International Energy Agency

Global Hydrogen Review 2025

Hydrogen and Alternative Fuels Unit

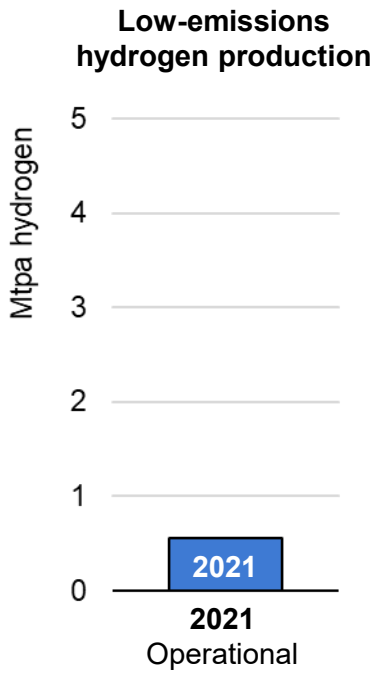
Technical Webinar, Paris, 6 November 2025

CLEAN ENERGY MINISTERIAL
Advancing Clean Energy Together

HYDROGEN INITIATIVE
AN INITIATIVE OF THE CLEAN ENERGY MINISTERIAL

Table of contents

Is the glass half-full or half-empty for hydrogen?



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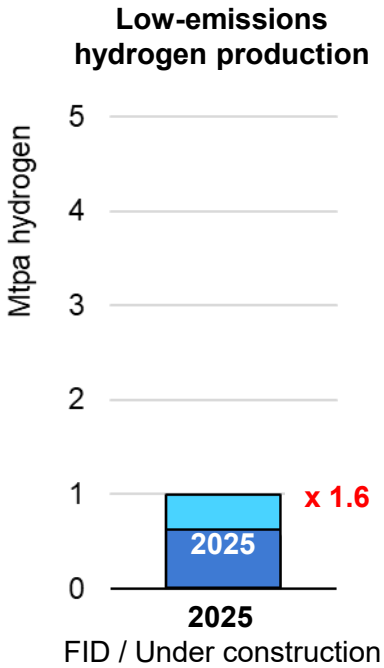

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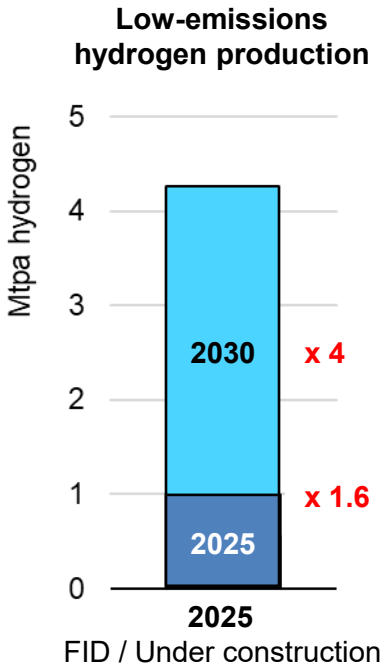

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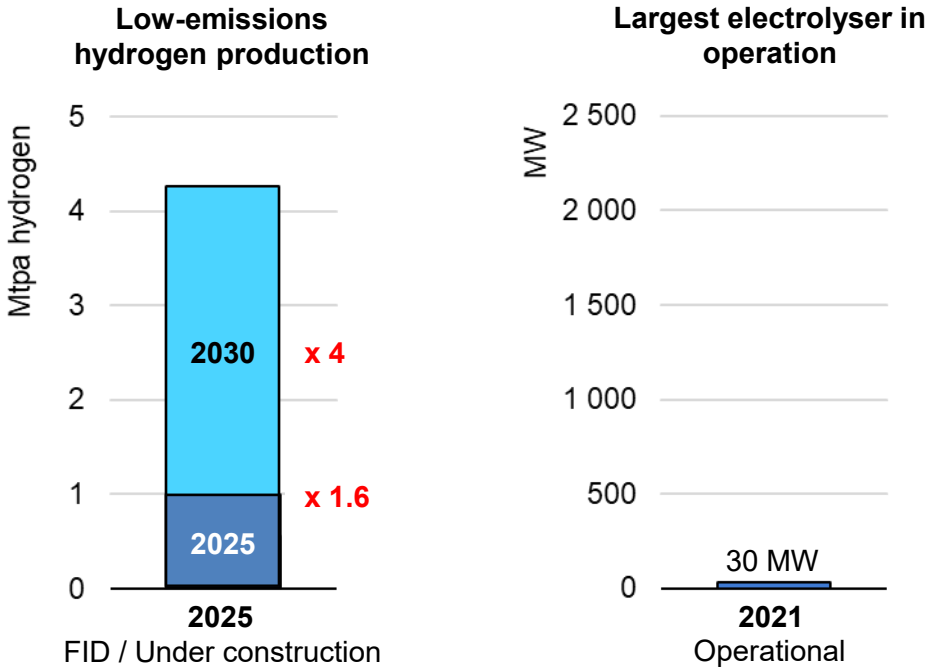

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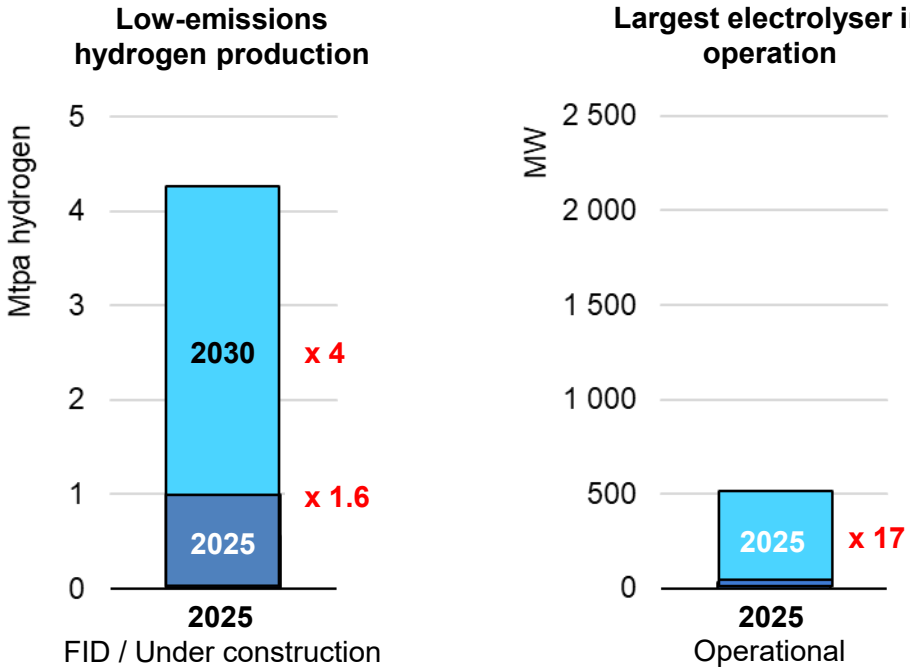

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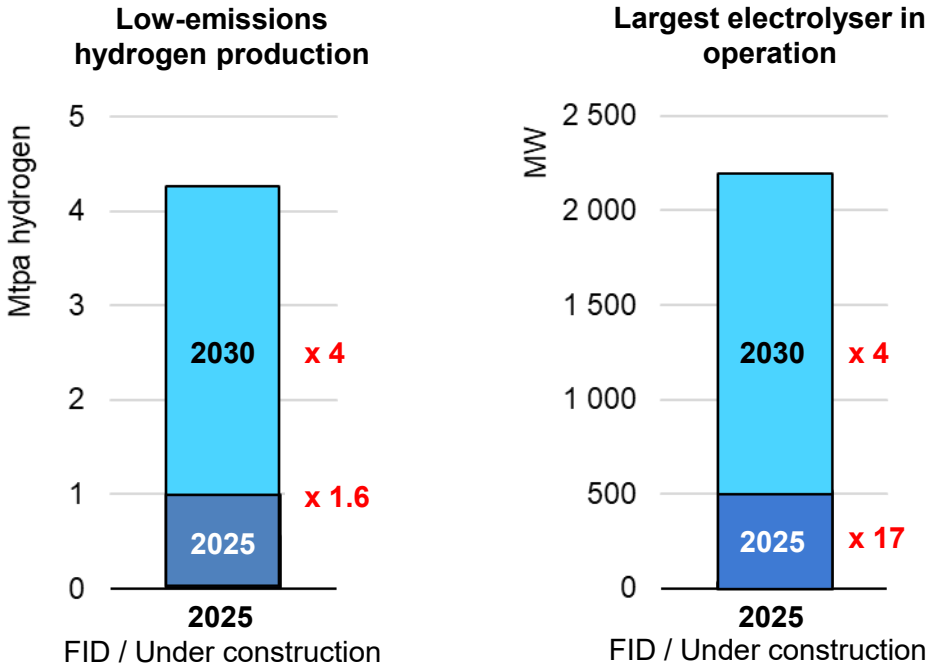

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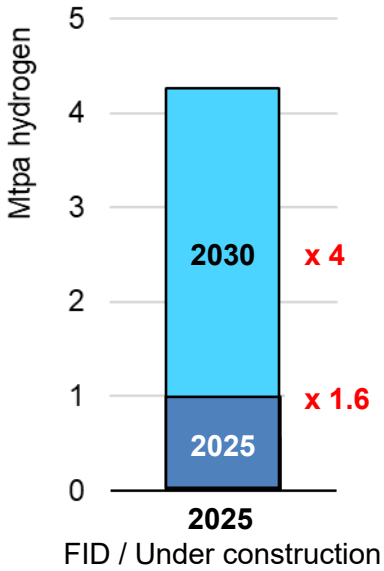
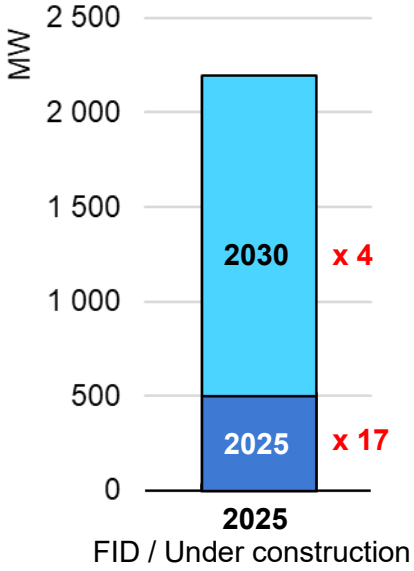
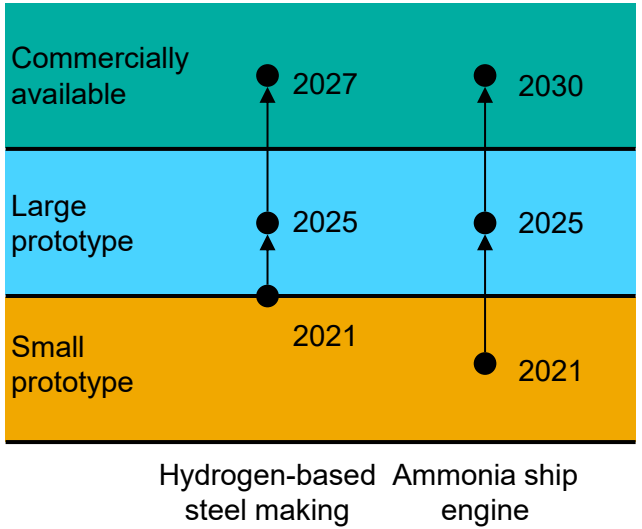
Low-emissions hydrogen production



