



Low-emissions hydrogen and hydrogen-based fuels

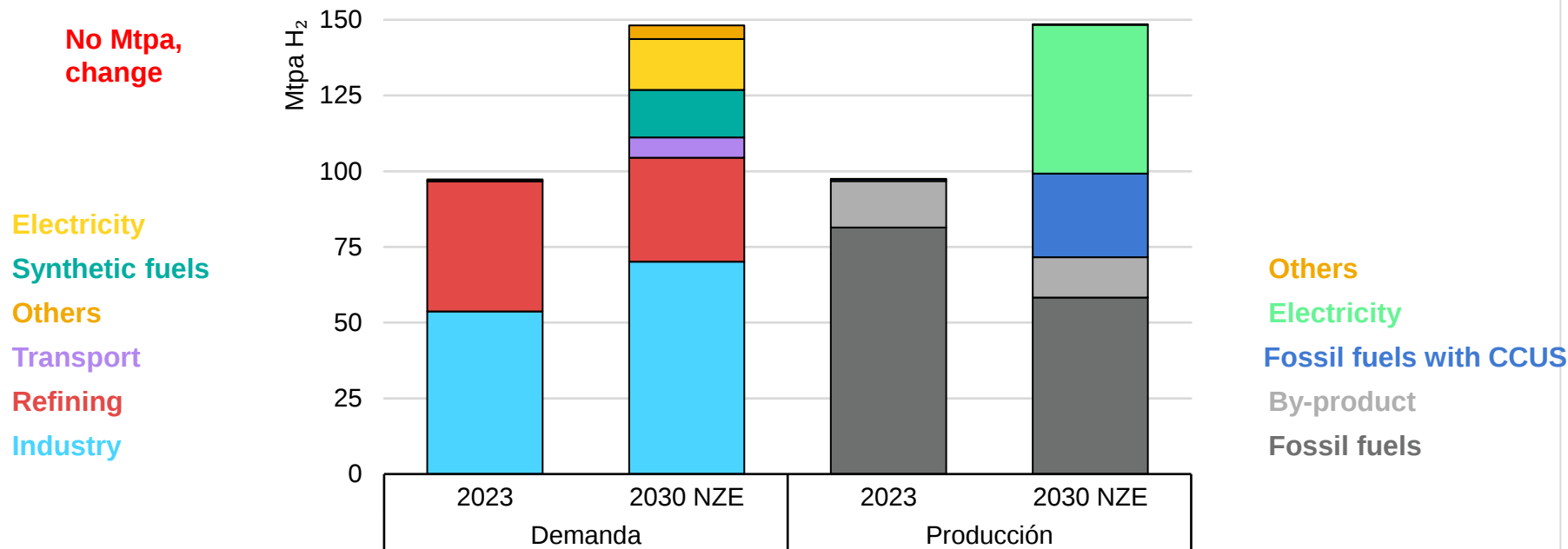
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Hydrogen is used today, but it comes with significant emissions

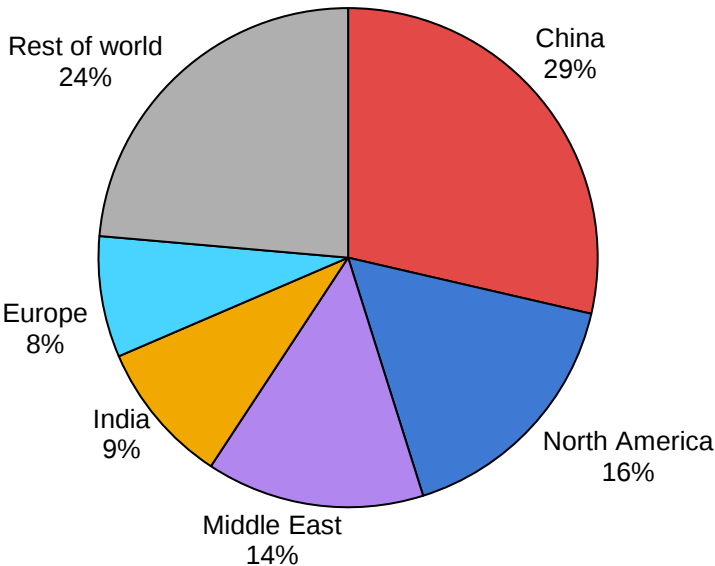
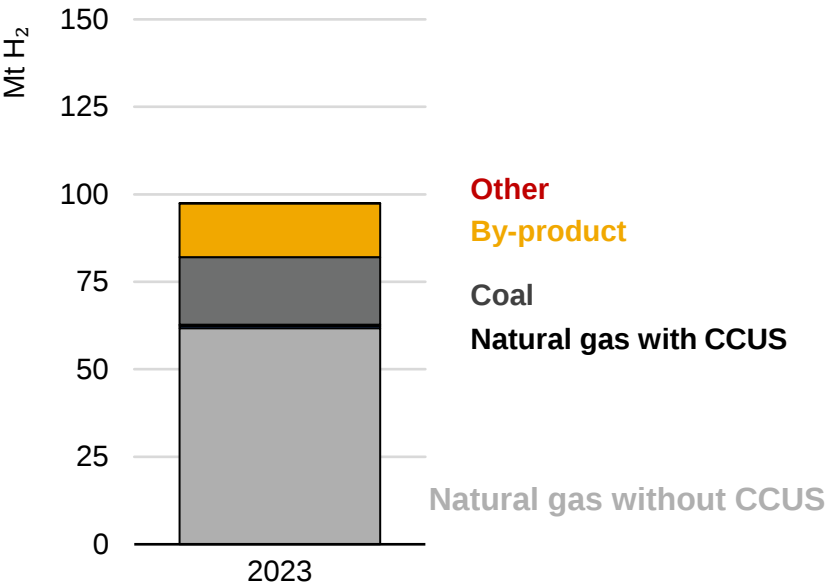
Hydrogen demand by sectors and production by technology in the Net Zero Emissions by 2050 Scenario, 2023-2030



Global hydrogen demand hit 97 Mt in 2023, nearly all for industry and refining from unabated fossil sources. In the NZE Scenario, demand grows 50% by 2030, with almost half being low-emissions hydrogen

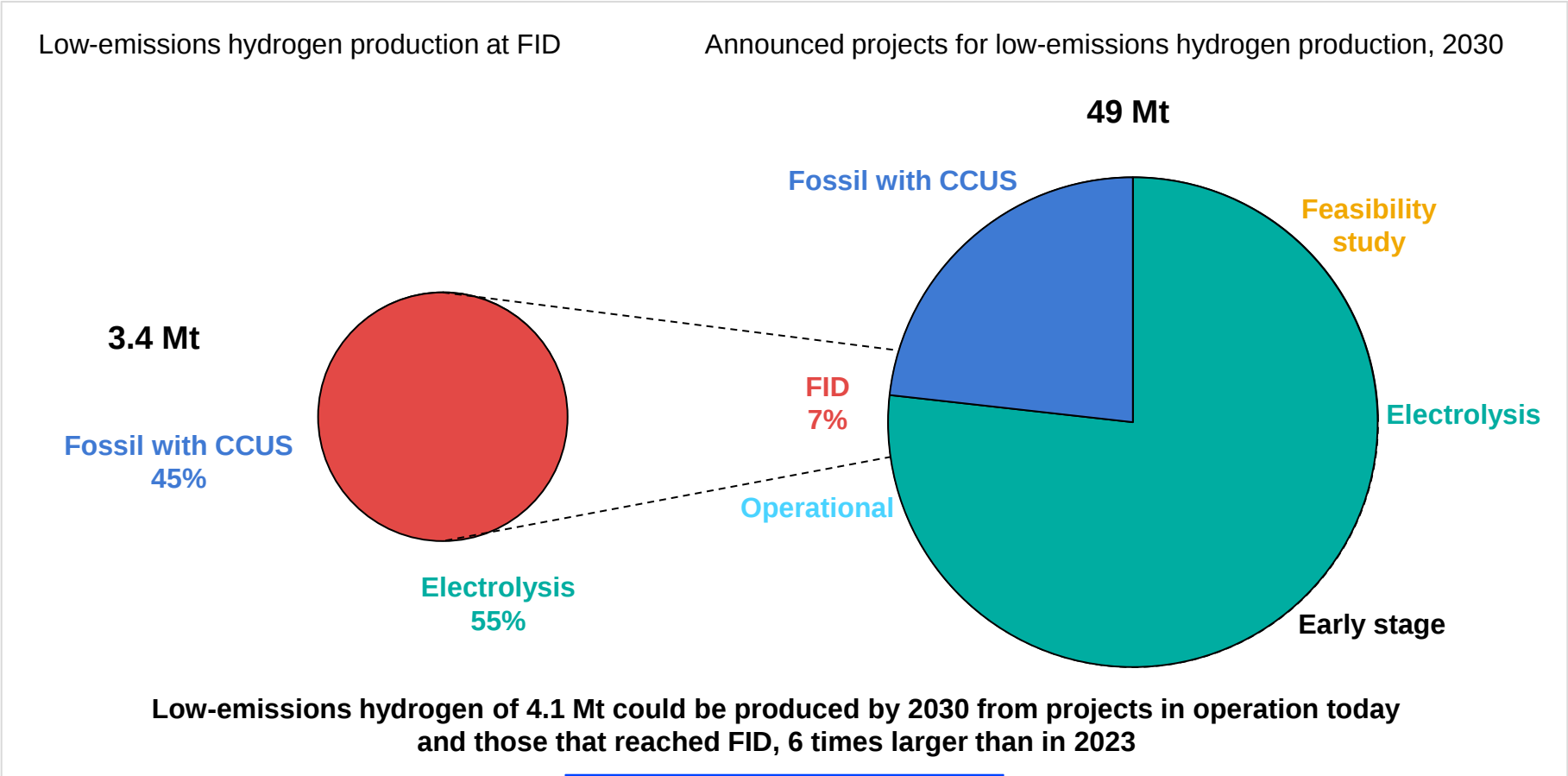
Hydrogen is used today, but it comes with significant emissions

