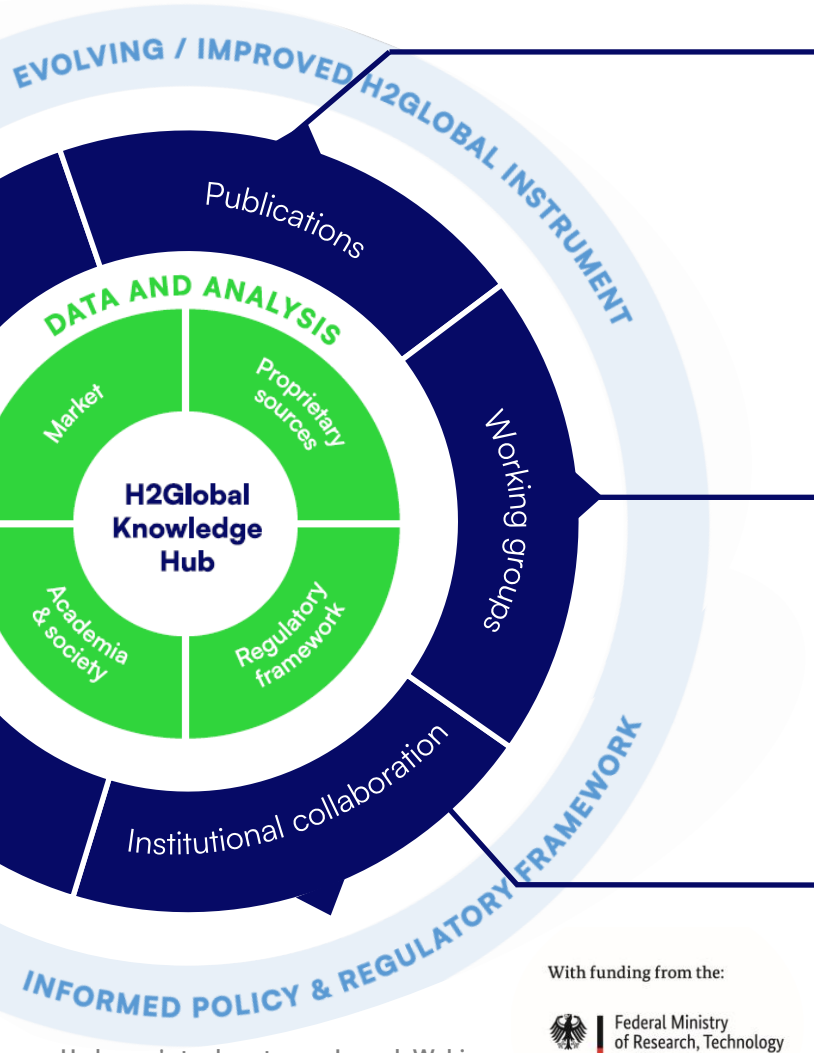


Hydrogen's trade gateway
Catalysing investment in export infrastructure

Report launch webinar
November 2026

H2Global

This report is part of the H2Global Knowledge Hub



THREE PUBLICATIONS IN 2026

- **Hydrogen's trade gateway: Catalysing investment in export infrastructure**
- Hydrogen's missing link: Enabling value chains to bridge the green premium
- Activating lead markets: Pathways to scale for clean hydrogen

CONTRIBUTION OF INDUSTRY EXPERTS COVERING THE WHOLE HYDROGEN VALUE CHAIN

- Regular virtual knowledge exchanges and in-person workshops
- Representation from finance, supply, infrastructure, demand, and manufacturing

COLLABORATION WITH KNOWLEDGE PARTNERS FROM:

- Center on Global Energy Policy at Columbia University
- IEA
- OECD
- Oxford Institute for Energy Studies
- World Bank
- Hydrogen Council

With funding from the:
Federal Ministry of Research, Technology and Space

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Agenda

1 Challenge

- Limited availability of export infrastructure

2 Infrastructure overview

- Technology-readiness and costs
- Export infrastructure gap
- Development archetypes