Largest electrolyser in operation



Technology development of key hydrogen applications



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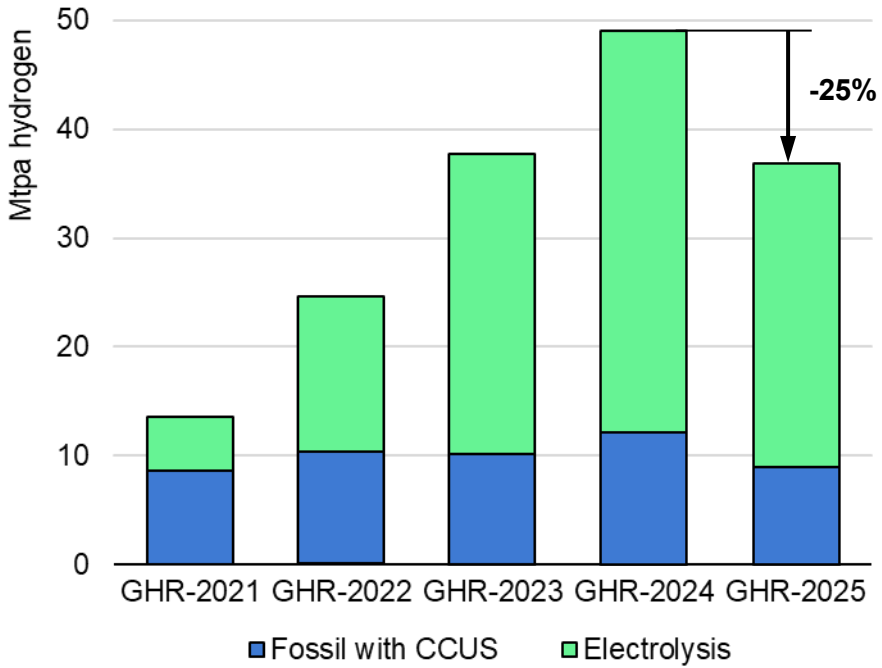
Signs of consolidation in the hydrogen industry

Pipeline of low-emissions hydrogen production projects, 2030



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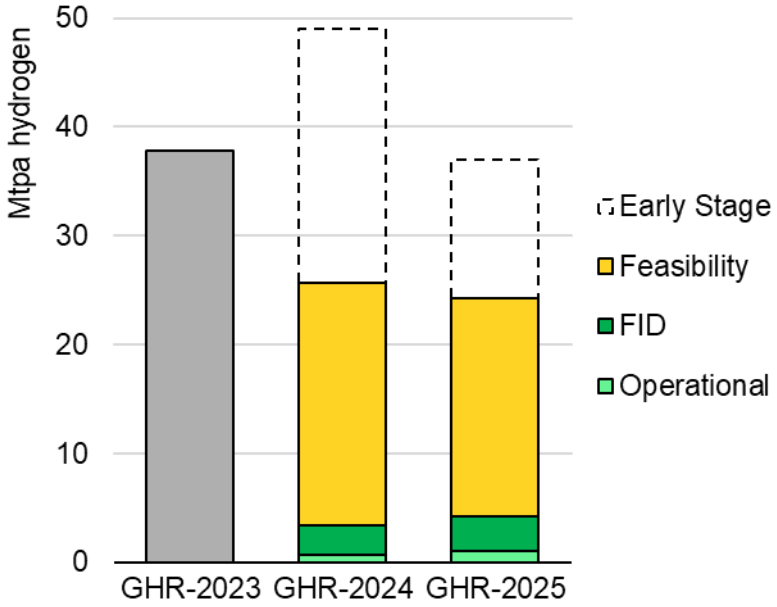
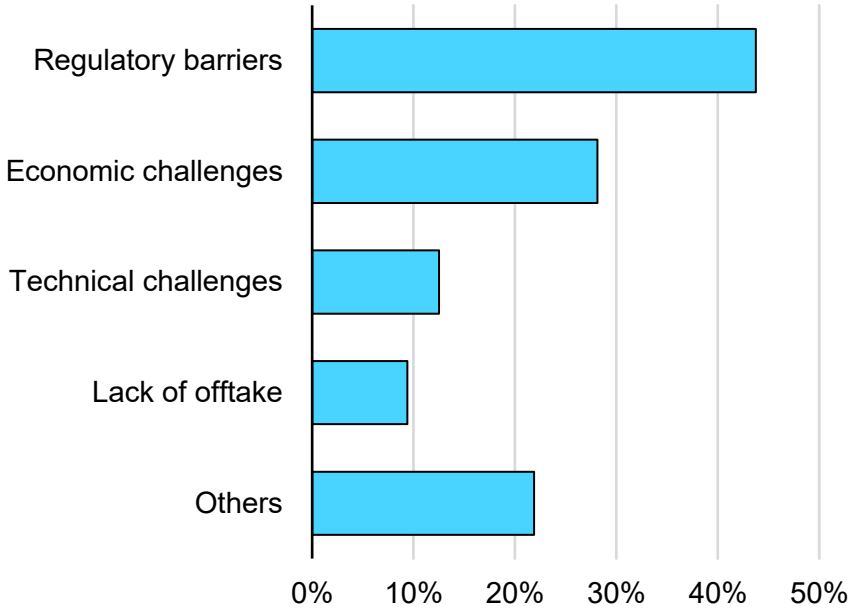
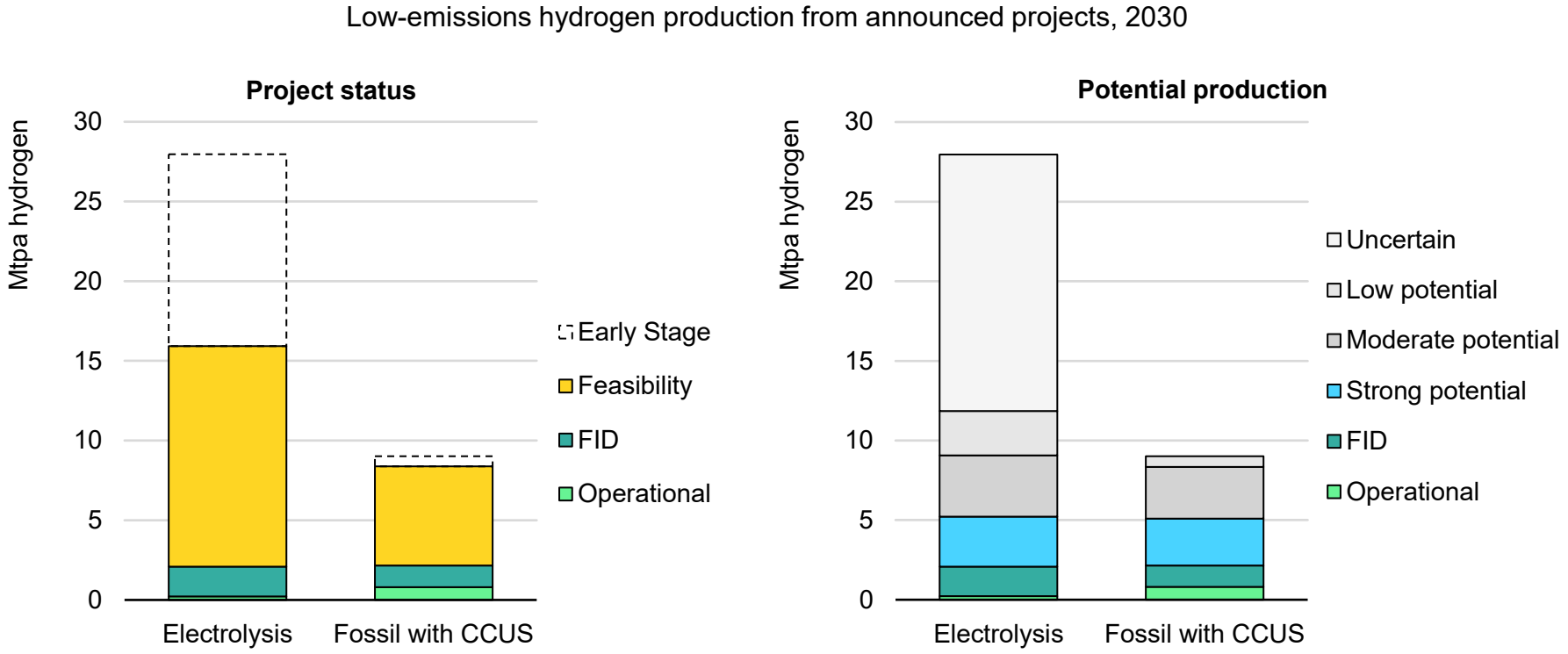