Hydrogen use by region, 2023



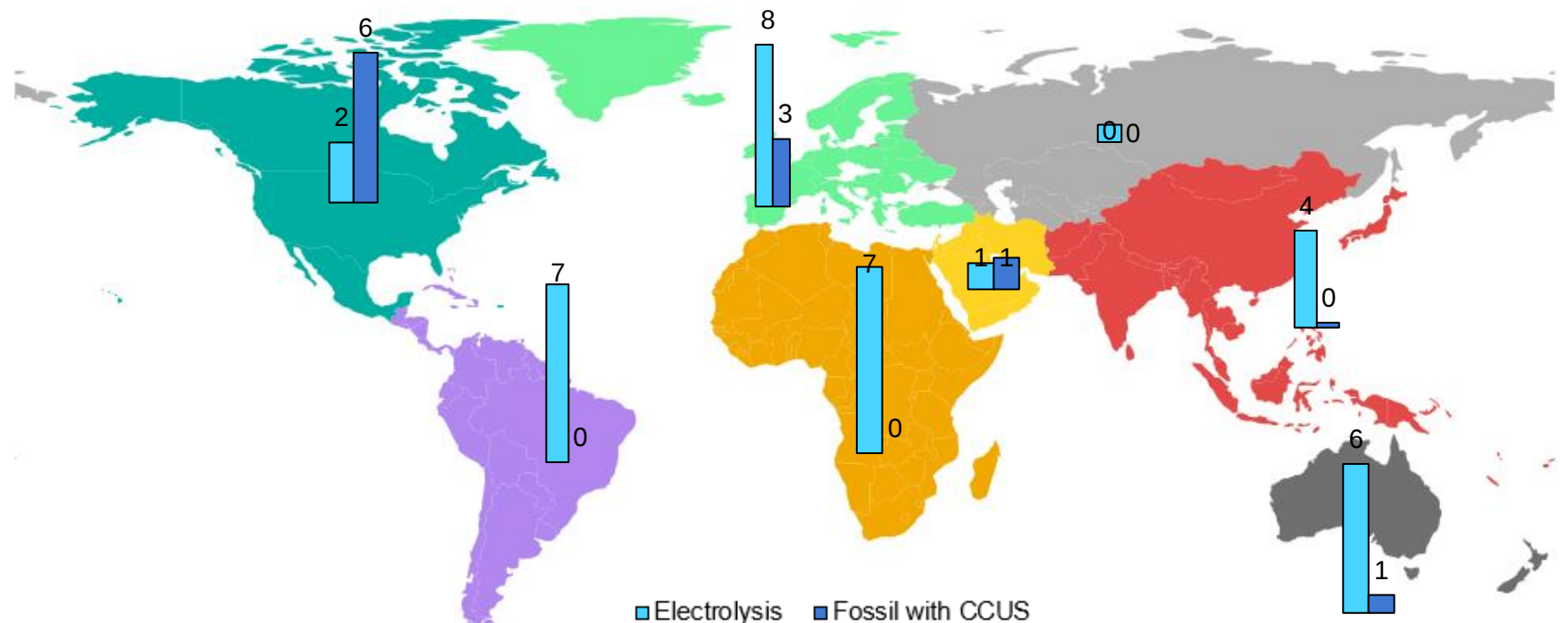
China is the world's largest consumer of hydrogen, producing almost 90% of the world's coal-based hydrogen

Investment decisions doubled in the last year



Low-emissions hydrogen projects are being announced worldwide

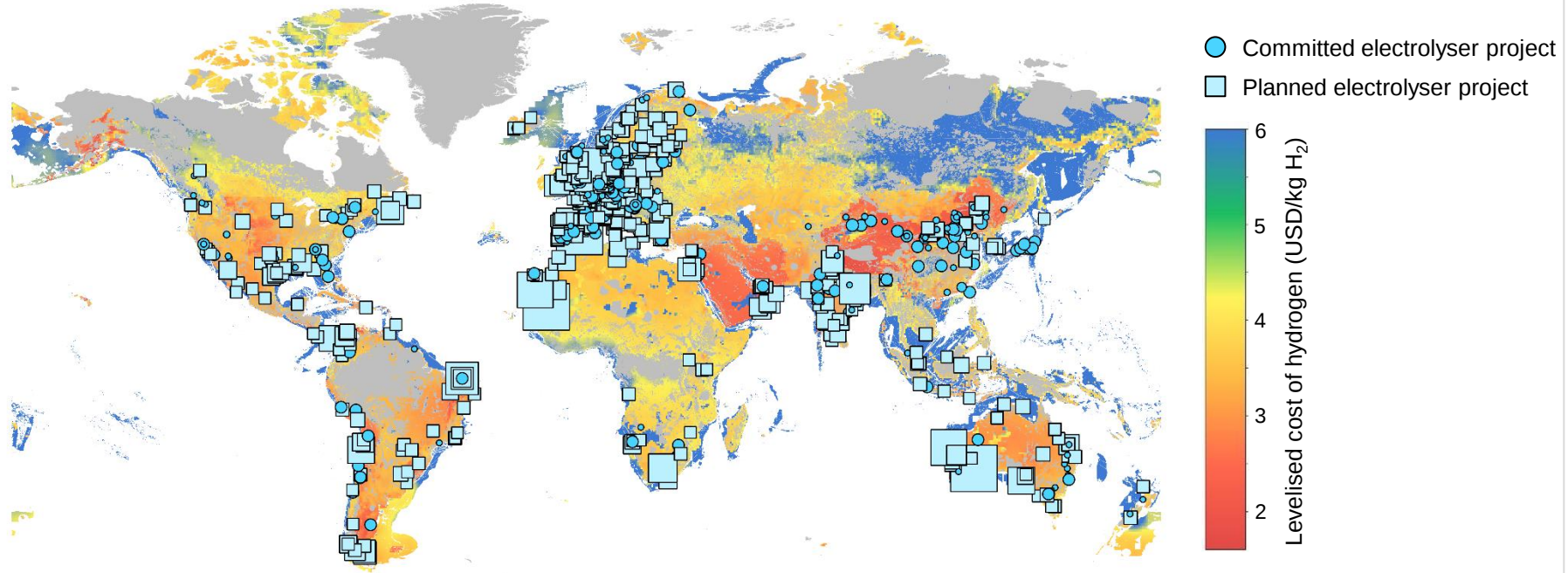
Announced low-emissions hydrogen projects around the world, 2030



A larger number of projects have been announced in Africa, Latin America and India in the past year, while the majority of operational capacity is in China, Europe and the United States