3 Case studies

- Brazil
- Oman
- Namibia & South Africa
- EU pipeline corridors

4 Recommendations

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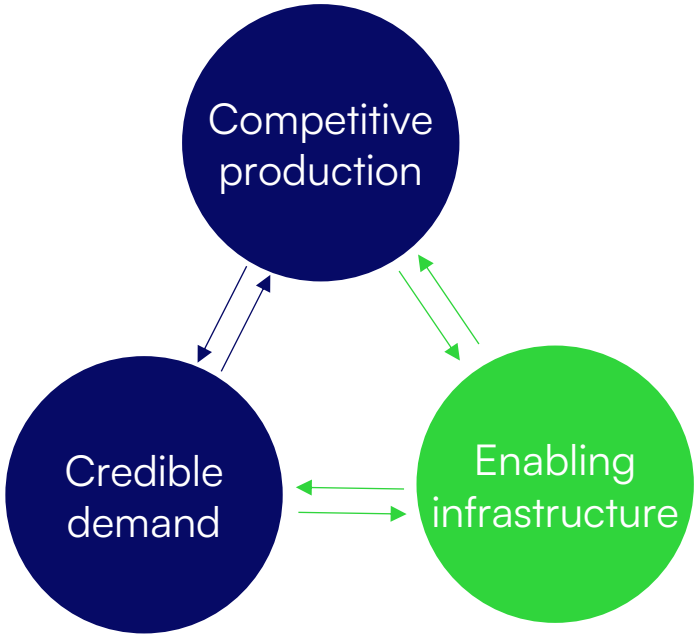


The challenge

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The challenge: Limited availability of export infrastructure hinders the further development of clean hydrogen projects

Three interdependent conditions...



...one coordination problem

Different starting points for seaborne infrastructure.

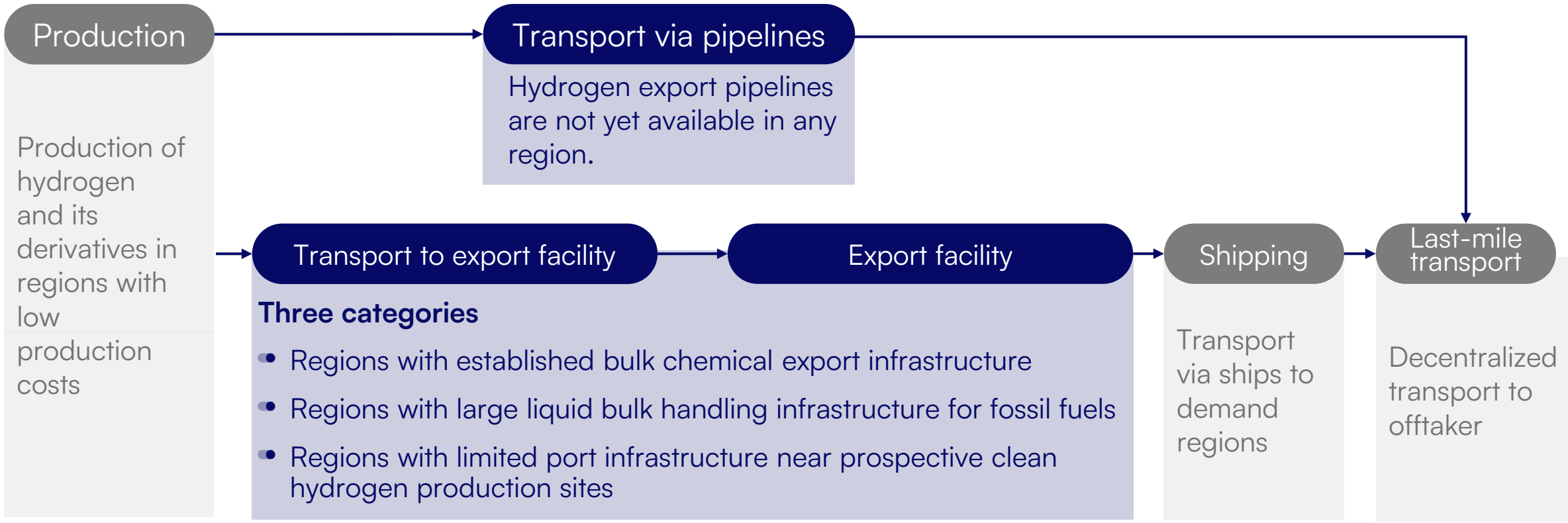
- Liquefied-gas ports,
- liquid-bulk ports
- and locations with limited infrastructure.