Share of cancelled projects by reported reasons



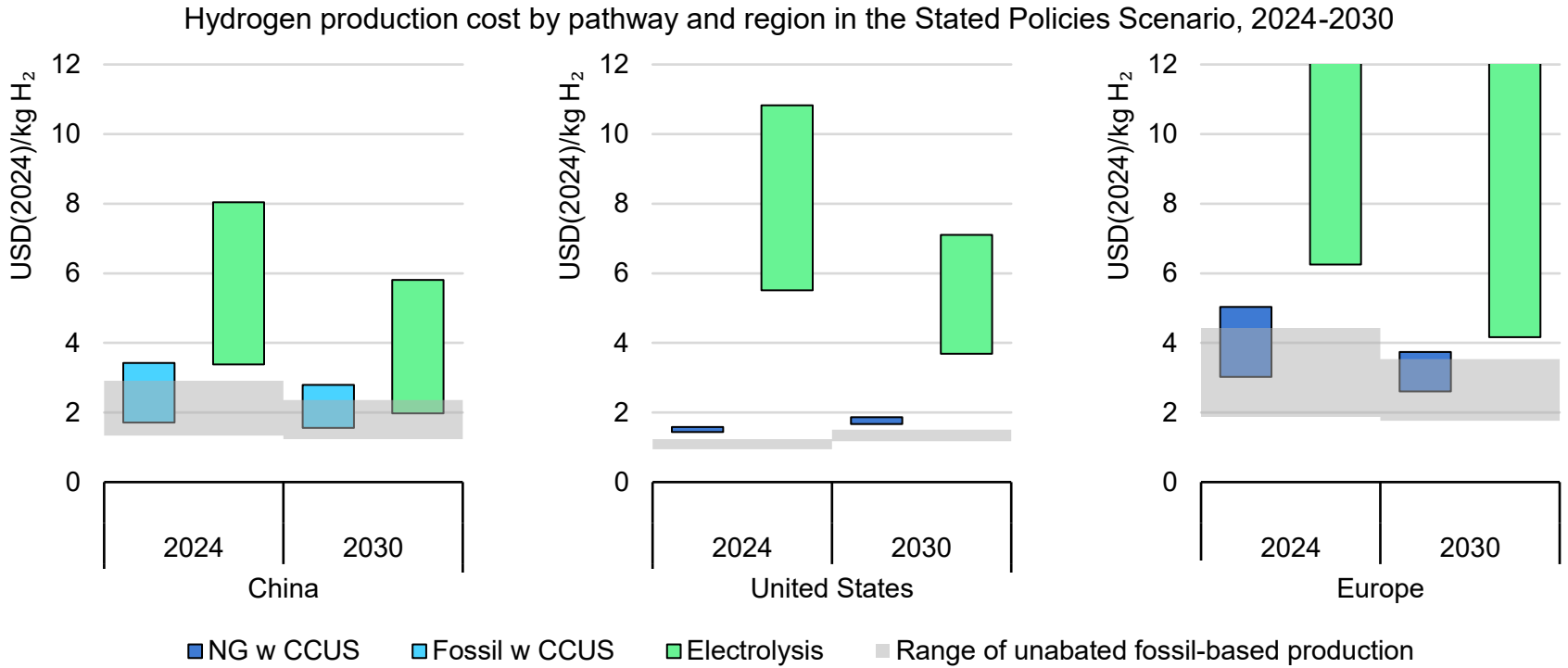
Delays and cancellations mainly affected early-stage projects.
Regulatory barriers, economic and technical challenges and lack of offtake were key reasons.

The time to complete projects by 2030 is shrinking



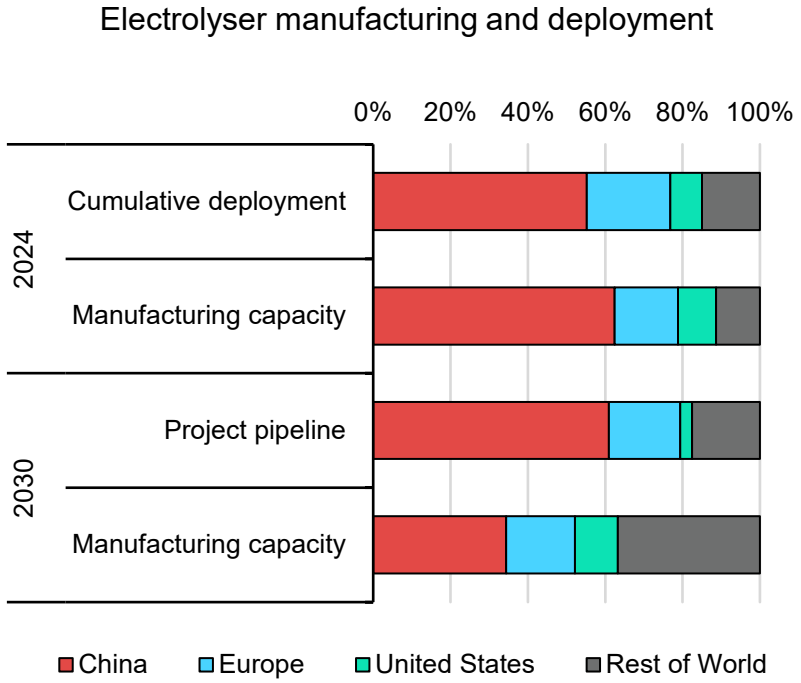
In addition to the 4 Mtpa of projects being in operation or having reached FID, a further 6 Mtpa have a strong potential to become available by 2030, taking into account project size, location and targeted end uses.

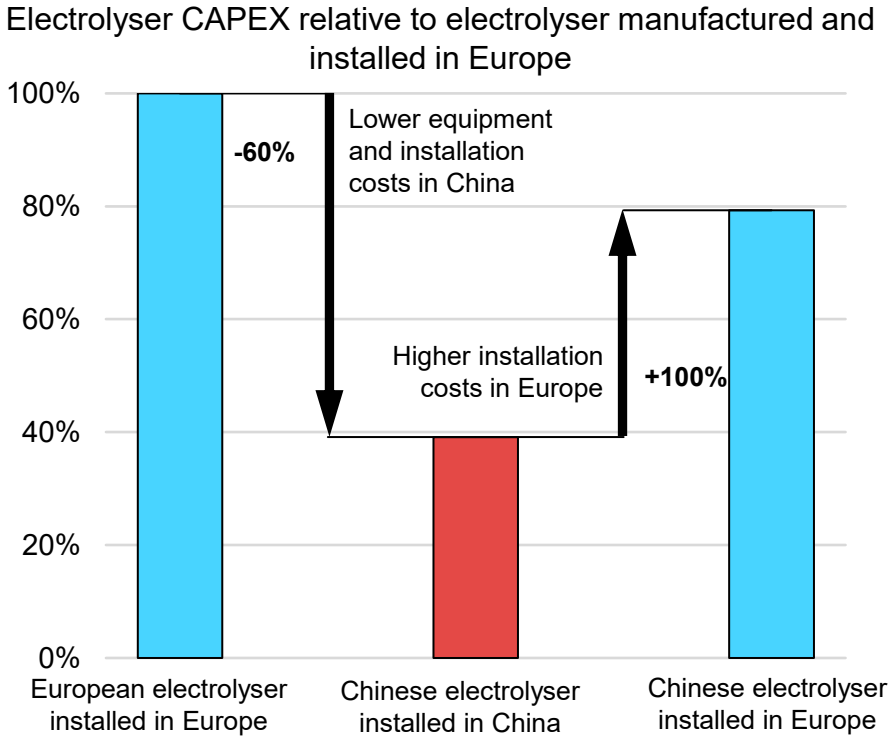
Production cost gap can start closing by 2030



In regions that currently depend on imports and face high natural gas prices, renewable hydrogen production could become competitive by 2030.

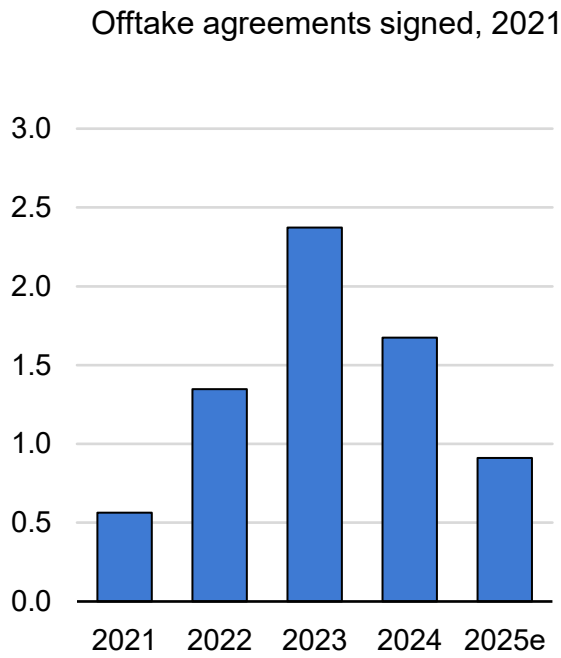
Impact of lower electrolyser costs in China should not be overstated





Installing Chinese electrolysers in Europe reduces the total CAPEX by only around 20% due to local costs as installation. Savings in hydrogen production costs are even lower, with electricity being a major cost component.

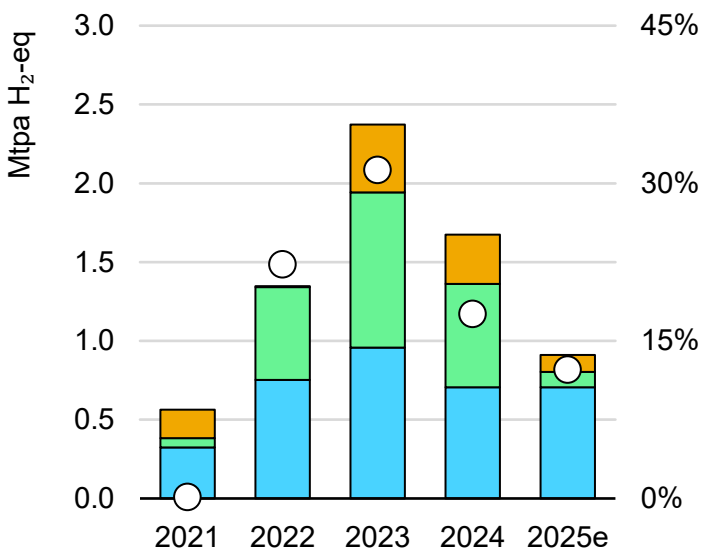
Offtake agreements critical to underpin investments



Offtake agreements have slowed down in 2024, mainly due to fewer trade agreements.