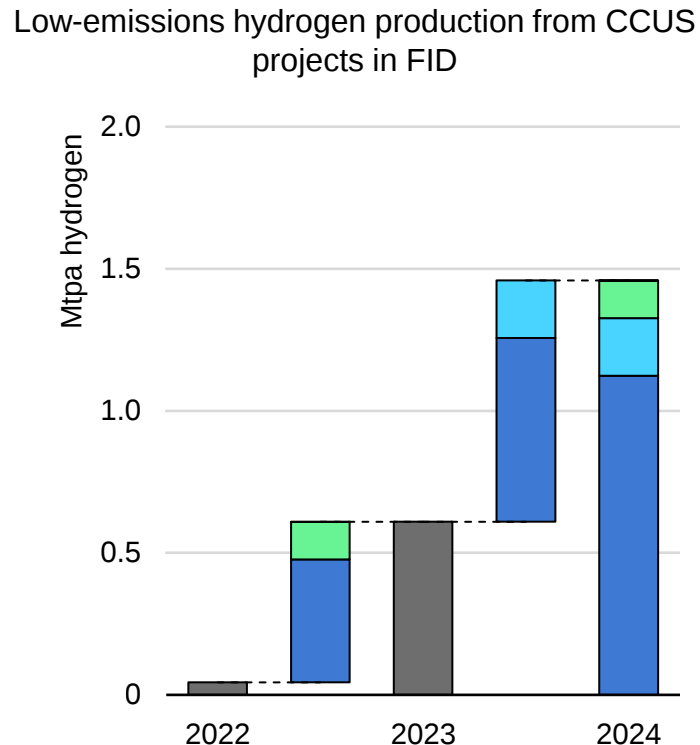
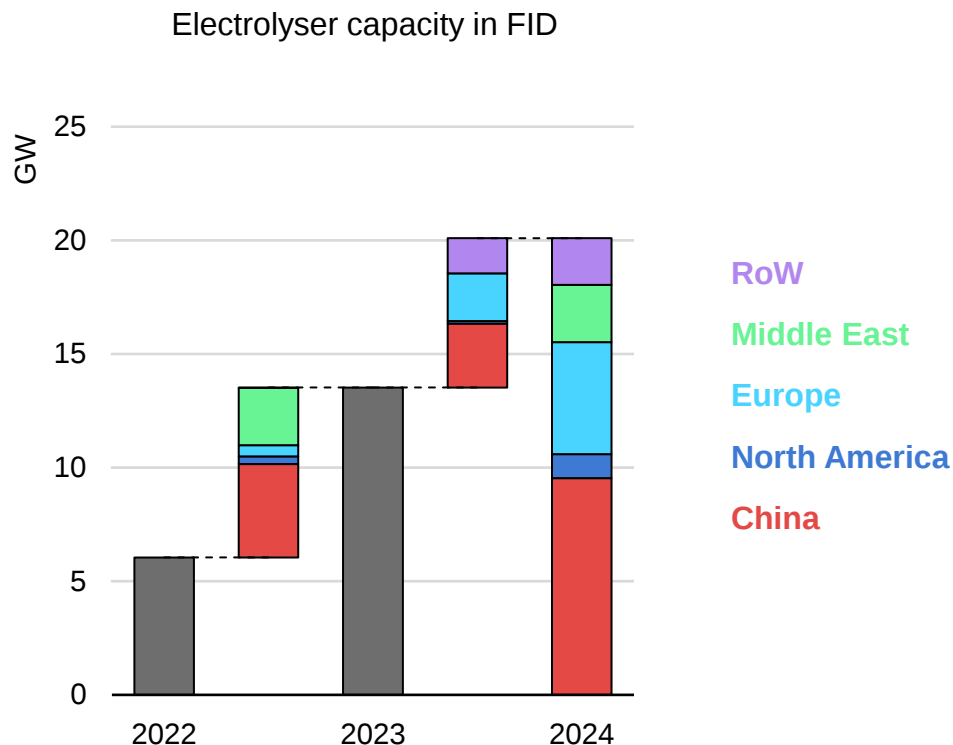
Scaling up deployment will bring down costs for renewable hydrogen

Hydrogen production cost from hybrid solar PV and onshore wind, and from offshore wind
in the Net Zero Emissions by 2050 Scenario, 2030



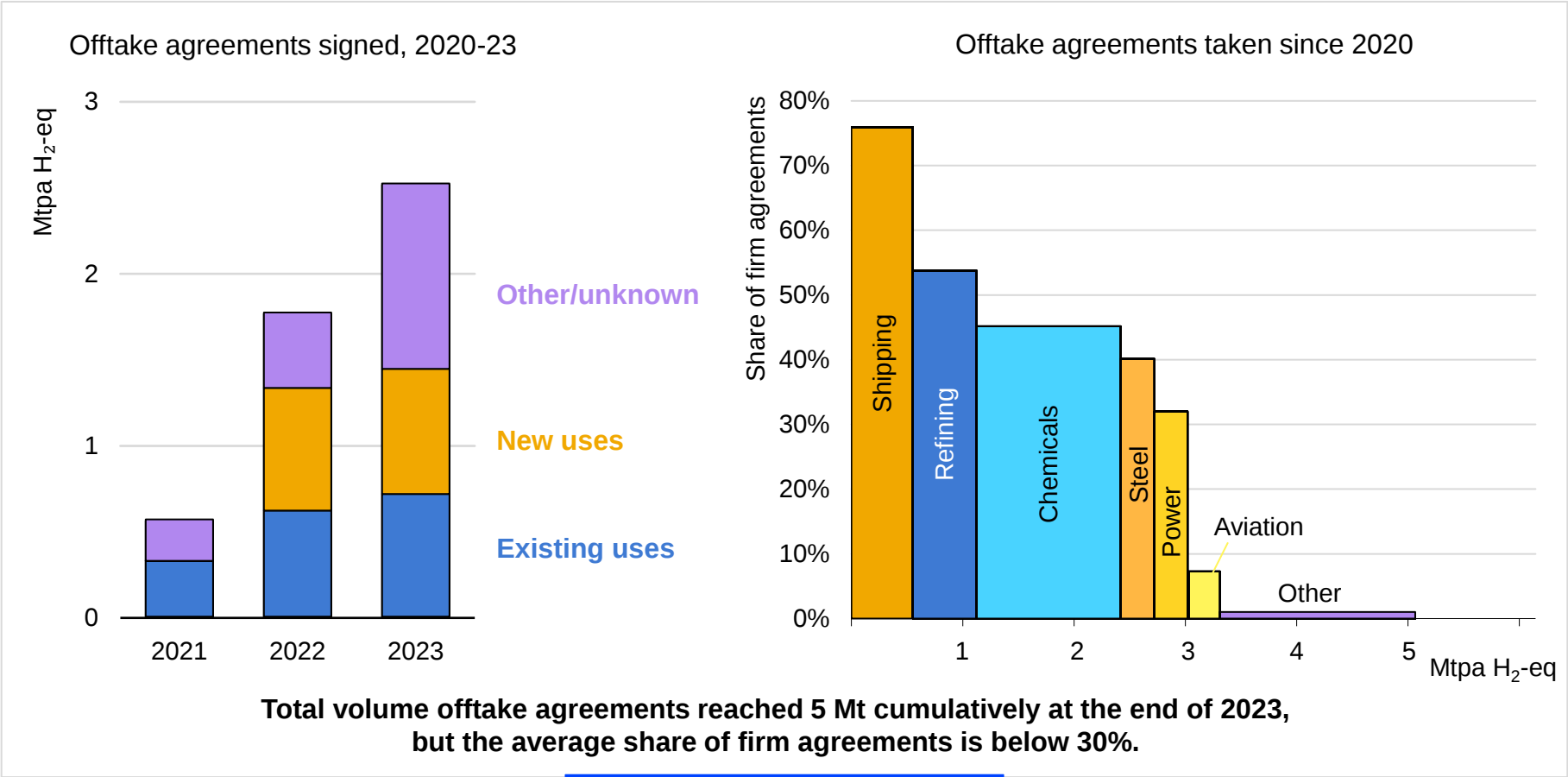
**Various regions around the world have excellent renewable resources for low-cost hydrogen production.
Production costs could fall below USD 2/kg H₂ by 2030 in certain locations.**

China and electrolyzers: the sequel to solar PV and EVs?