Pipelines are part of export infrastructure, and not a port-only issue.

Infrastructure timing and sizing must manage an uncertain project pipeline.

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Different infrastructure types start from scratch
or build on existing infrastructure



Report focus: Assessment of the gaps for export infrastructure as well as analysis of ownership models and support approaches that can facilitate timely infrastructure deployment.

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Infrastructure overview

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Technologies to facilitate hydrogen export

Pipelines



- Cheapest hydrogen export option for **distances up to 2000-2,500 km.**
- Repurposing of natural gas pipelines is usually possible.

Port infrastructure



- Ship-based becomse cost-competitive with pipelines for **distances above 2,500 km**.
- Use of existing port infrastructure for clean hydrogen-based ammonia, methanol, SNG, and LOHC possible, while dedicated infrastructure needs to be built for handling of LH2.

KEY COMPONENTS

- **Dredging** (where required in shallow waters)
- **Berthing infrastructure** (jetties, mooring piles, quay walls)
- **Superstructure** (loading arms, manifolds, pipelines, support frames, security elements)
- **Breakwater systems** (for open coastal ports)
- **Storage tank / terminal**

Offshore terminals



- Cost-efficient alternative to port development in early or temporary development phases.
- Not easy to scale up volumes.

KEY TYPES

- Single-point mooring
- Floating terminals (FSRUs)

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Technology Readiness Level (TRL) of export infrastructure

	Conversion	Onshore export terminal	Offshore terminals**	Pipeline
Gaseous hydrogen				Onshore: 9 (new), 8 (repurposed) Offshore: 6
Liquid hydrogen	9	7		
LOHC	9	9	9	9
Ammonia	9	9	7	9
Methanol	9	9	9	9
SNG*	9	9	9	9
e-fuels	9	9	9	9

Most required technologies for exporting hydrogen and its derivatives are readily available at commercial scale (TRL 9). Export terminals for liquid hydrogen as well as ammonia offshore terminals have been validated at pre-commercial scale (TRL 7).

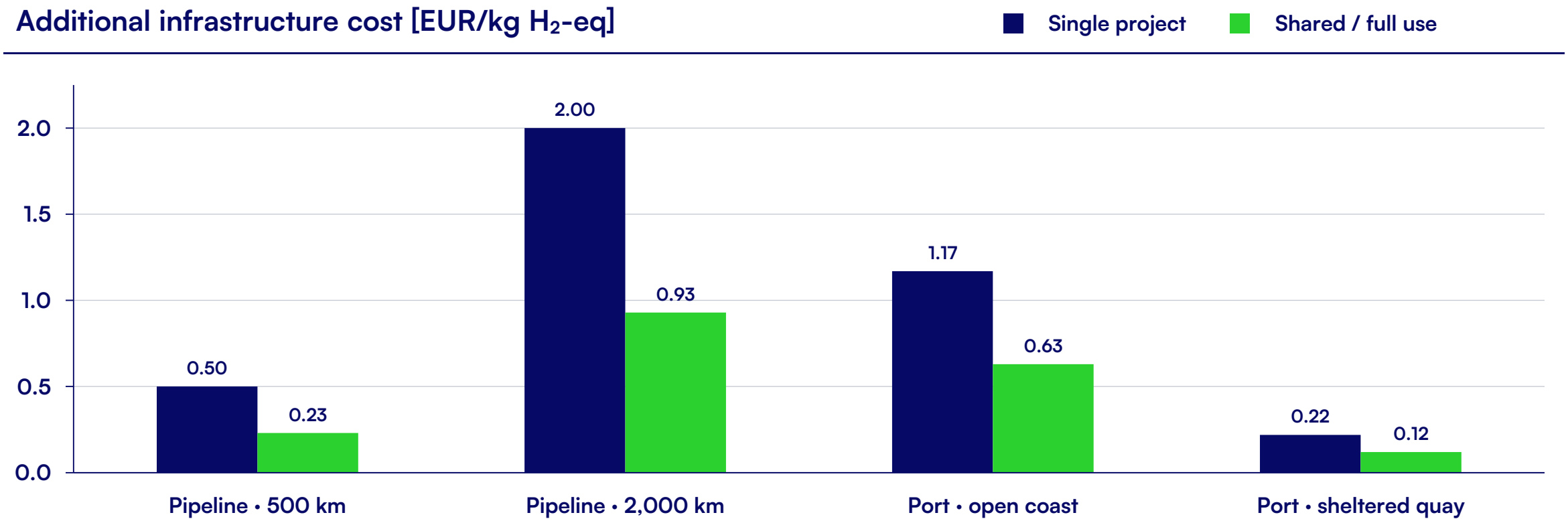
*SNG reconversion without CCUS.