Offtake agreements critical to underpin investments

Offtake agreements signed, 2021-25



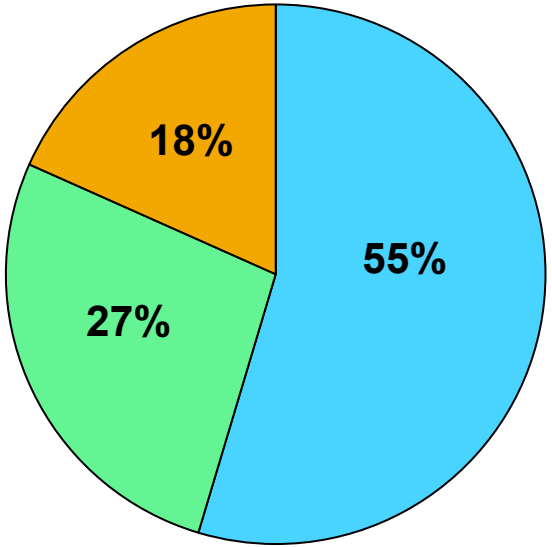
Other

H_2-based fuels

Industry or refining

Share of firm agreements

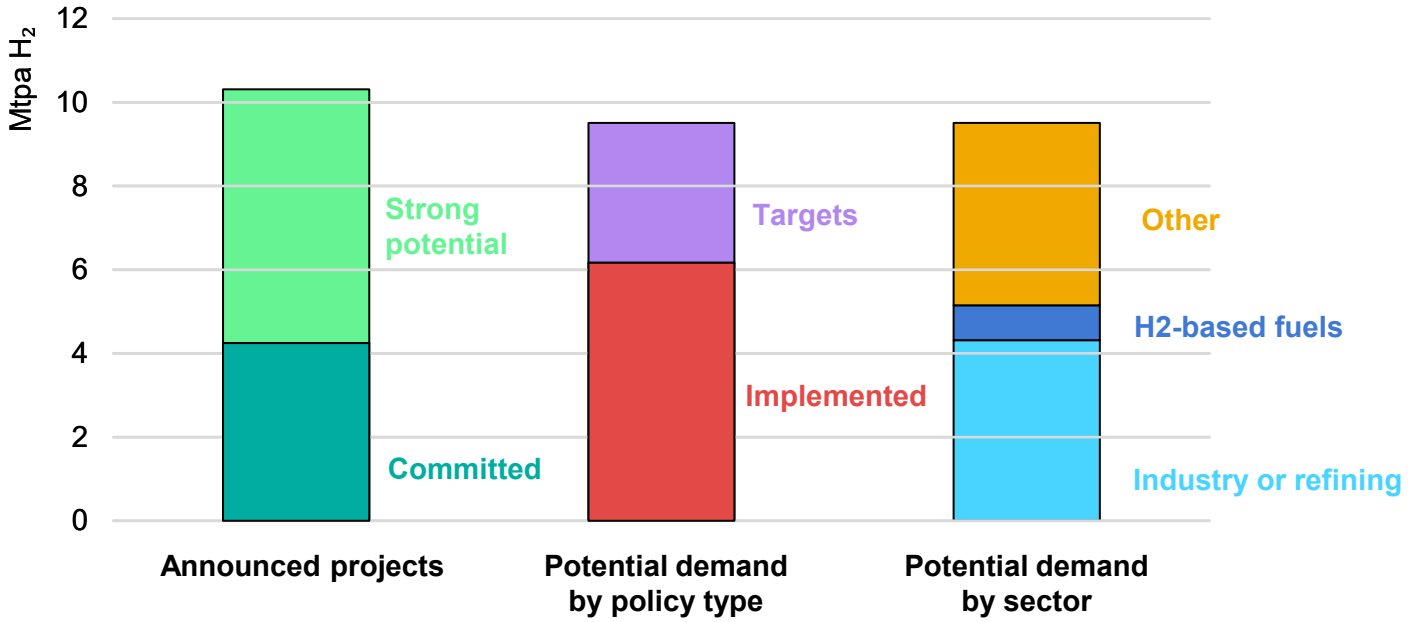
FIDs in production, 2021-25



Offtake agreements have slowed down in 2024, mainly due to fewer trade agreements.
But firm offtake in industry, refining and hydrogen-based fuels is helping increase investment in production projects.

Implementation of demand policies can unlock investment in supply

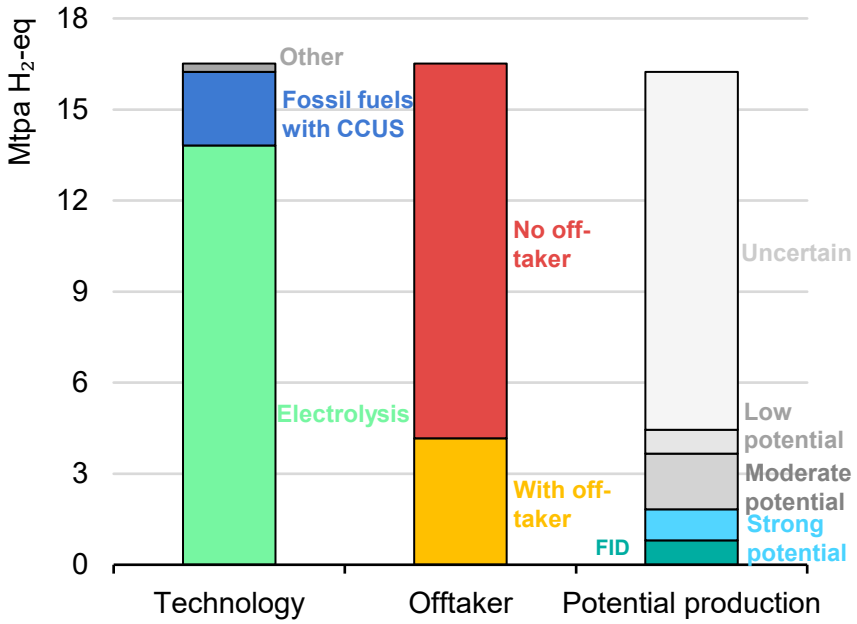
Potential annual demand from policies and production for low-emissions hydrogen, 2030

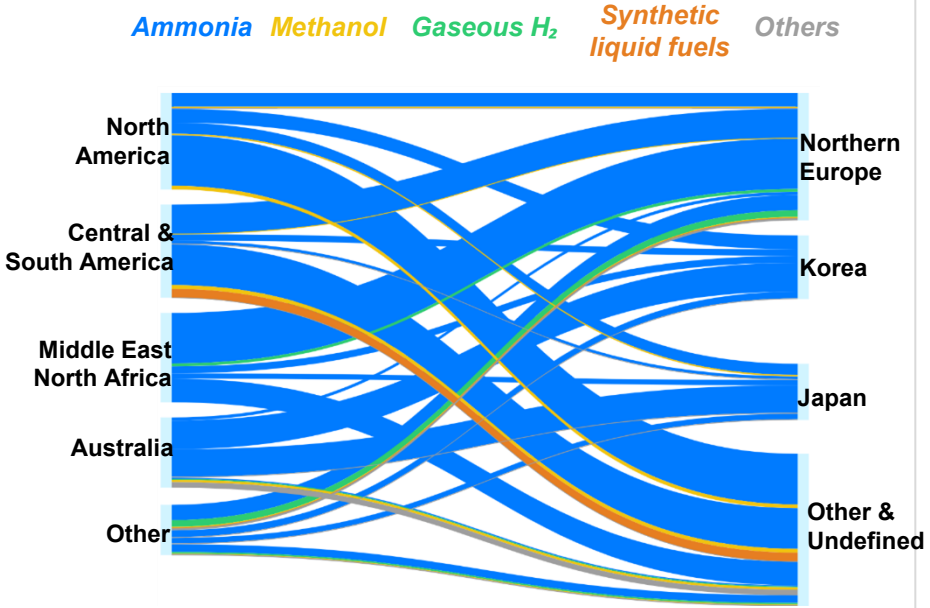


Policies to create demand for low-emissions hydrogen are now being implemented, but at a slow pace. Further action is possible in existing using and new applications ready to adopt in the short term

Trade is a major driver behind many announcements, but uncertain

Low-emissions hydrogen production from announced projects intended for exports, 2030

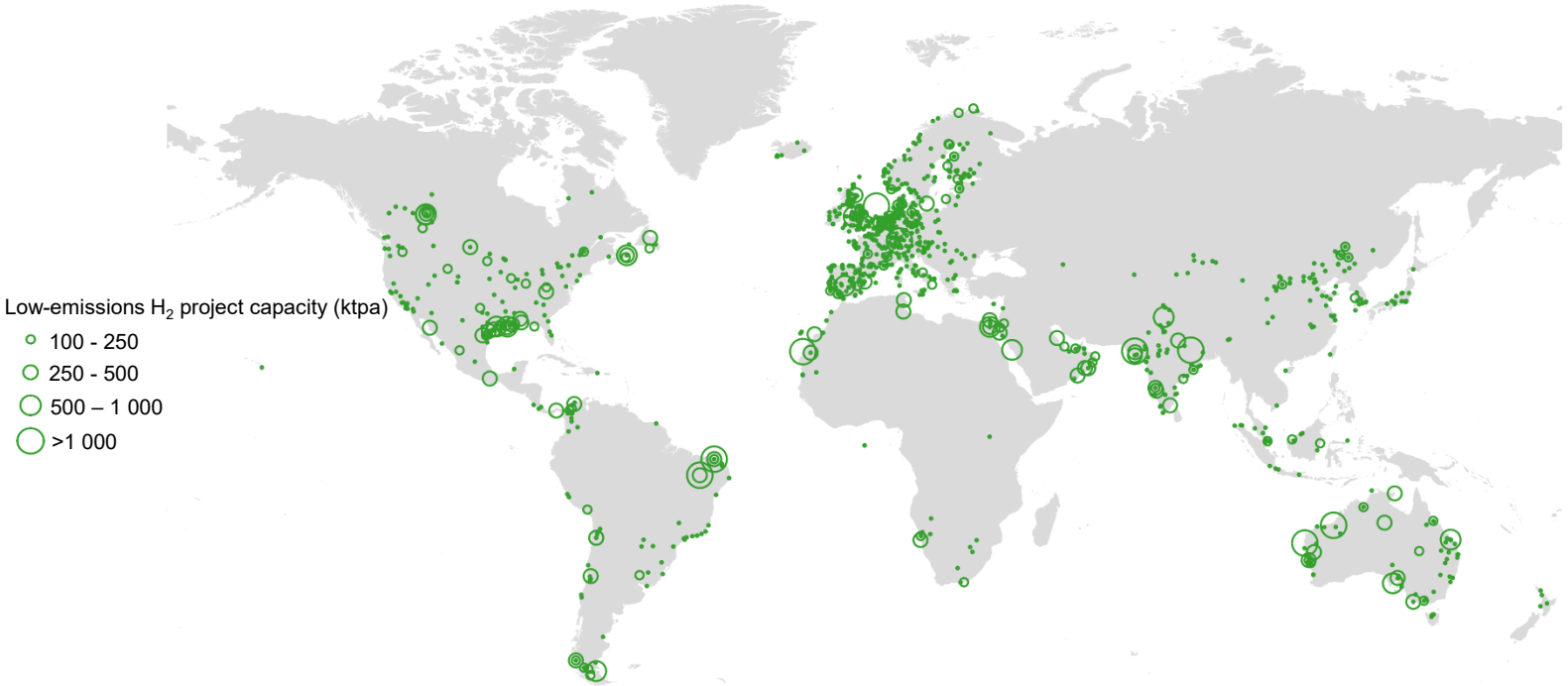




Around 45% of announced low-emissions hydrogen projects by 2030 target exports, but only one-quarter have identified off-takers and less than 5% have secured investment