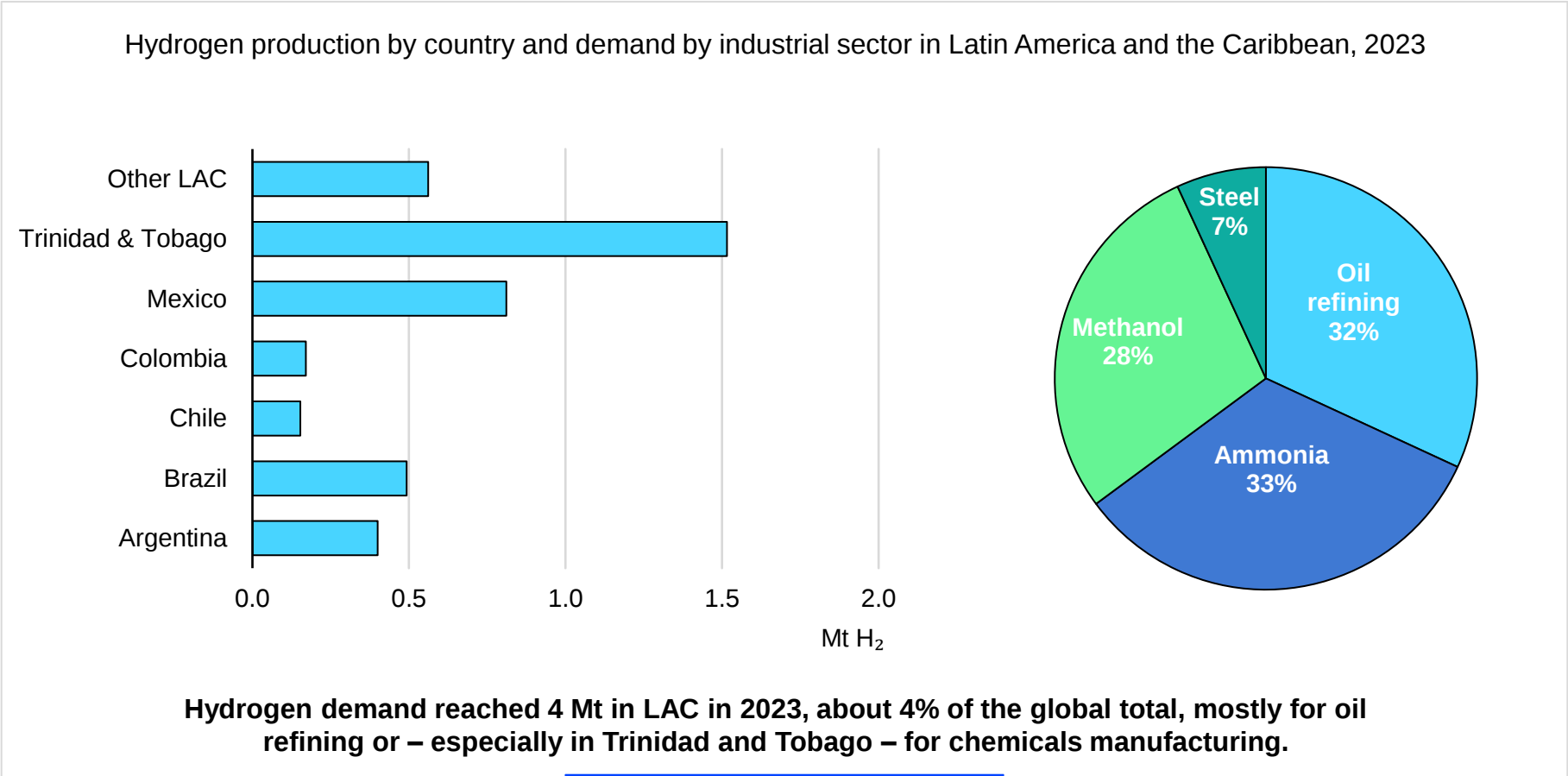


China accounts for 50% of global announced FIDs in electrolysis projects, cementing its leadership on a strong manufacturing sector. North America and Europe lead FIDs in CCUS projects.

Offtake agreements are growing, but remain mostly preliminary

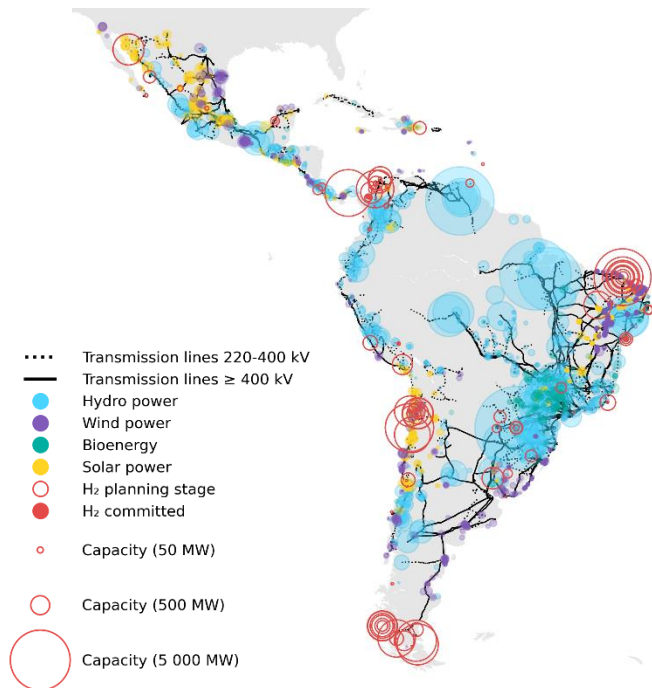


Hydrogen in LAC today

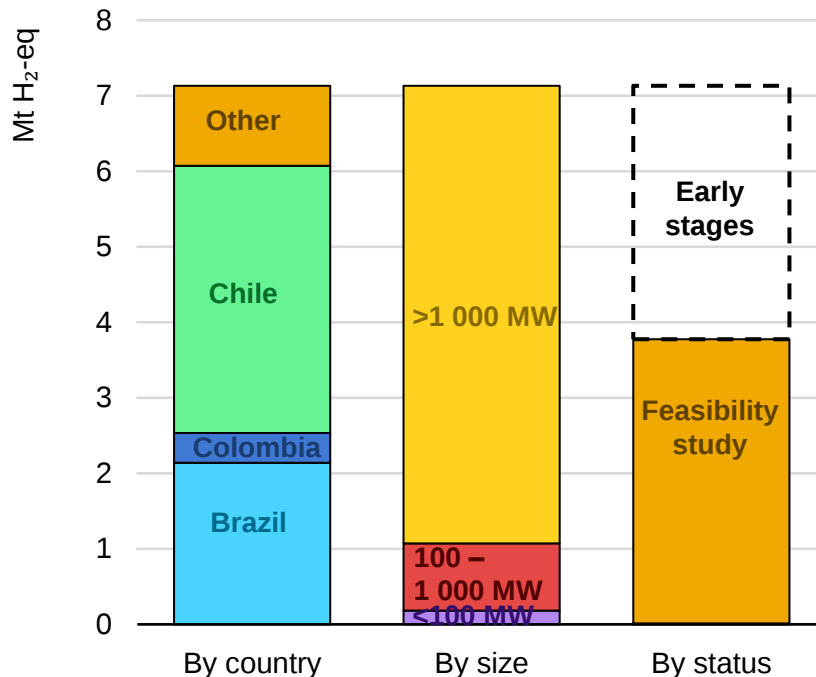


Hydrogen - an opportunity for Latin America in the new energy economy

Announced hydrogen projects and existing electric infrastructure



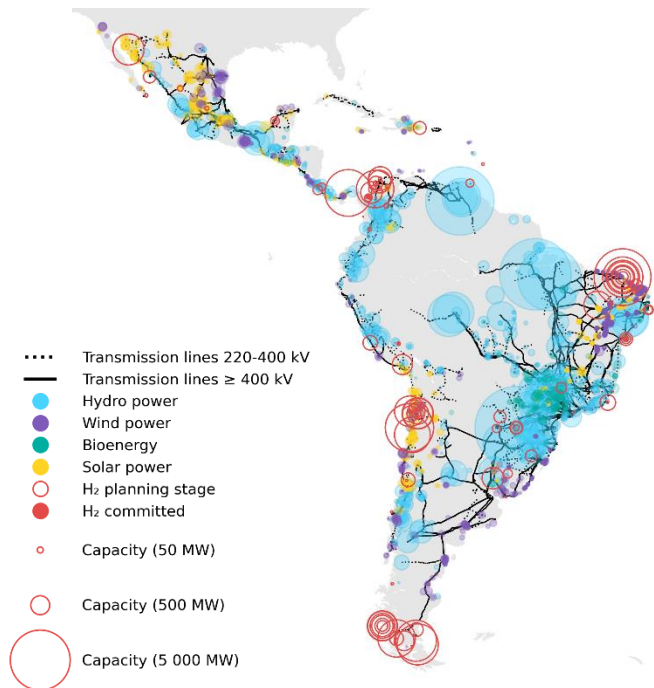
Announced projects for low-emissions hydrogen production, 2030



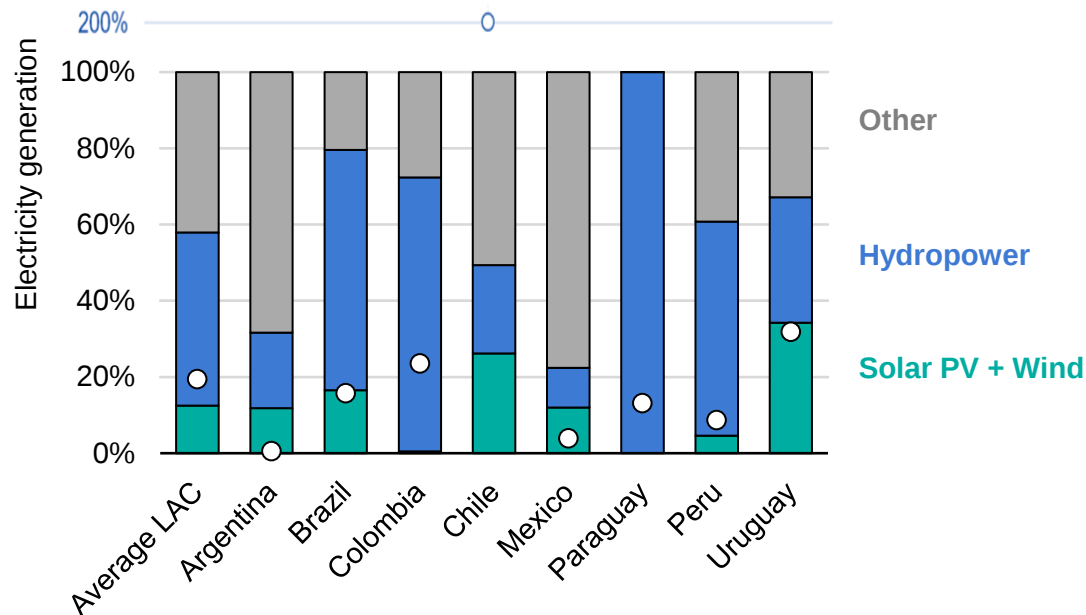
If all announced electrolytic hydrogen production projects materialise, LAC would account for 20% of global production by 2030, with over 85% of projects in the gigawatt scale.