**Floating storage units and single-point mooring systems.

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Shared capacity and sheltered ports improve export economics

Additional infrastructure cost [EUR/kg H_2-eq]



Pipeline conditions

20-inch; 60% repurposed. Single: 45%; shared: 100% utilisation.

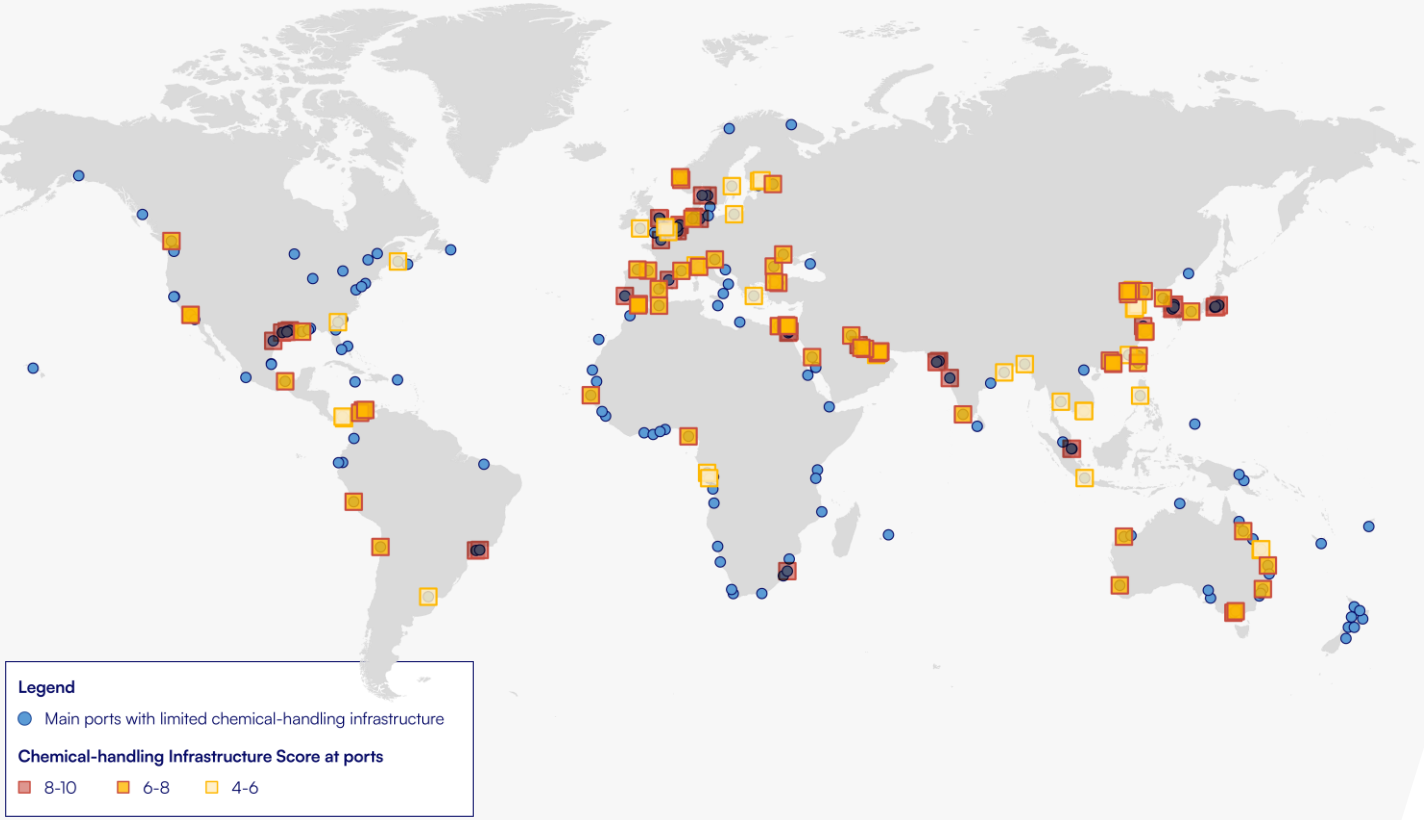
Port conditions

Open coast: jetty + breakwater; sheltered: quay wall. Single: 53%; shared: 100% utilisation.

