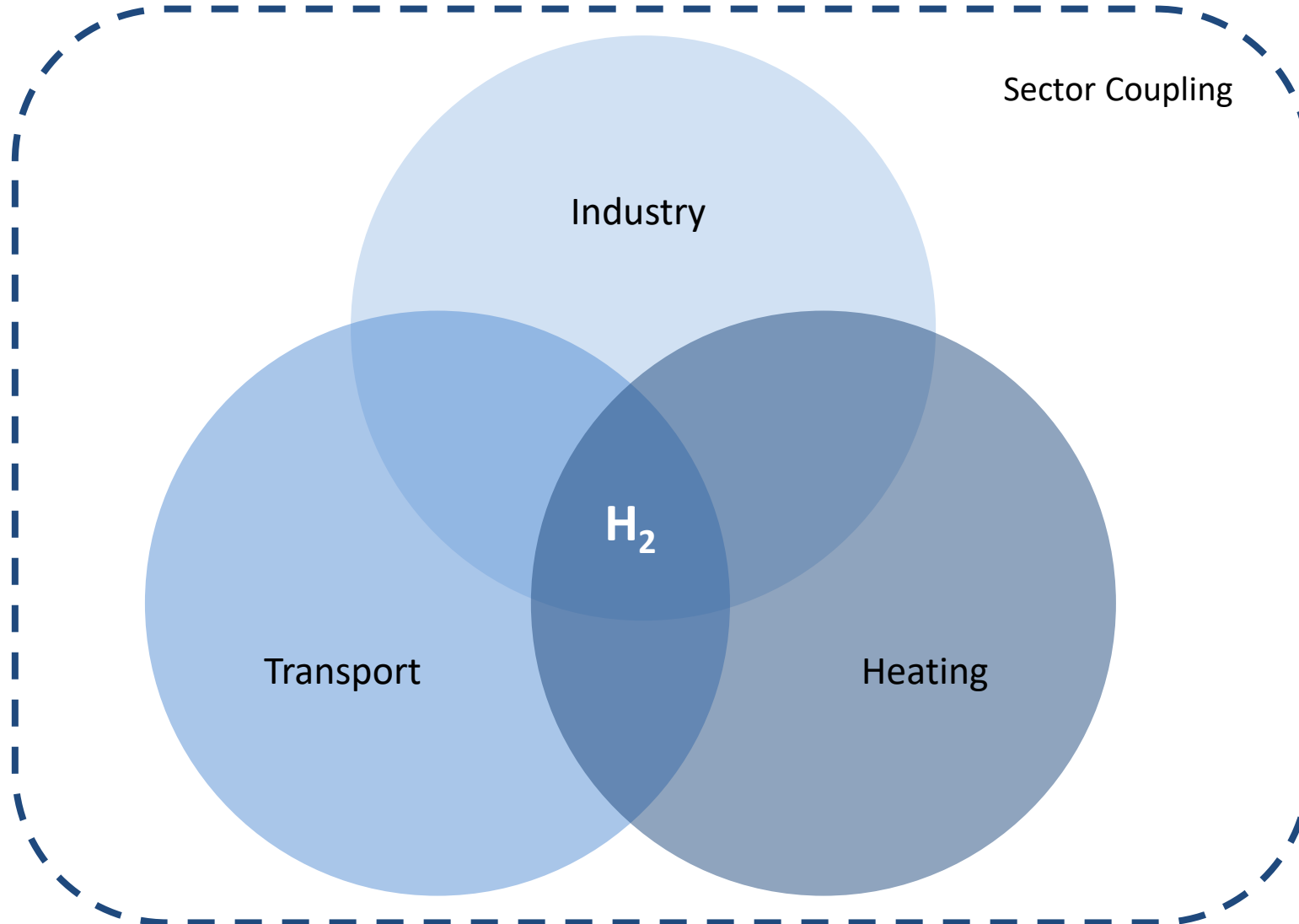
9 August | Comments

COP26



land lurched forward again last year,

Hydrogen may be used as a clean energy vector to decarbonise hard-to-reach sectors, and further increase efficiency through *sector coupling*...