Ports are central for low-emissions hydrogen-based fuels in shipping

Location of main ports and of announced low-emissions hydrogen projects within 500 km distance from ports, 2030



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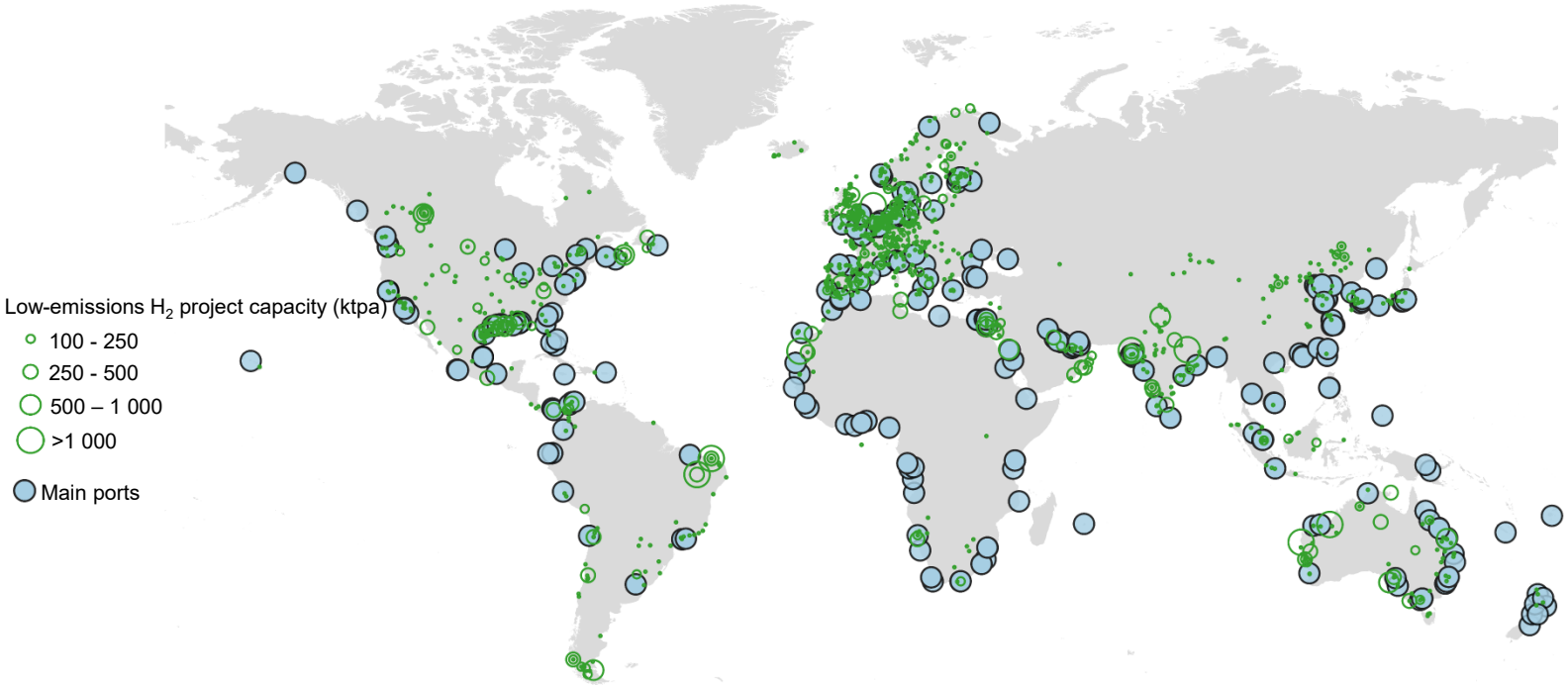

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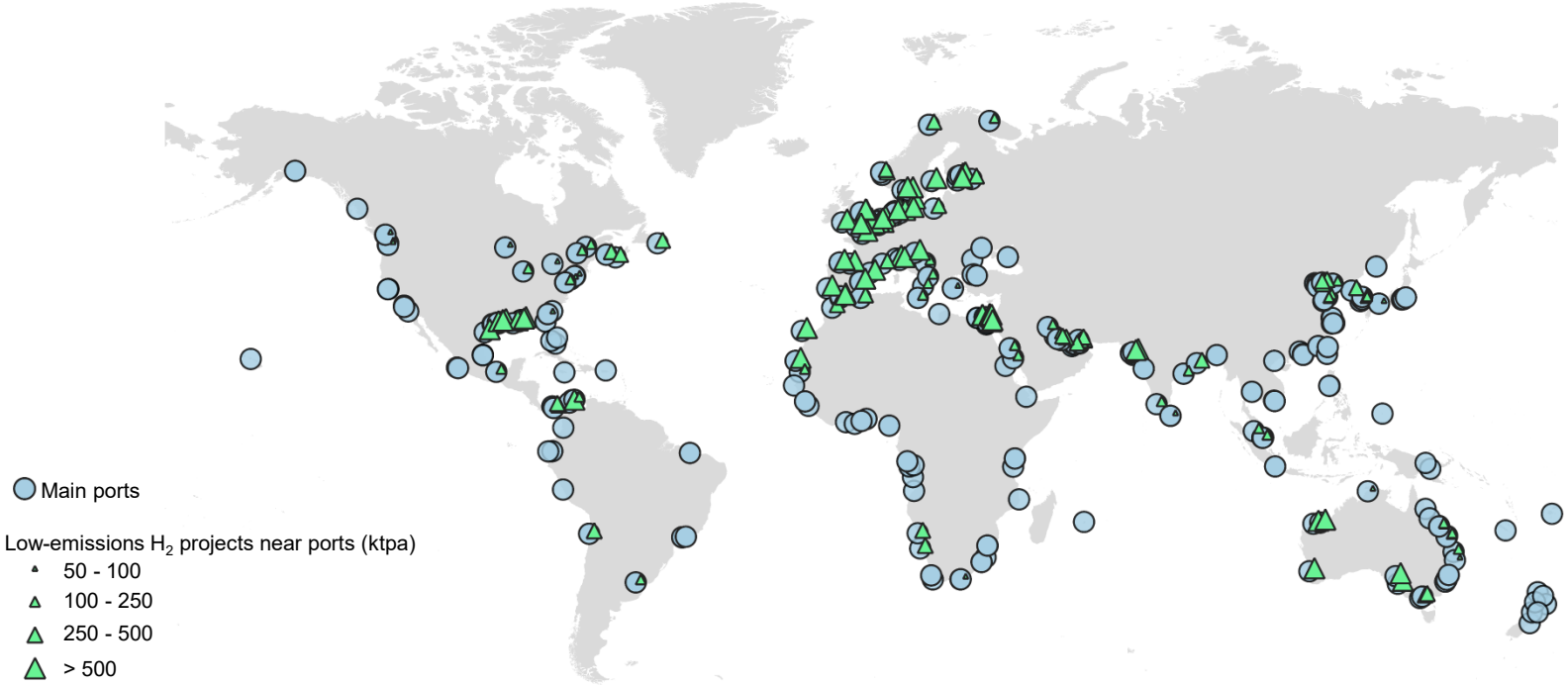
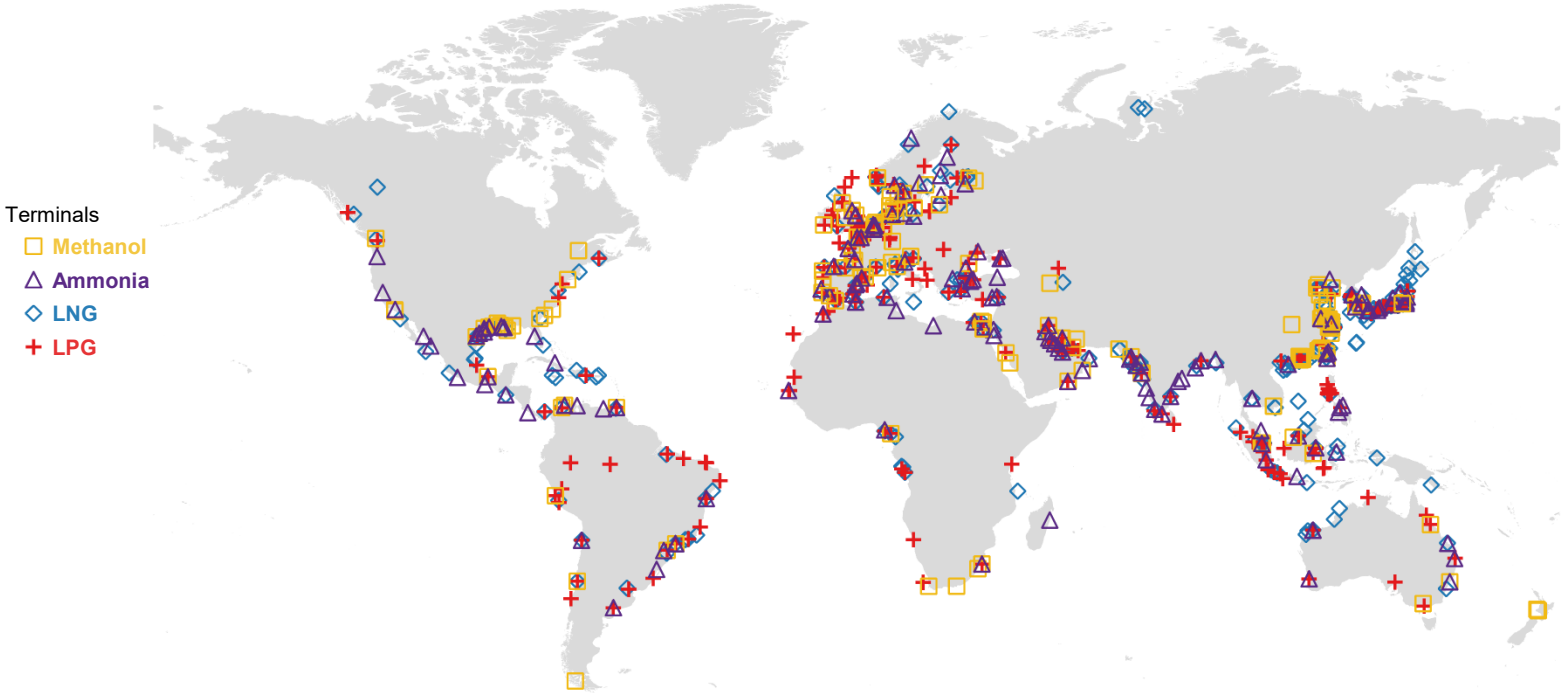