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Existing ports could reduce the need for new export infrastructure

IEA's "Chemical-handling Infrastructure Score"



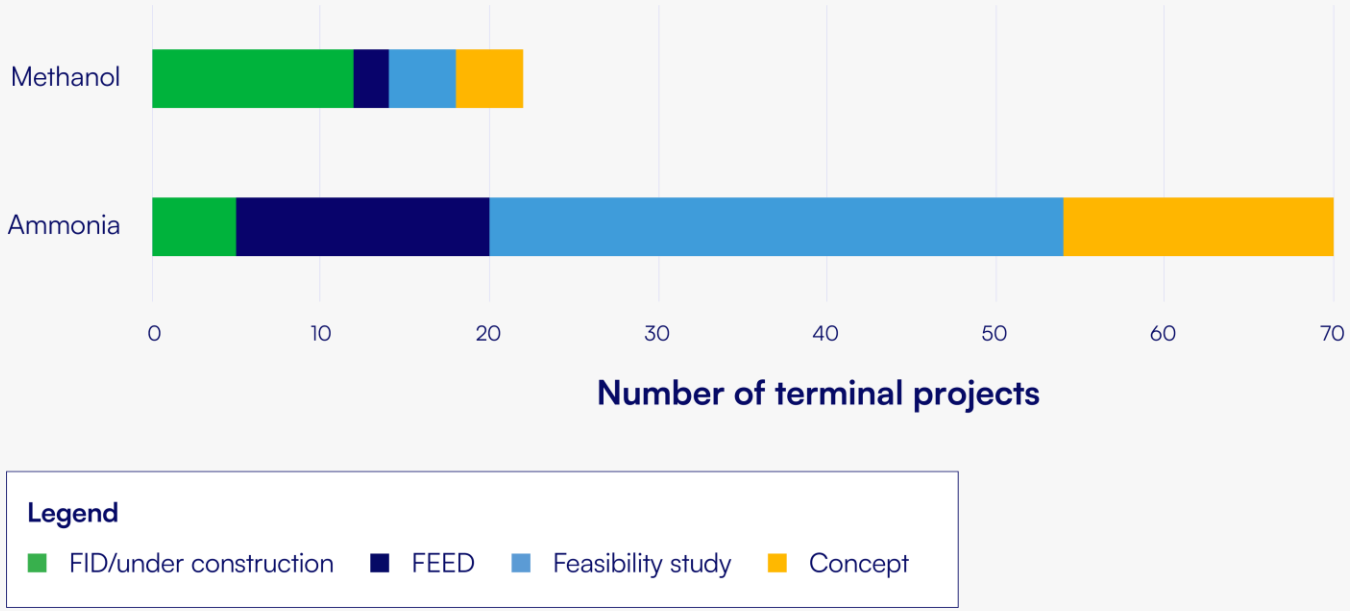
Key insights

- Nearly 80 ports achieve a score above 5 out of 10
- Existing facilities reduce the need for additional infrastructure to support future clean hydrogen exports, facilitating potential infrastructure expansion
- More than 50% of announced H2 projects are located within 250 km of a major port, and 70% within 500 km