Hydrogen needs a huge surge in renewables and grid transmission

Announced hydrogen projects and existing electric infrastructure



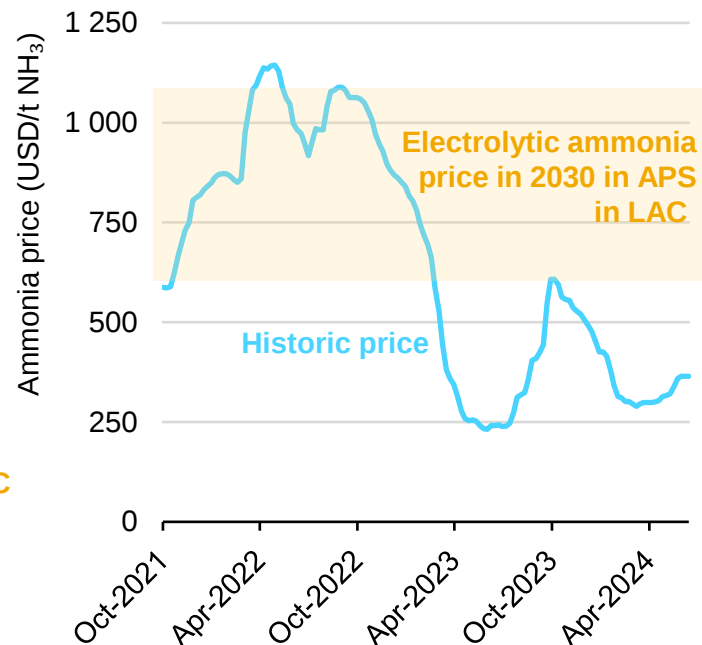
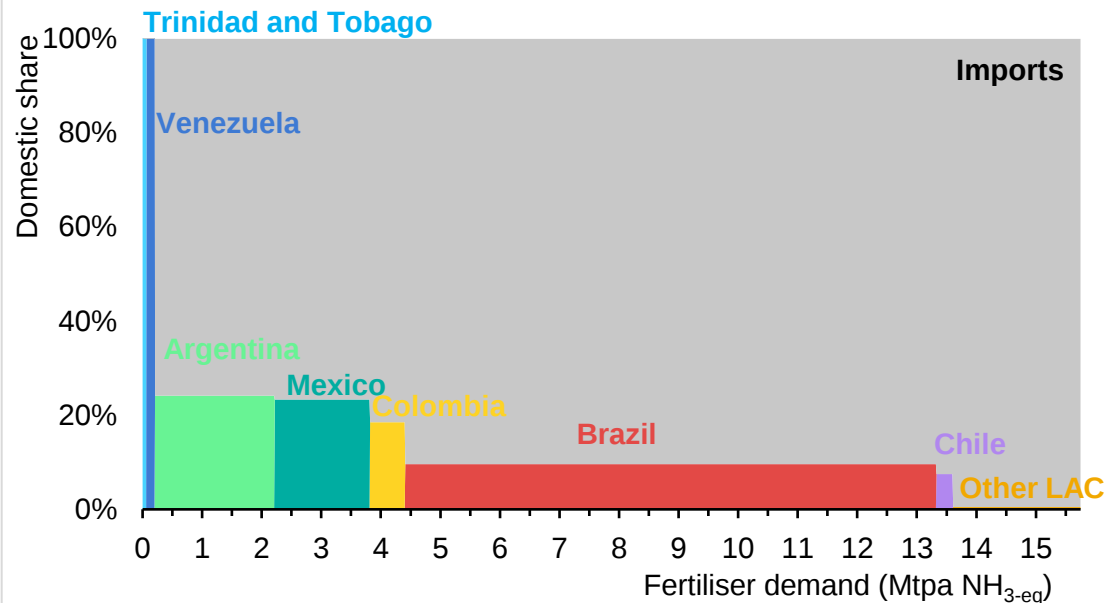
Potential electricity demand for electrolytic hydrogen production from announced projects, 2030, and electricity generation, 2022



Announced electrolytic hydrogen projects in LAC by 2030 would consume the equivalent of 20% of the region's current electricity generation.

Ammonia's trade deficit is a low-emissions opportunity for the region

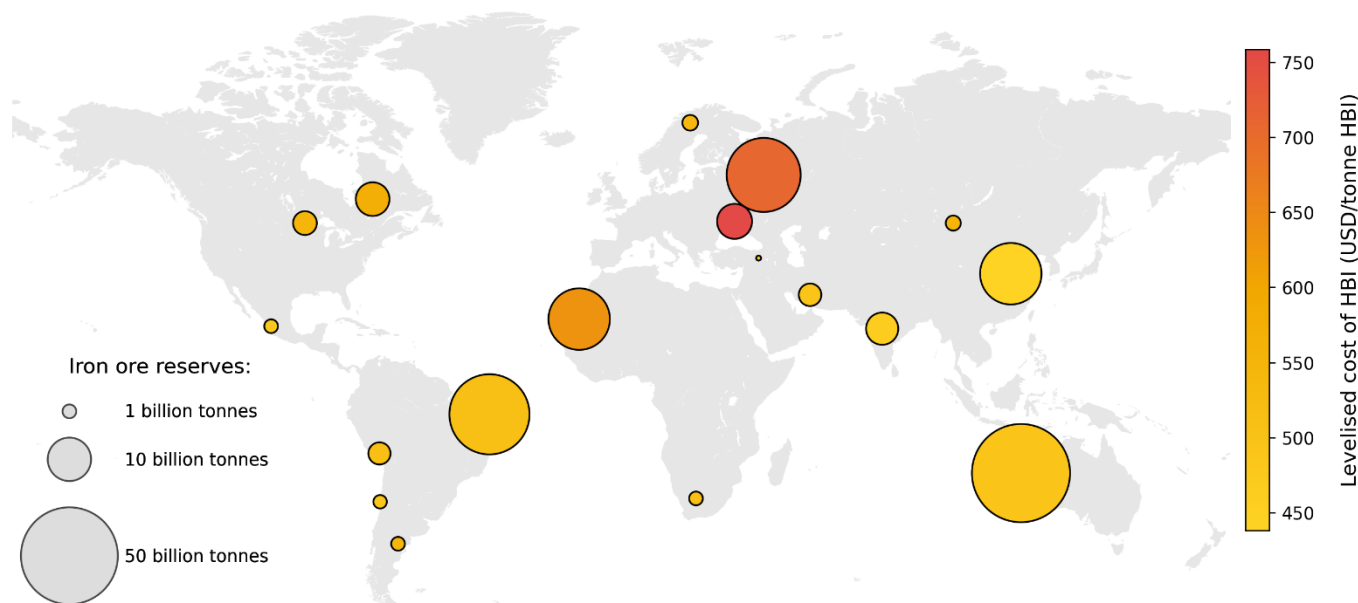
Nitrogen-based fertilisers demand in Latin America and the Caribbean and ammonia price



LAC meets nearly 80% of its nitrogen-based fertiliser demand with imports, whose trade deficit represents 0.1-0.4% of the GDP for the largest economies in Latin America

Shipping hot briquetted iron instead of iron ore and hydrogen

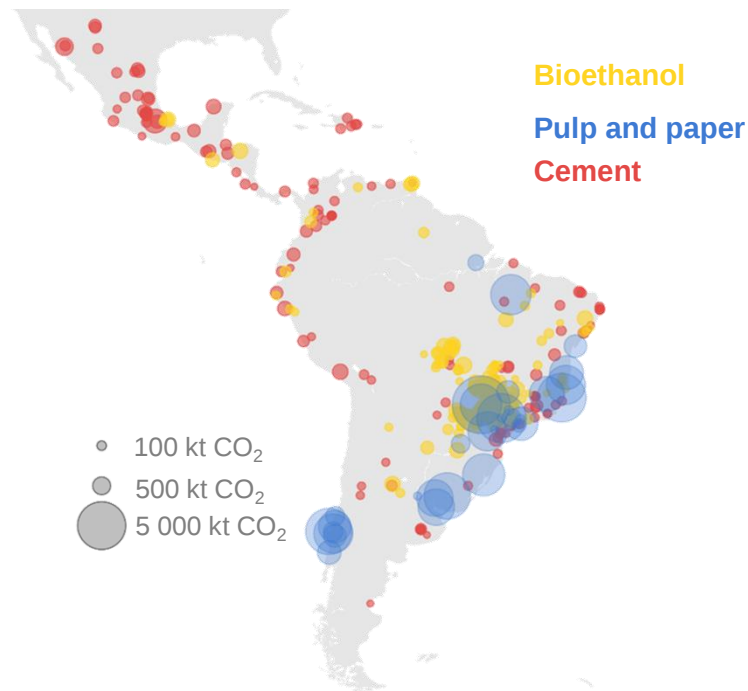
Levelised cost of producing hot briquetted iron in the Announced Pledges Scenario 2030 by iron ore reserves in 2022