Over 120 major ports could access each at least 100 ktpa of low-emissions hydrogen by 2030, corresponding in total to almost 70% of the low-emissions hydrogen production from announced projects

Existing infrastructure, a springboard for potential uptake

Announced low-emissions hydrogen projects within 500 km from main ports and Chemical-handling Infrastructure Score, 2030



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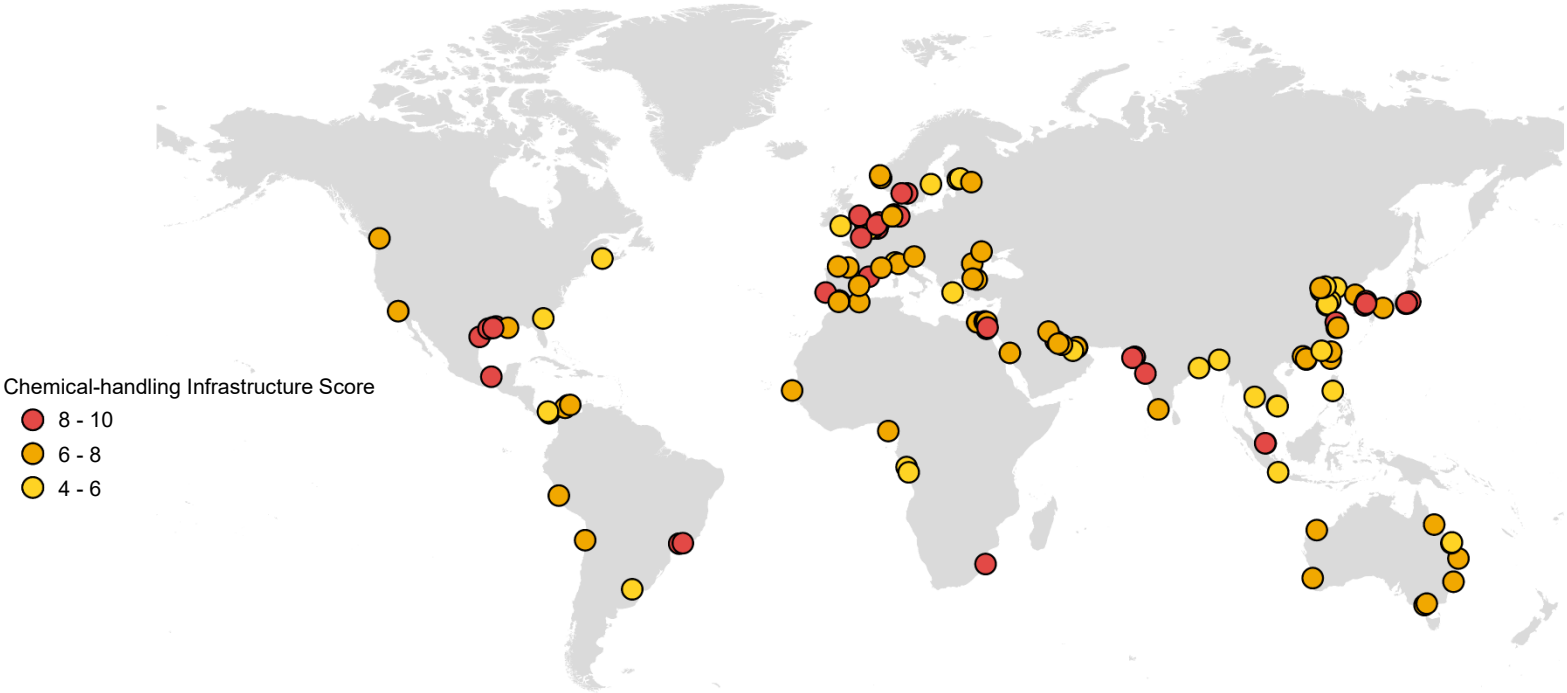

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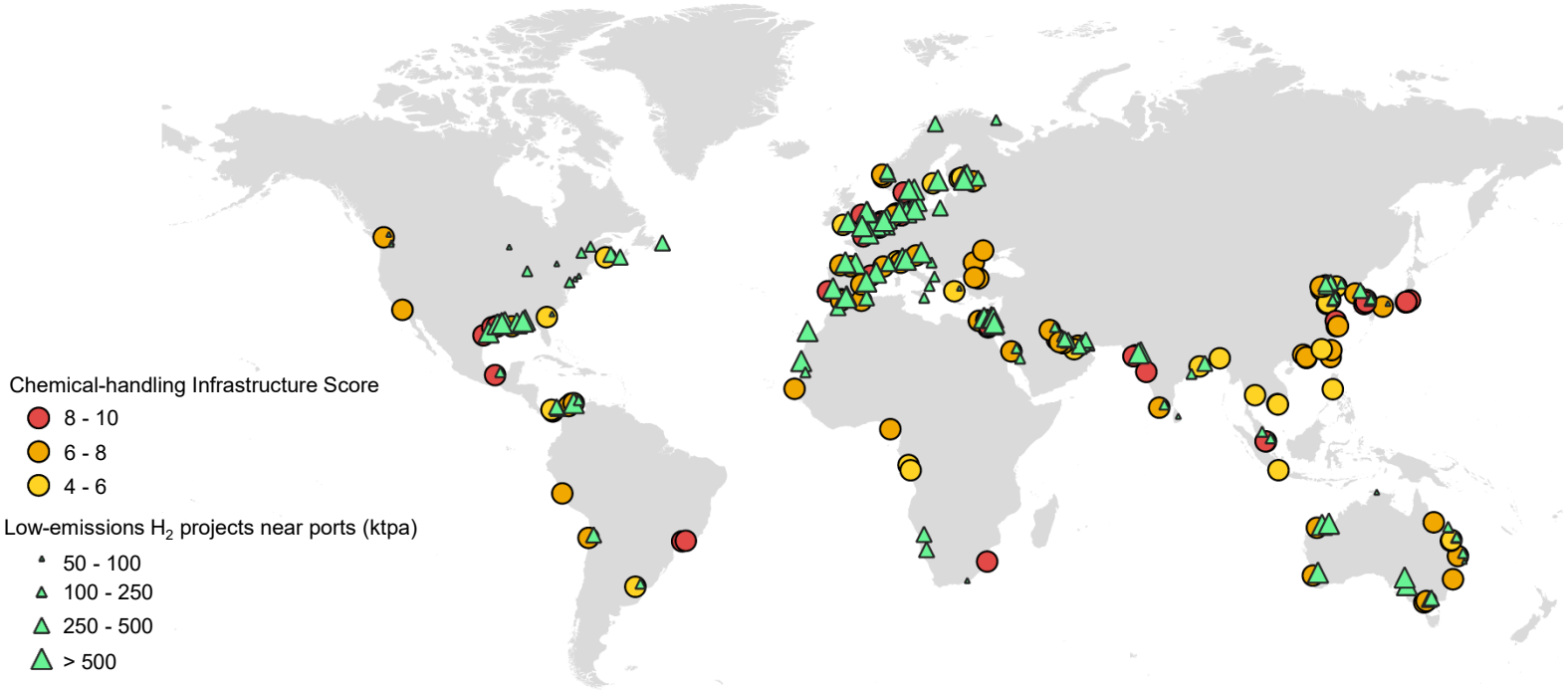
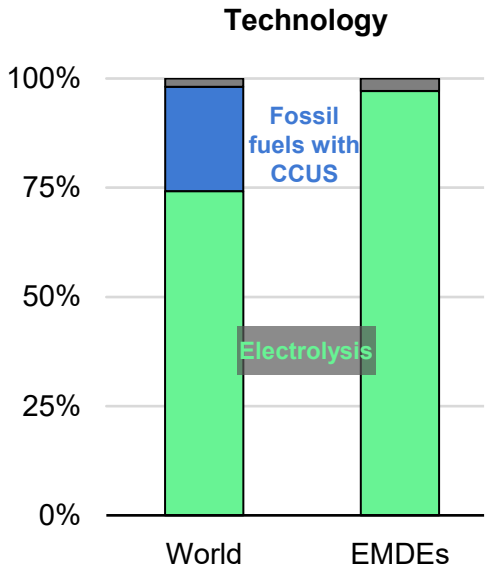
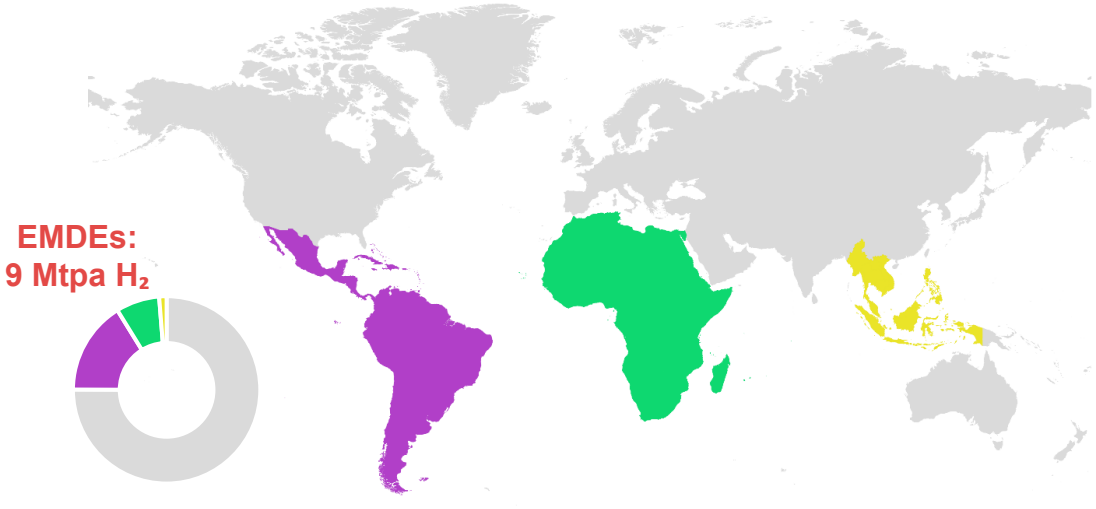


Almost 80 ports have strong readiness to handle hydrogen-based fuels, and nearly 55 are close to announced low-emissions hydrogen projects, while 60% are also main bunkering hubs

How fast can emerging economies turn ambitions into deployment?