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Most announced export terminals have not yet reached FID

Development status of announced ammonia and methanol terminal projects worldwide

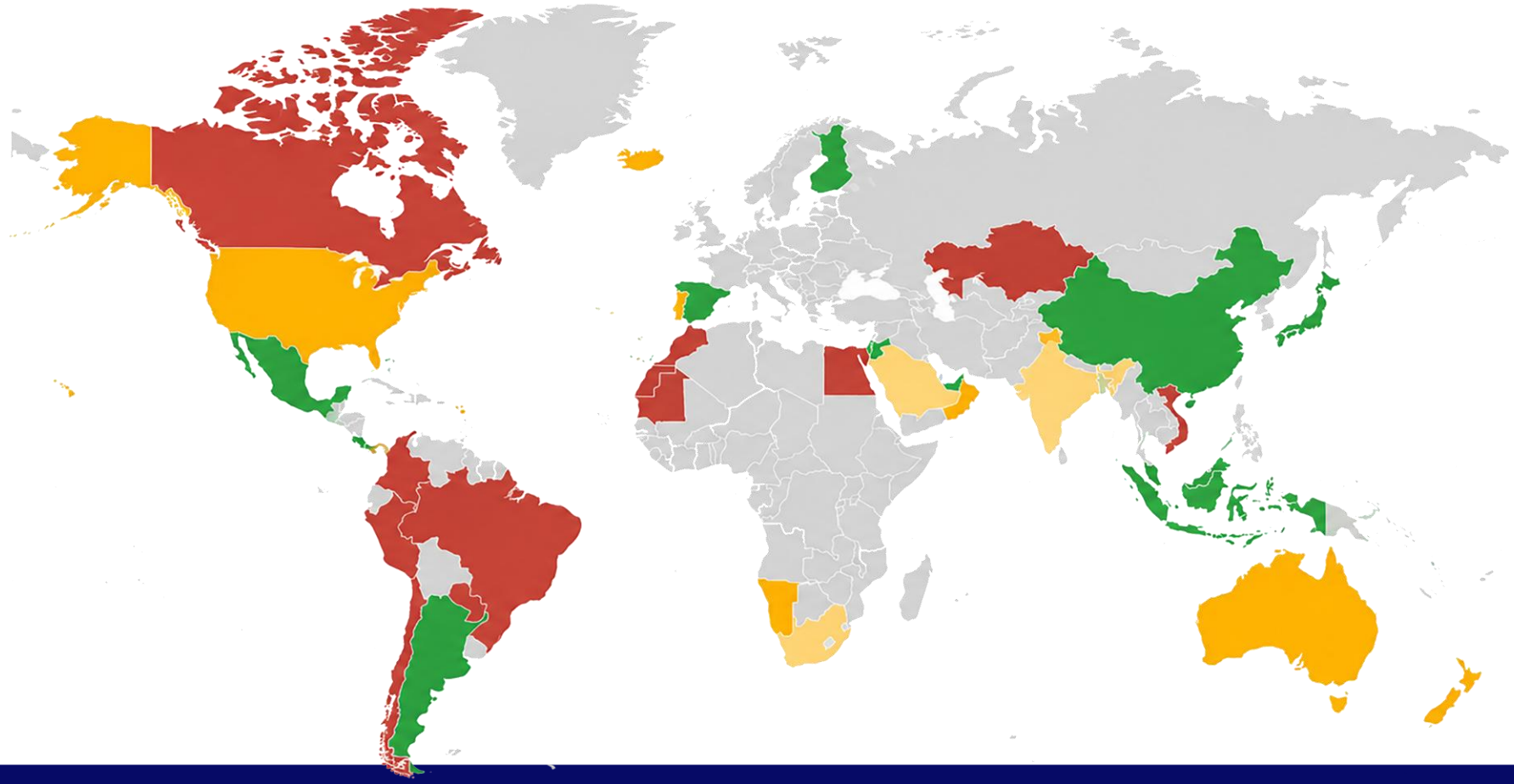


Key insights

- All announced export volumes for ammonia export sum up to almost 50 Mtpa, while current global trade amounts to less than 20 Mtpa.
- Less than 8% of announced trade volumes come from projects with FID+

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Ammonia infrastructure readiness varies substantially by country



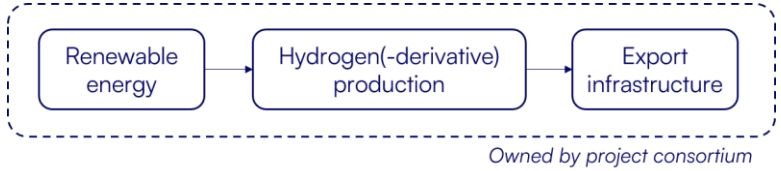
- Existing infrastructure is sufficient to accommodate announced ammonia production volumes
- Existing infrastructure + announced projects at FEED+ are sufficient