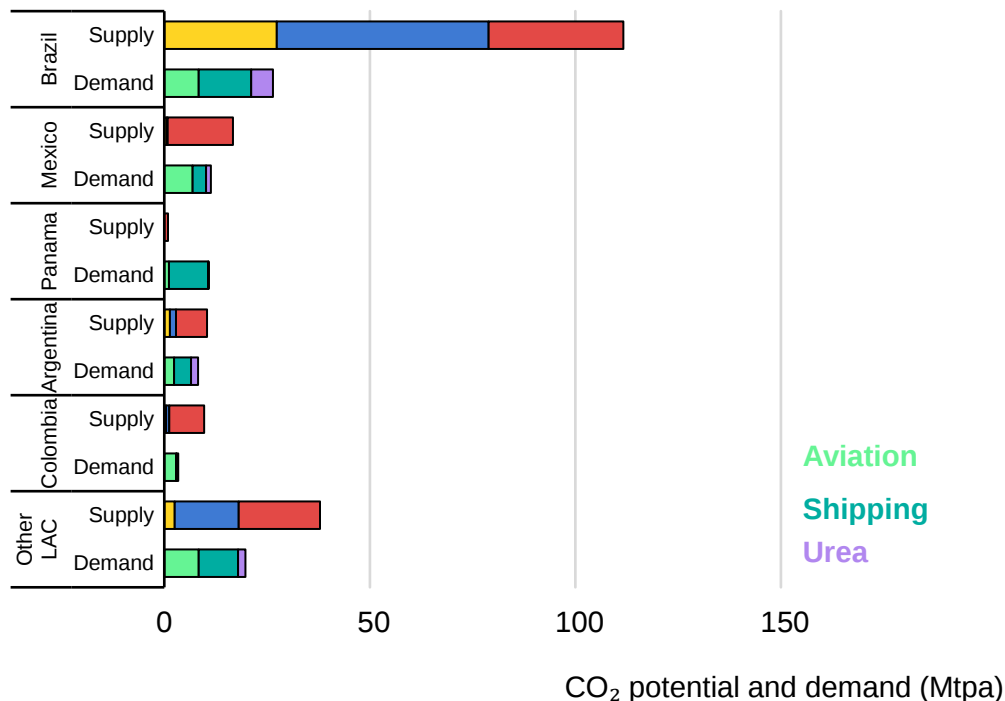
LAC can produce HBI cost-effectively compared to other regions of the world, as a result of its vast iron ore reserves and high-grade ores suitable for 100% H₂ DRI

An opportunity to use its biogenic CO₂ resources

Available biogenic and unavoidable CO₂ sources, 2023



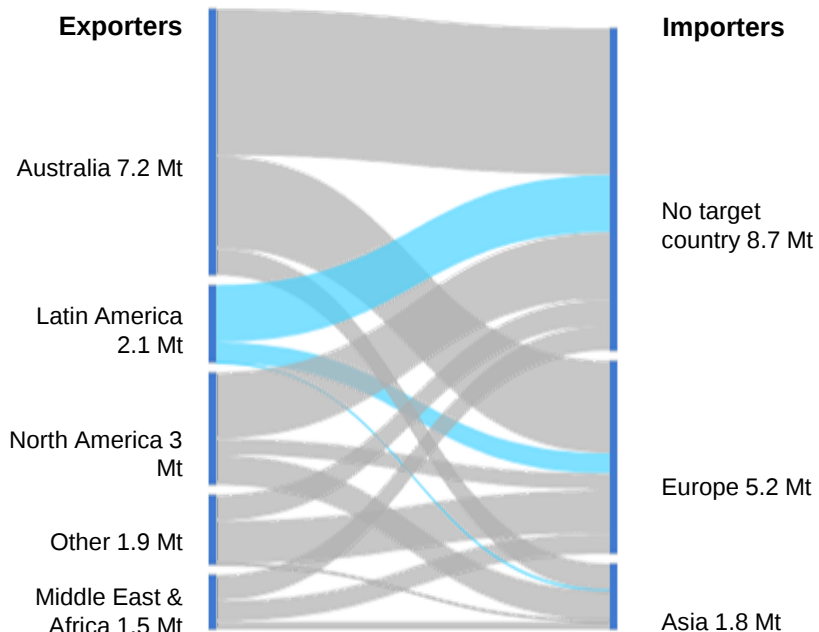
CO₂ supply potential and CO₂ demand for synthetic fuels and urea, 2023



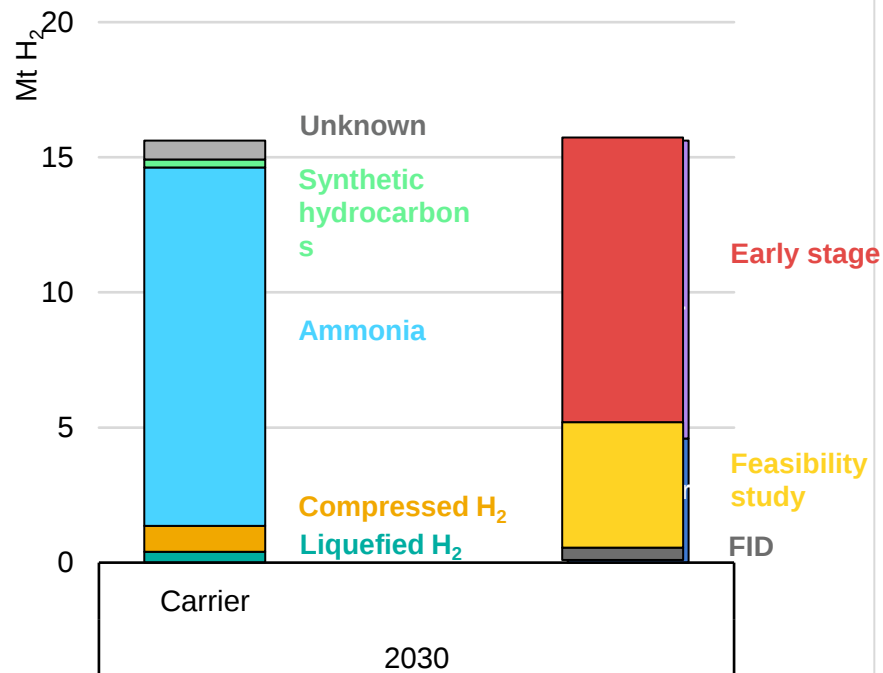
In LAC, certain countries have abundant CO₂ resources from the pulp, paper, and bioethanol industries to meet domestic demand for urea or aviation and shipping fuels, while others may require alternative CO₂ sources

Interest in hydrogen trade remains high, but uncertainty persists

Announced low-emissions hydrogen trade flows in 2030

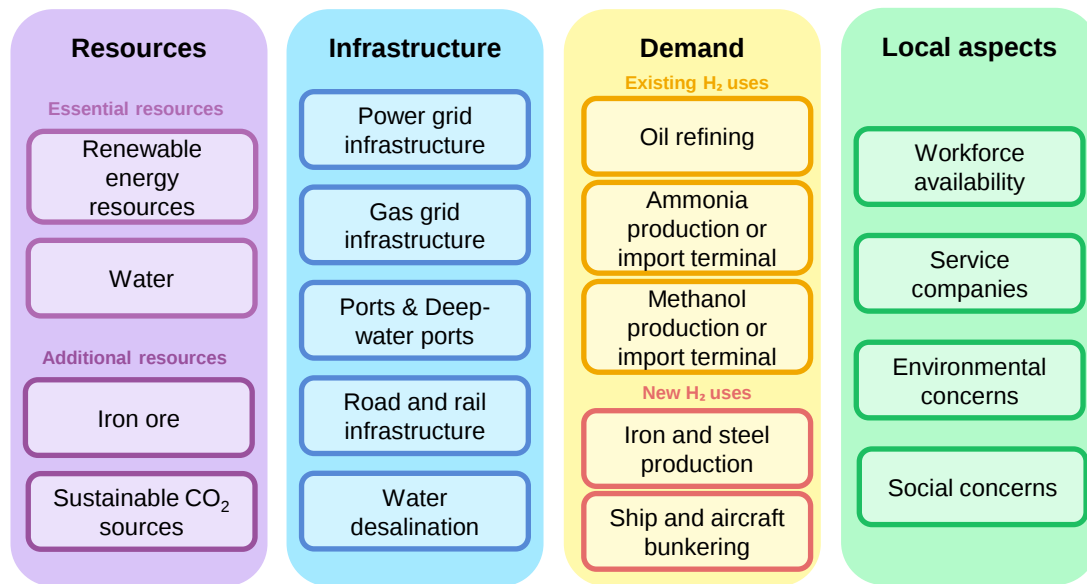


Low-emissions hydrogen trade



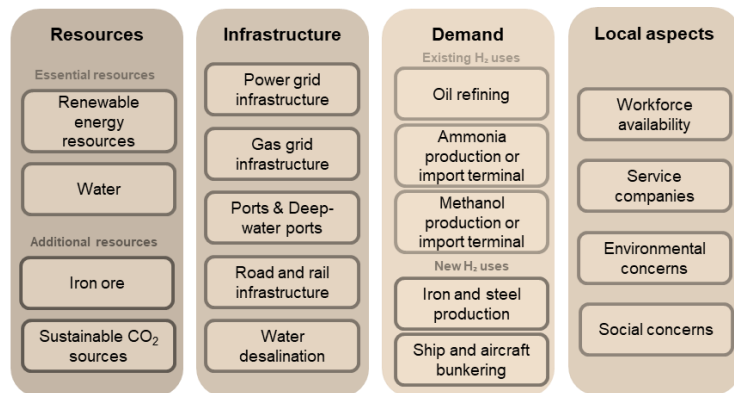
Planned hydrogen exports could reach 16 Mt by 2030, though almost all projects are at early stages and less than one-third have identified a potential off-taker.