Share of low-emissions hydrogen production from announced projects, 2030





Projects in EMDEs focus almost exclusively on electrolysis, are larger and mainly export-oriented, but remain at earlier stages of development, with limited committed investment

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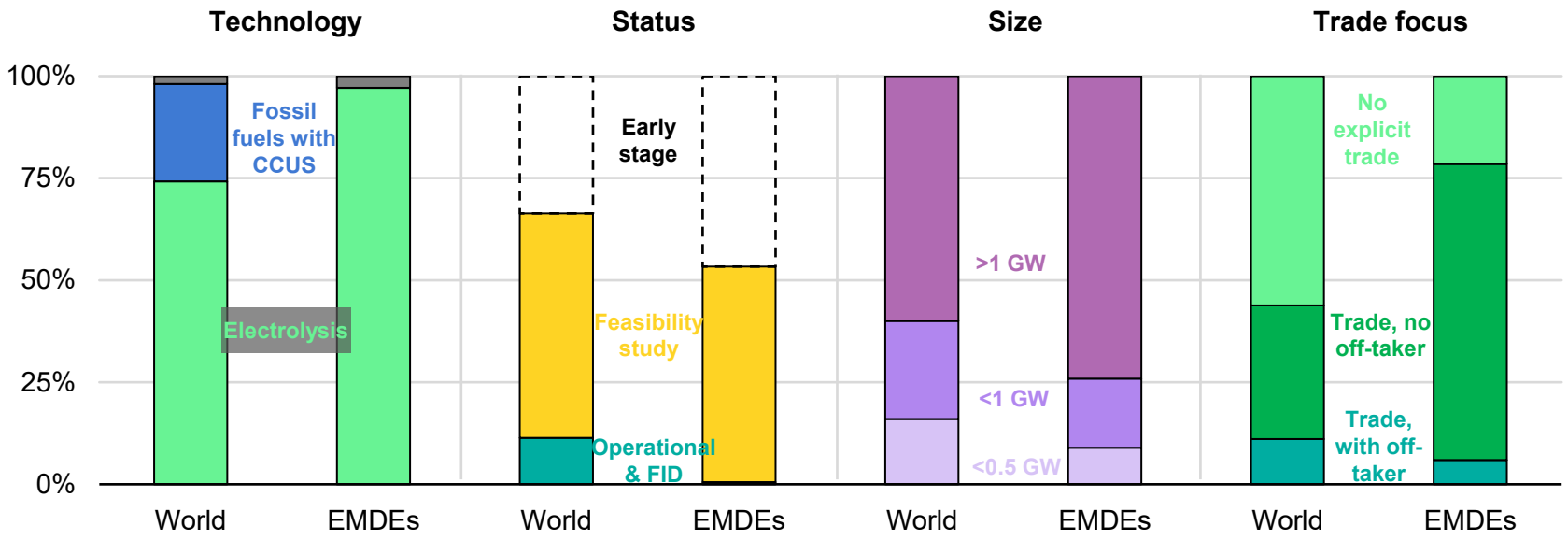

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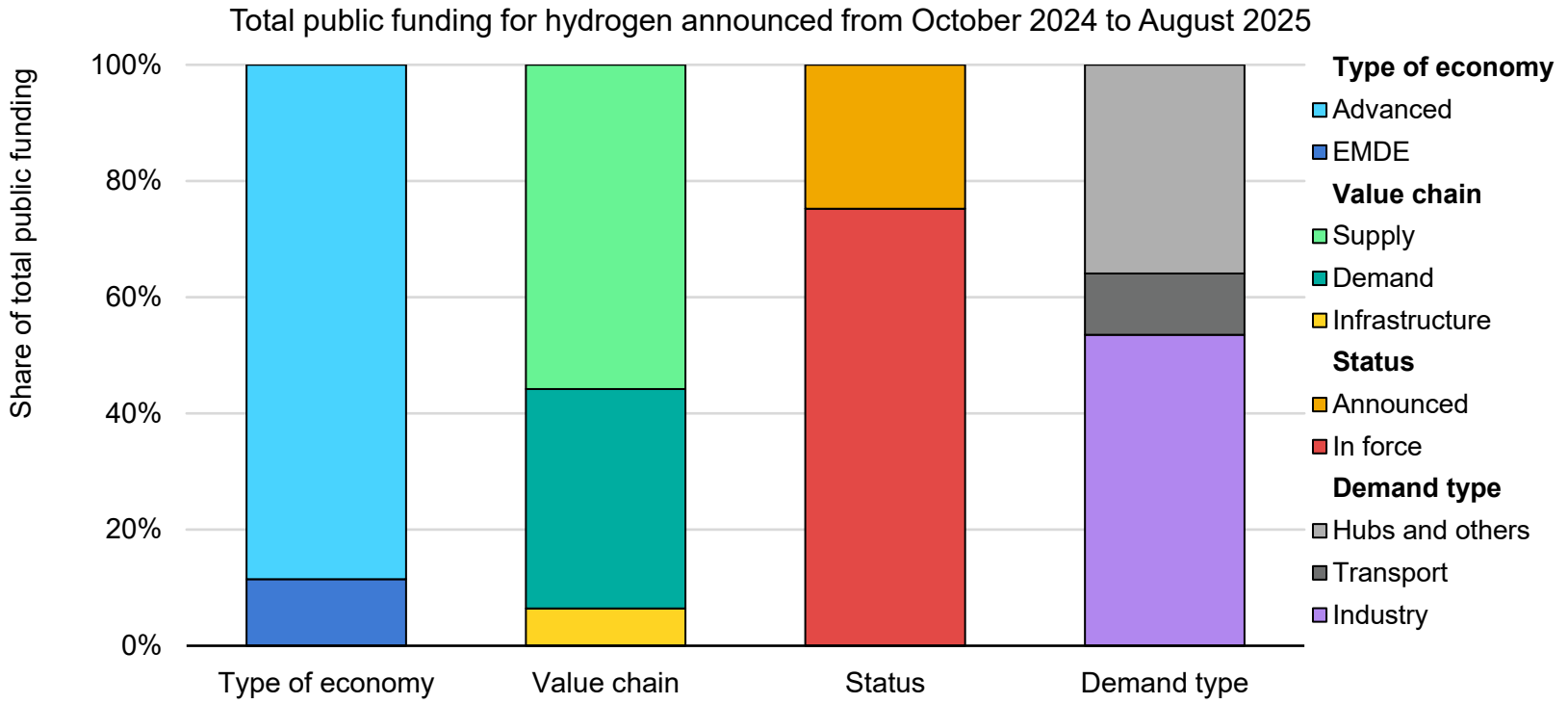
Over USD 38 billion of public funding mobilised in the past year



Over 90% of the public funding comes from developed economies, support for the supply side is 1.5 times the support for the demand side, and almost three quarters of the funding comes from enforced policies.

Where does hydrogen stand today in Southeast Asia?

4 Mt of demand in 2024

- Indonesia (35%), Malaysia (22%), Viet Nam (15%), Singapore (12%).
- Ammonia (49%), refining (31%), methanol (20%).
- 1% of regional energy-related **CO_2 emissions**.
- 8% of **gas supply**.

5 countries with strategies

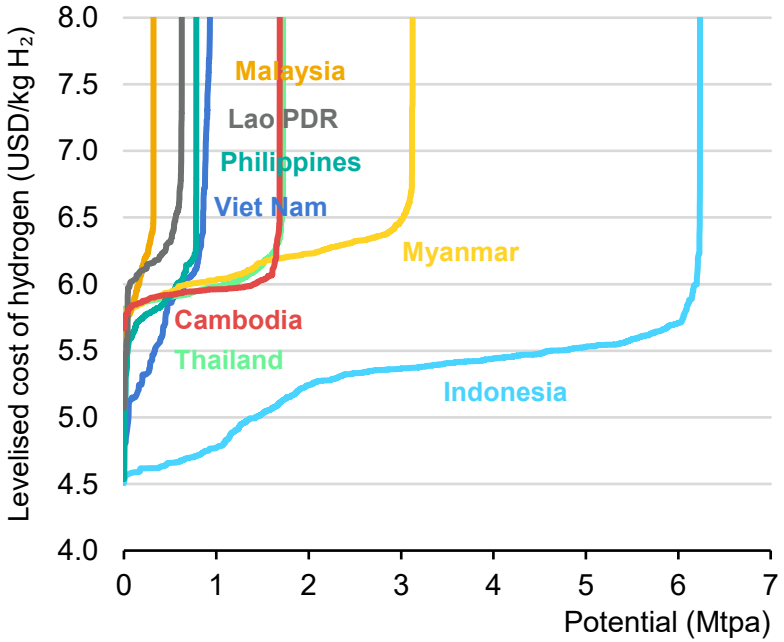
- **Mixed views** on production pathways and trade.
- Preparatory work by Thailand and the Philippines.
- **No certification scheme** is **in place**, but work is ongoing in three countries.

17% of ammonia exports (2023)

- Southeast Asia is a net **ammonia exporter**, but **only Indonesia and Malaysia** export.
- **Malaysia** represents 73% of exports. Most **other countries are importers**.
- Regional **production of crude steel** is 60% of **demand**.

What are the opportunities in hydrogen production?

Supply cost curves for renewable hydrogen



Trade of hydrogen derivatives, 2024

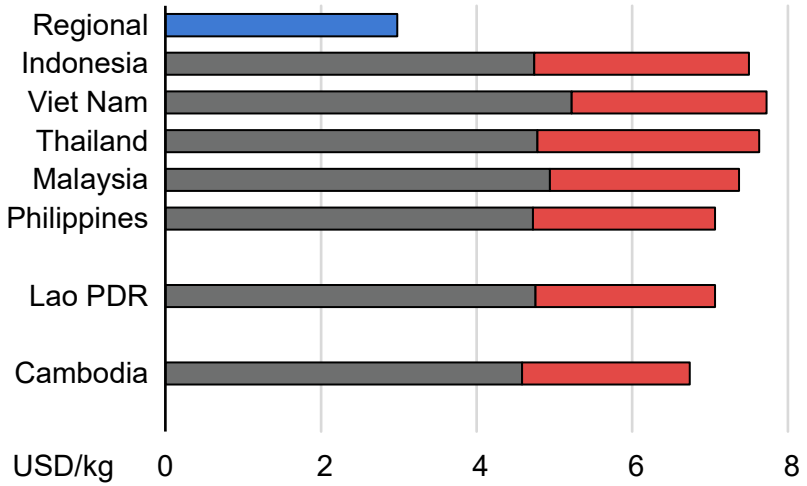
Imports Exports

	Ammonia	Methanol	Steel
Indonesia	Exports	Imports	Imports
Viet Nam	Imports	Imports	Imports
Thailand	Imports	Imports	Imports
Malaysia	Exports	Exports	Exports
Philippines	Imports	Imports	Imports
Singapore	Imports	Imports	Imports
Myanmar	Imports	Imports	Imports
Brunei	Imports	Imports	Imports

Southeast Asian countries have four main opportunities: their renewable hydrogen potential, displacement of imports of hydrogen derivatives, high demand concentration and deployment through state-owned enterprises.