- Existing infrastructure + all announced projects are sufficient
- Existing infrastructure + all announced projects are not sufficient

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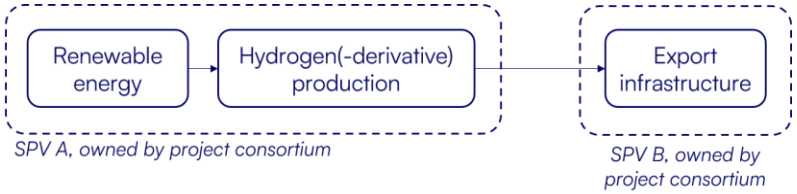
Four ownership structures allocate infrastructure risk differently

Export infrastructure is part of the hydrogen project's SPV.



Integrated model

Export infrastructure is financed through a separate SPV, which is also owned by project sponsors.



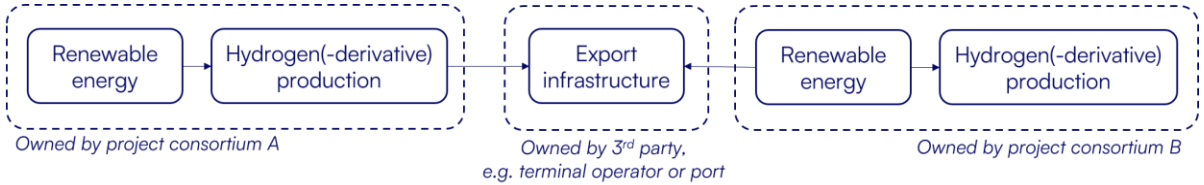
Separated model

HIGH — LOW

Risk sharing — **Project control**

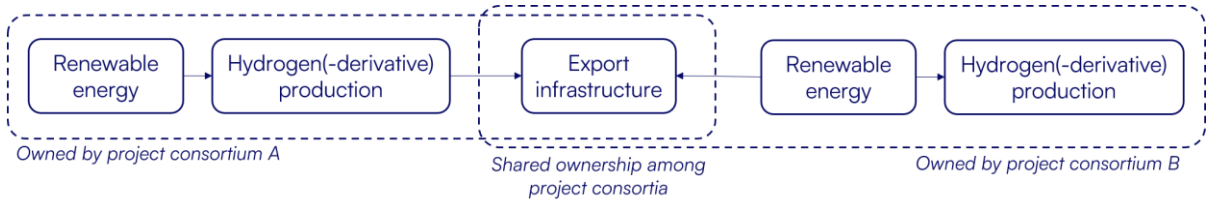
LOW — HIGH

Third-party model



Export infrastructure is financed through a third-party operator.