Moving towards implementation requires identifying enabling factors



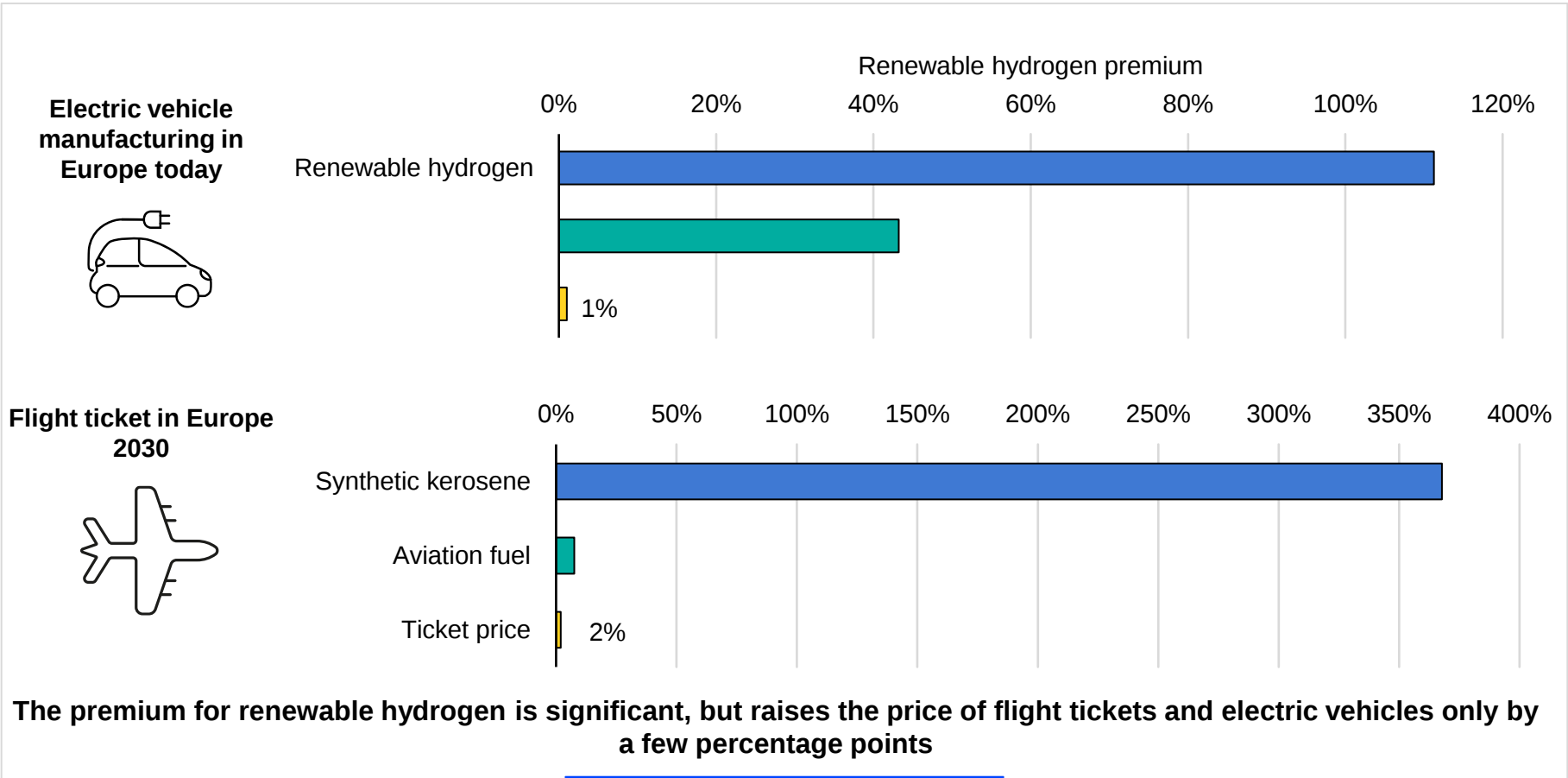
The potential for hydrogen hubs in different locations is influenced by a combination of resources, infrastructure and existing and scalable demand, as well as other local factors

Moving towards implementation requires identifying enabling factors



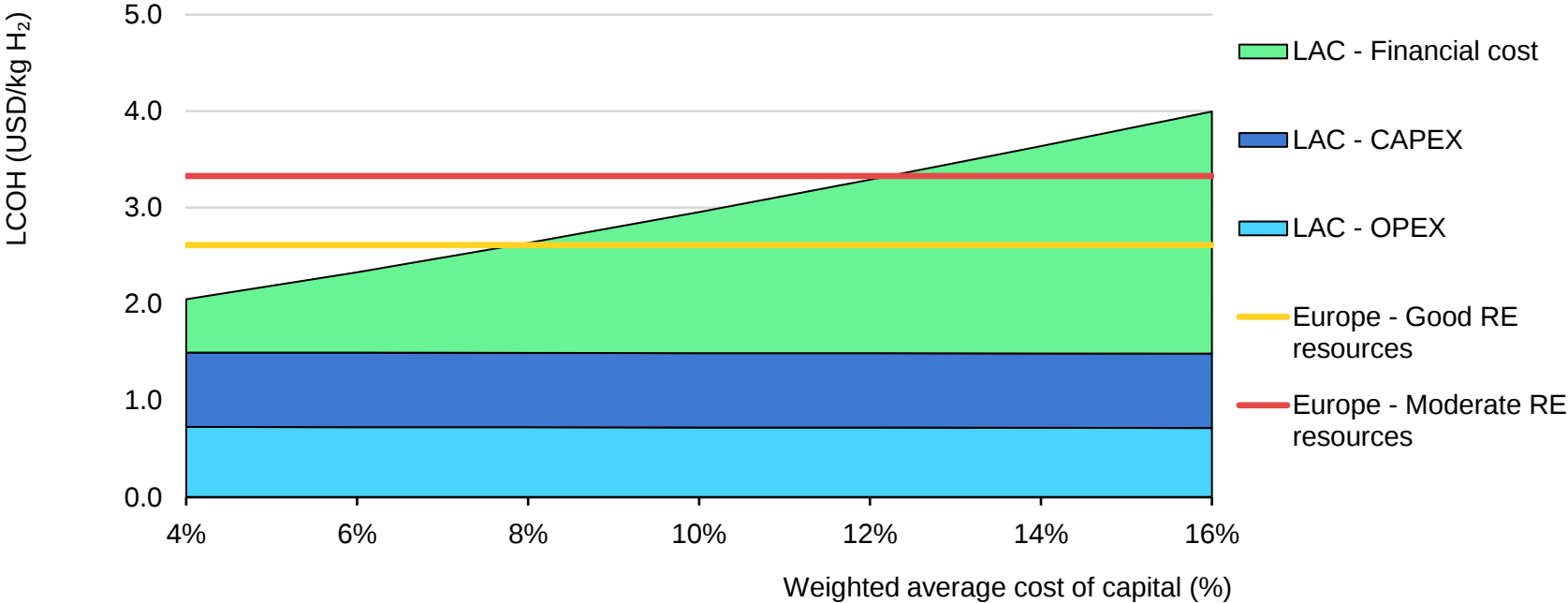
Several hydrogen hubs could emerge in LAC for different purposes, such as industrial demand aggregation hubs, bunkering hubs or supply hubs in more remote areas

Impact of renewable hydrogen on the cost of goods and services



High capital costs undermine good renewable energy potential

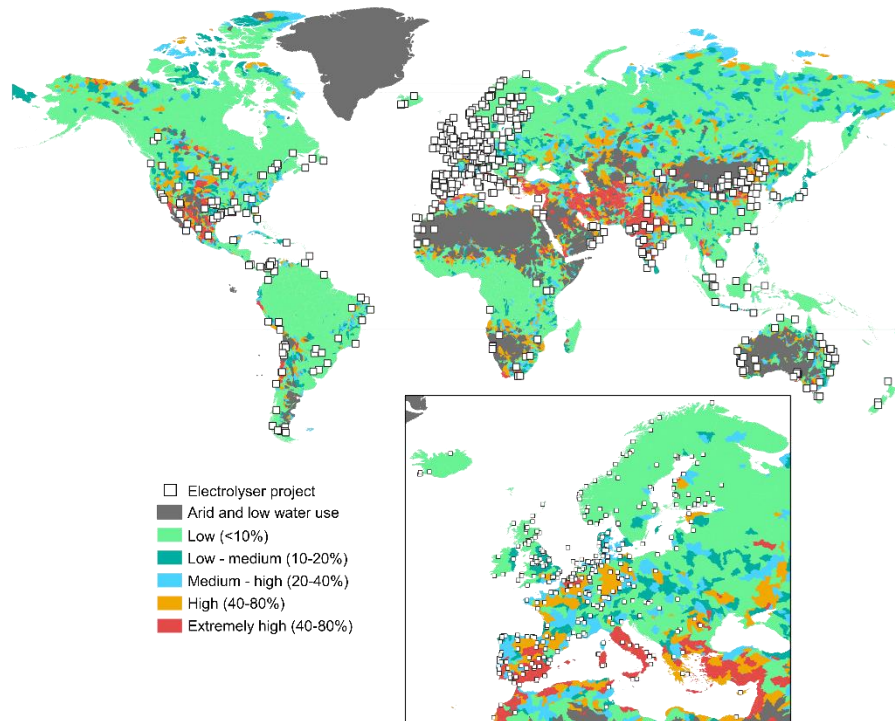
Levelised cost of hydrogen production with different cost of capital in the Announced Pledges Scenario, 2030



A cost of capital premium of 4-8 percentage points could result in higher hydrogen production costs in LAC than in advanced economies, despite better quality renewable resources.