What are the challenges that Southeast Asia is facing today?

Levelised cost of hydrogen production, 2023



High cost of capital, low renewable penetration in the electricity mix and low incentives for fuel switching in existing industrial applications are the main barriers for low-emissions hydrogen

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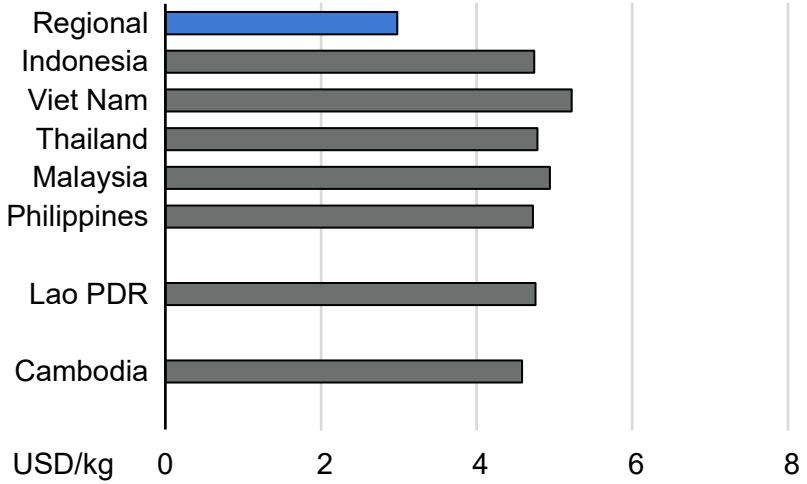
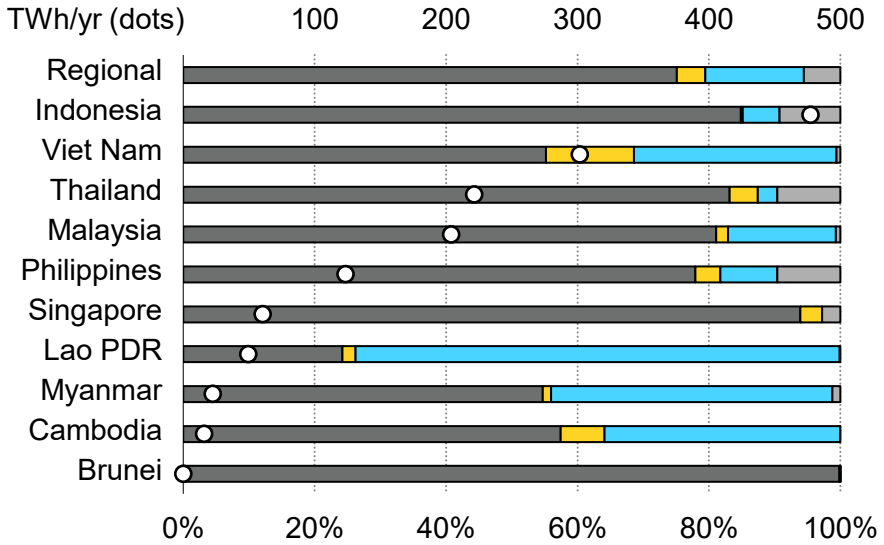


CAPEX/OPEX WACC premium Gas with CCUS

Electricity production mix, 2024



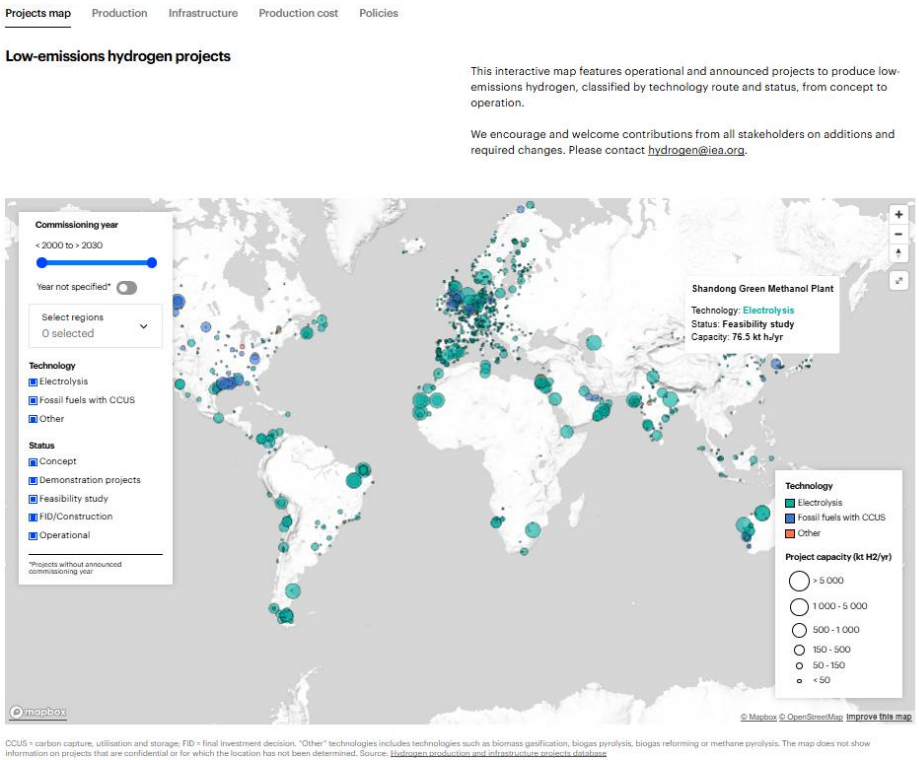
Fossil fuels Hydropower
Solar and onshore wind Others

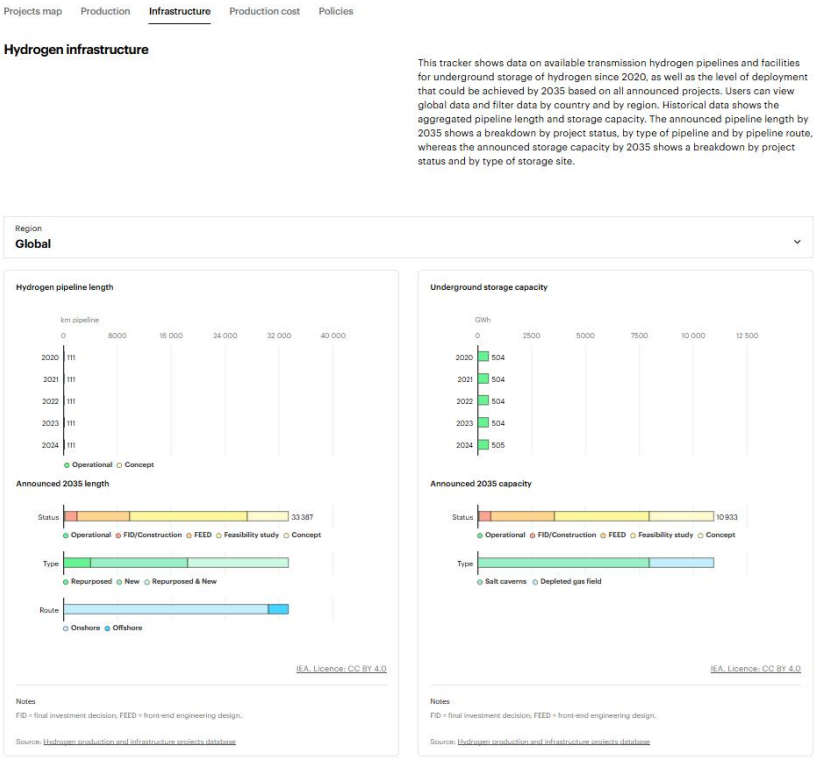
High cost of capital, low renewable penetration in the electricity mix and low incentives for fuel switching in existing industrial applications are the main barriers for low-emissions hydrogen

IEA Policy recommendations

- **Maintain support schemes for low-emissions hydrogen production**, with a focus on shovel-ready projects that target existing applications.
- **Accelerate demand creation** for low-emissions hydrogen and hydrogen-based fuels through regulations and support schemes in key sectors.
- **Expedite deployment of hydrogen infrastructure** by removing barriers and leveraging early opportunities.
- **Enhance public support to reduce technology risk** and facilitate project financing.
- **Support emerging and developing economies in moving up the value chain** for low-emissions hydrogen-based products.

New online Hydrogen Tracker





https://www.iea.org/data-and-statistics/data-tools/hydrogen-tracker

New online Hydrogen Tracker

Policy type

Framework legislation | Infrastructure | International collaboration | **Market pull** | Regulations | Resource push

● In force ○ Announced - Ended

	Carbon contracts for difference	Carbon pricing instruments	Fuel standard	Grants for demand	Hubs	Loan and loan guarantees for demand	Mandates and quota	Public procurement	Tax incentives for demand
	View policies	View policies	View policies	View policies	View policies	View policies	View policies	View policies	View policies
Australia				● 1	● 1			● 1	
Austria				● 6					● 1
Belgium				● 1			○ 1		
Brazil					○ 1	● 1			
Canada			● 1	● 7	● 1		● 1	● 1	● 2
Chile				○ 1		● 1	● 1		○ 1
Colombia				● 1		● 1			
Costa Rica									● 2
Czech Republic				● 7			● 6		
Denmark				● 1			○ 3		- 1
Egypt									● 3
Estonia				● 2					
Finland				● 4			● 1		● 1
France				● 9			○ 1	● 1	● 1
Germany	● 1	● 1		● 13	○ 1	● 4	● 4	○ 1	
Greece				● 1					● 2
Hungary				● 1					
Iceland				● 1					
India		○ 1		● 1	- 1		○ 2		
Ireland				● 2			○ 1	○ 1	
Italy				● 2	● 1				
Japan				● 9					● 1
Jordan									● 1

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Q&A Session