Hydrogen has many uses as part of a net zero energy future

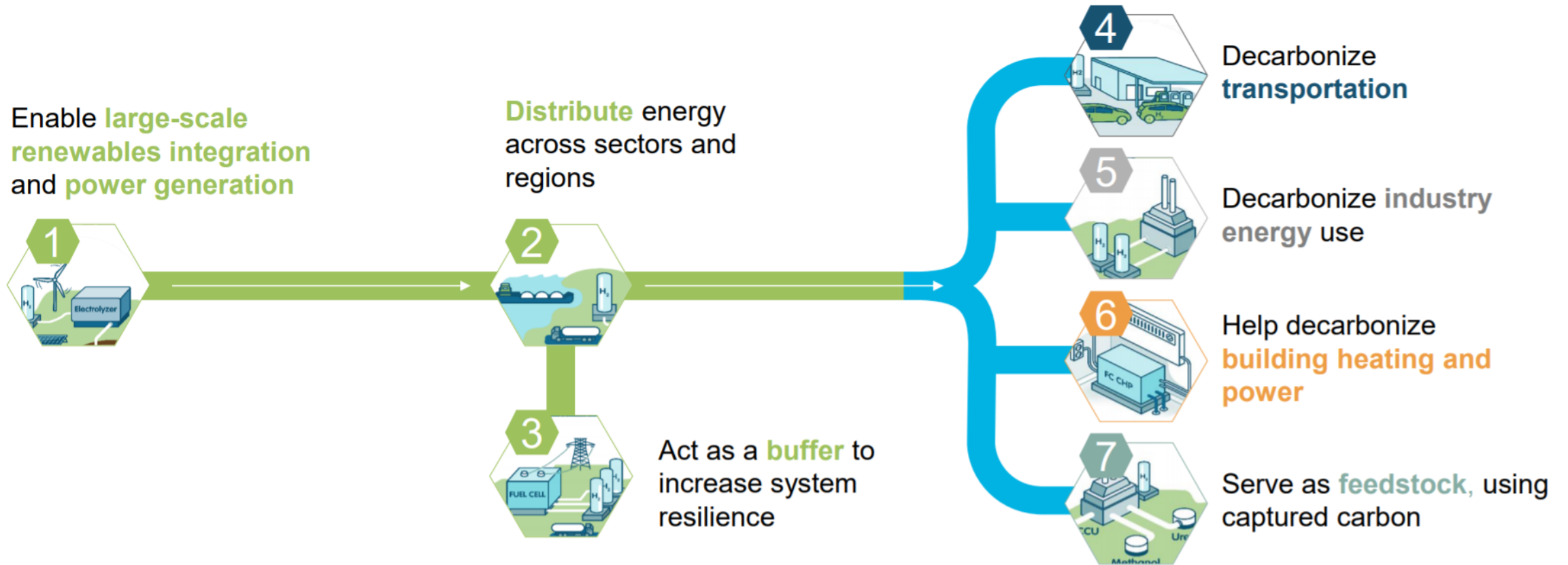