Water scarcity could challenge projects in stressed regions

Announced low-emissions hydrogen production from electrolyser projects and water stress levels, 2030



Around half of the low-emissions hydrogen production from announced electrolyser projects in 2030 is located in regions facing water stress

Expanding port infrastructure, especially deep-water ports, is needed

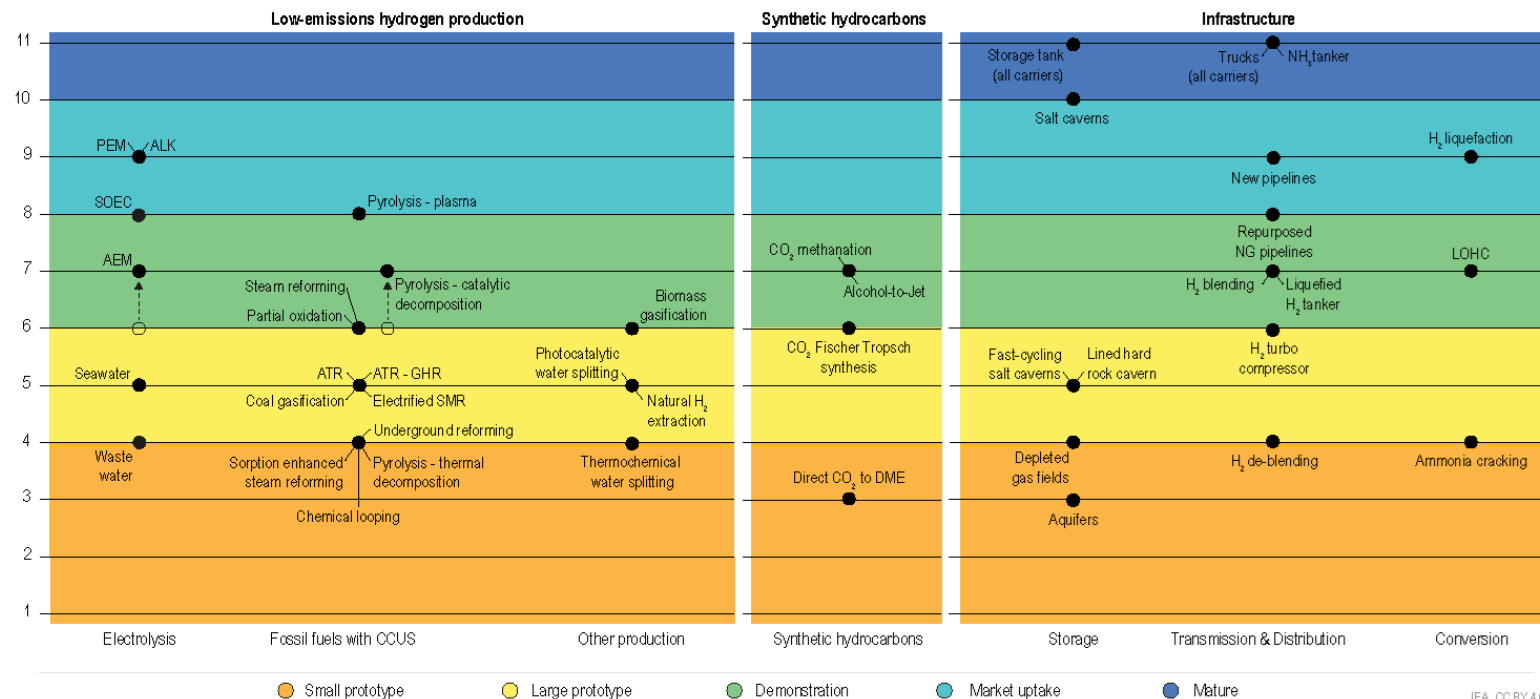
Existing and announced port infrastructure projects for hydrogen and hydrogen-based fuels trade and bunkering



Port facilities for the trade and bunkering of ammonia and methanol are planned around the world, which will significantly expand current capacity at terminals

Market uptake needs further innovation to reduce production costs

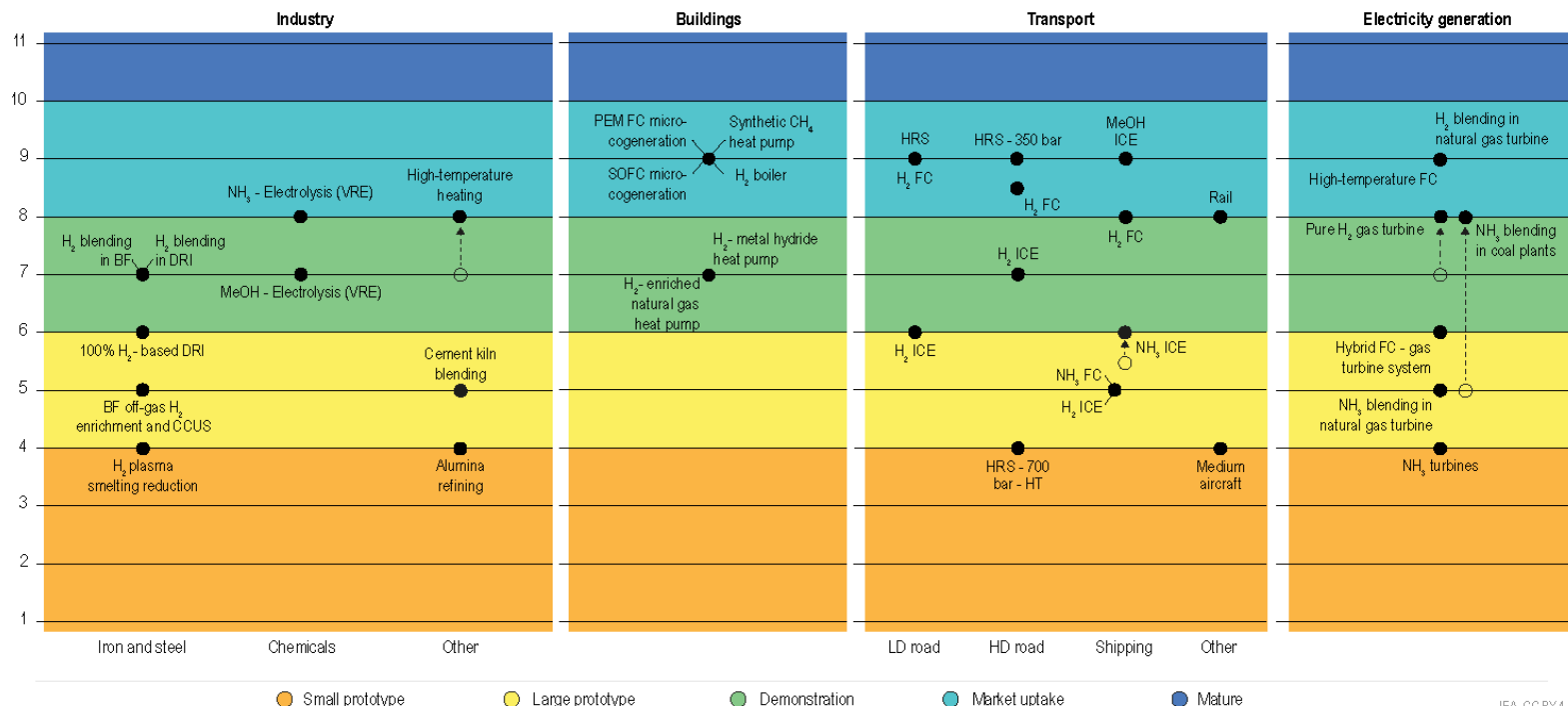
Technology readiness levels of production of low-emissions hydrogen and synthetic fuels, and infrastructure



Although some technologies are already commercially available, innovation is critical to reduce production costs and ensure market uptake, as well as to demonstrate synthetic hydrocarbon production technologies at scale

Ongoing innovation efforts may soon yield results in end uses

Technology readiness levels of technologies for hydrogen end-uses by sector



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Most end-use technologies with limited decarbonisation options are still at the demonstration stage, but many projects are aiming for market readiness this decade

Opportunities

- Massive renewable resources
- Large projects pipeline
- Domestic demands and large trade deficits
- Vast export potential

Challenges

- High cost of capital
- Infrastructure deployment
- Policy implementation
- Global market creation

1. Accelerate **demand creation** for low-emissions hydrogen, leveraging industrial hubs and public procurement
2. **Support project developers** to scale up low-emissions hydrogen production and drive cost reductions
3. Strengthen **regulation and certification** of environmental attributes for low-emissions hydrogen
4. Identify opportunities to start **developing hydrogen infrastructure**
5. Support **emerging markets and developing economies** in expanding low-emissions hydrogen production and use

Q&A Session