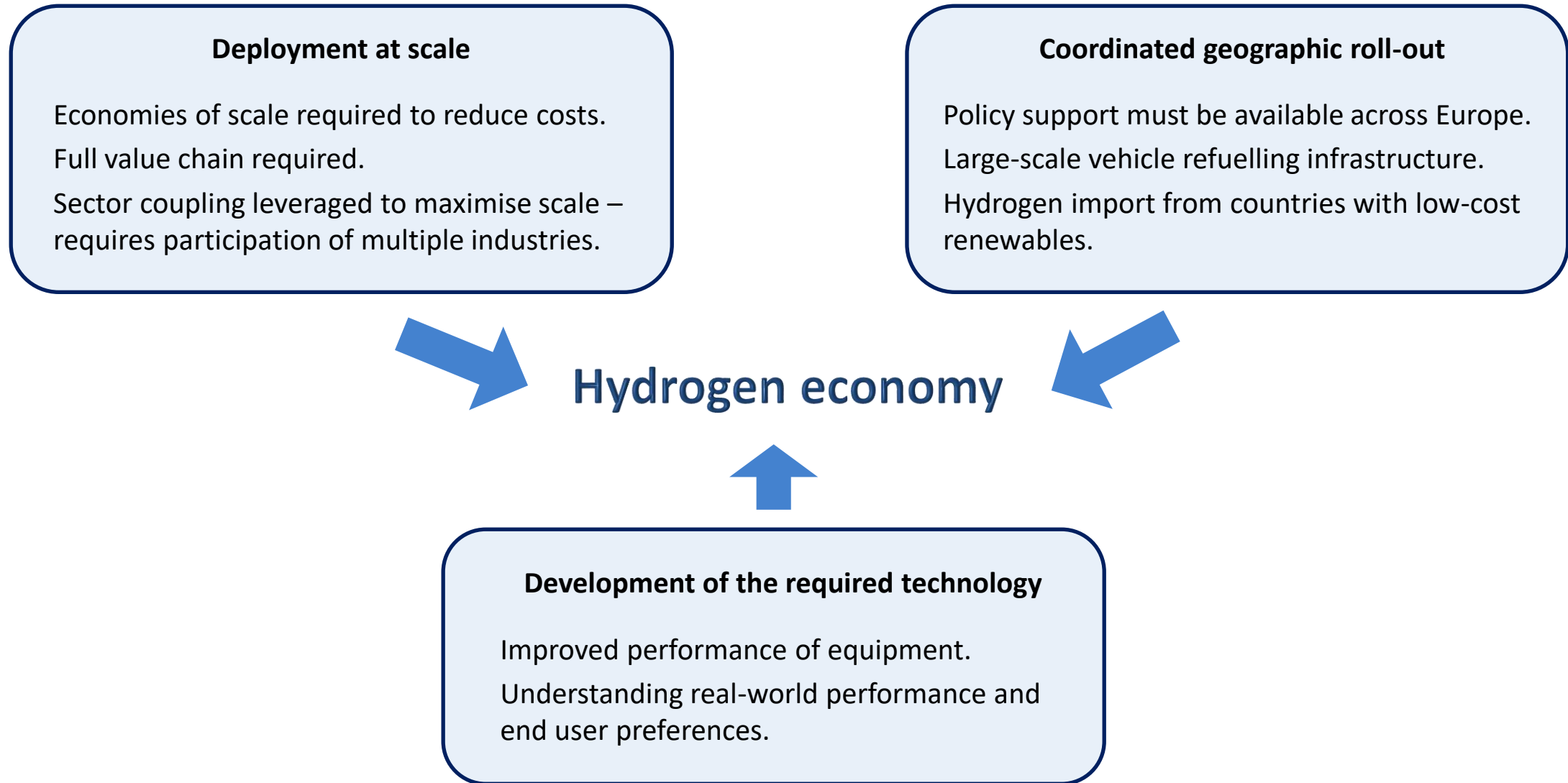
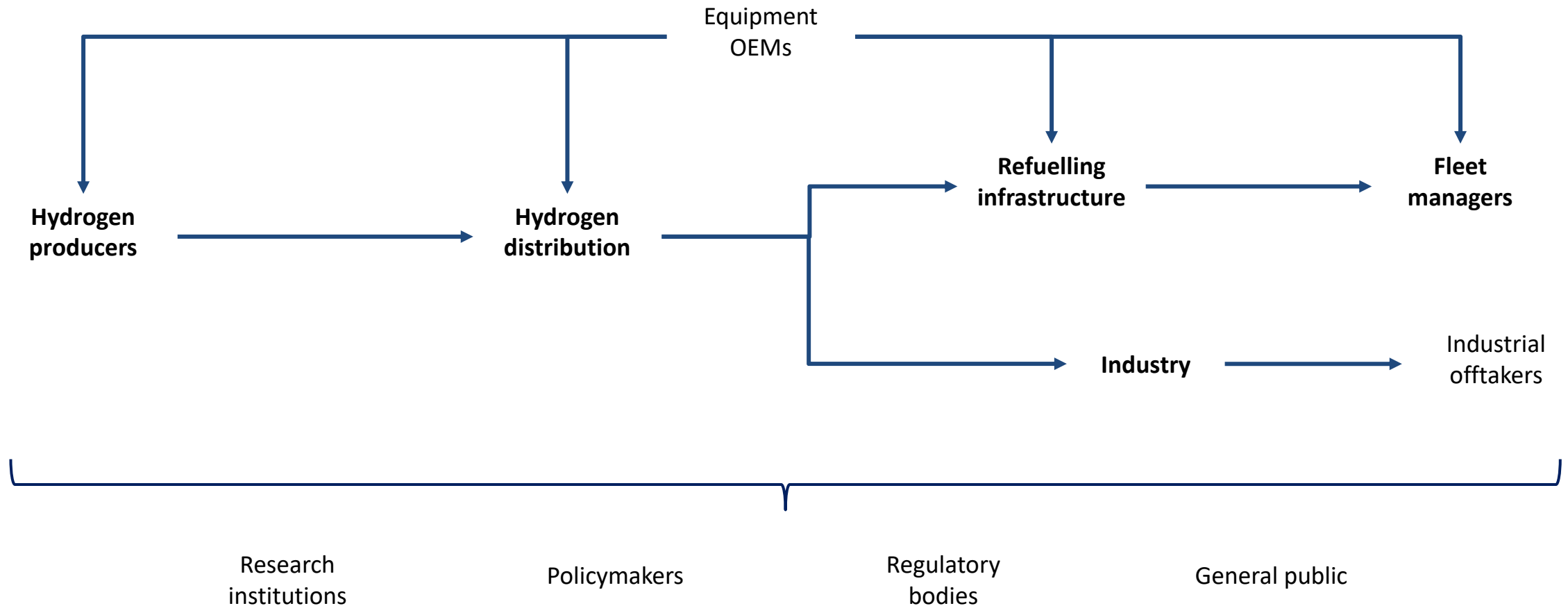


Image source: Roadmap towards a hydrogen economy, Hydrogen Council, 2017*

Synchronising the roll-out of hydrogen technologies is challenging during the early years – all three aspects are needed for a successful hydrogen economy



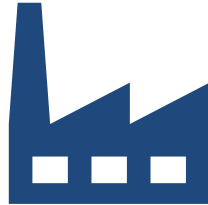
Early hydrogen projects involve a large number of stakeholders, with some playing a key role in the development of the project



Hydrogen supply and demand sources need to work together to coordinate on timing, geographies, and scale...

	Hydrogen suppliers	Hydrogen demand sources	Challenges
Scale	Larger-scale production leads to low cost hydrogen	Large-variation in demand scale	<ul style="list-style-type: none"> • Insufficient scale leads to high cost hydrogen • Scale of production should be matched to demand
Location	Siting near a source of low-cost renewable power	Existing industrial sites Vehicles can operate in limited regions (buses) or across Europe (trucks)	<ul style="list-style-type: none"> • Transporting hydrogen long distances can add to cost • Insufficient refuelling infrastructure range will put off fleet operators
Timing	2+ years required for infrastructure development	1+ year for vehicle delivery 2+ years for industry switching	<ul style="list-style-type: none"> • Supply and demand must come into operation simultaneously <ul style="list-style-type: none"> • Commitments ahead of time • Urgent need to decarbonise

Multiple end users can work together to create a large-scale, high value demand source



Industrial end use

- High hydrogen demand
- Demand certainty through time
- Long offtake agreements possible

⇒ **Industry can create a large-scale secured demand, but...**

- Low hydrogen costs required to compete with fossil-hydrogen



Transport end user

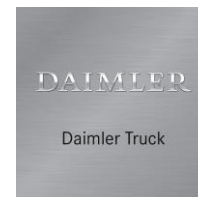
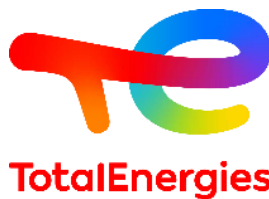
- Low hydrogen volumes (in early stages)
- Demand fluctuates and is uncertain

⇒ **Early stage transport projects make large-scale hydrogen production difficult to justify, but...**

- Higher hydrogen price can be achieved for parity with road fuels

H2Accelerate

Accelerating the uptake of green hydrogen for trucking



Hydrogen infrastructure players




Commit to investing in production equipment and refueling infrastructure at scale

Truck manufacturers

Commit to investing in scaling up production to achieve series manufacturing during the 2020s

The central objective of the H2Accelerate collaboration is to create the conditions for the mass-market roll-out of hydrogen trucks in Europe.

H2Accelerate collaborative activities:

- **Encourage supportive policy** 
 - Create a robust evidence base to justify policy intervention
 - Targeted outreach to policymakers at a European and member state level
- **Inform customers, investors and the general public** 
 - Develop a public vision for hydrogen truck roll-out
 - Communication on the viability of hydrogen trucking
- **Funding acquisition** 
 - Identification of suitable funding programs
 - Joint funding applications to obtain capital funding to support early roll-out and market initiation activities

Deployment will take place in progressive phases

- Green hydrogen produced through electrolysis with renewable electricity will power the vehicles.
- High capacity hydrogen refuelling stations deployed in strategic locations, with fast fuelling (under 15 minutes) and ultra-high reliability.
- Truck numbers will increase and the refuelling network will expand along TEN-T corridors over three phases:
 - **Phase 1: R&D and deployment** - hundreds of trucks and tens of high-capacity refuelling stations deployed in regional clusters.
 - **Phase 2: Industrial scale up** - increasing scales of deployment to thousands of trucks, with refuelling network expansion along TEN-T corridors.
 - **Phase 3: Sustainable growth** - tens of thousands of trucks are on the road, with hundreds of refuelling stations supplying them.
- The success of these phases will lead to the full industrialisation of the fuel cell truck market post-2030.

H2Accelerate members aim to build a pan-European refuelling network



Phase 1



Phase 2/3

Illustration of a potential hydrogen station network roll-out to cover an increasing length of European roads.

A hydrogen station network roll-out may start in corridors linked to the manufacturing centers of H2A OEMs.

Any questions?



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