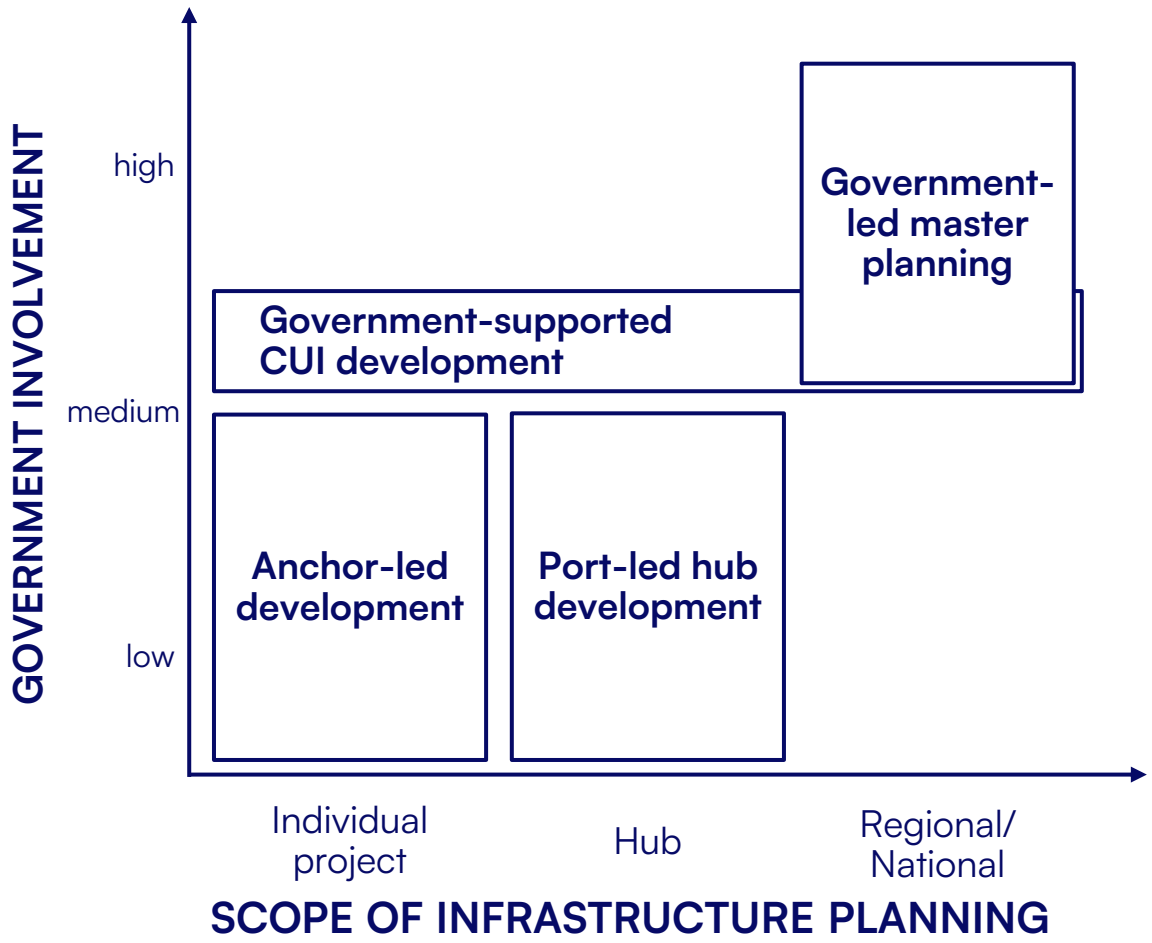
Shared model



Export infrastructure is financed through multiple hydrogen projects, sharing the assets.

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Four development archetypes can coexist



Anchor-led development
A large project drives dedicated investment and timing.

Port-led hub development
A port or SEZ coordinates land, projects and infrastructure providers.

Government-supported CUI development
Public risk-sharing makes specific shared assets investable.

Government-led master planning
Government steers land, rules, incentives and wider planning.

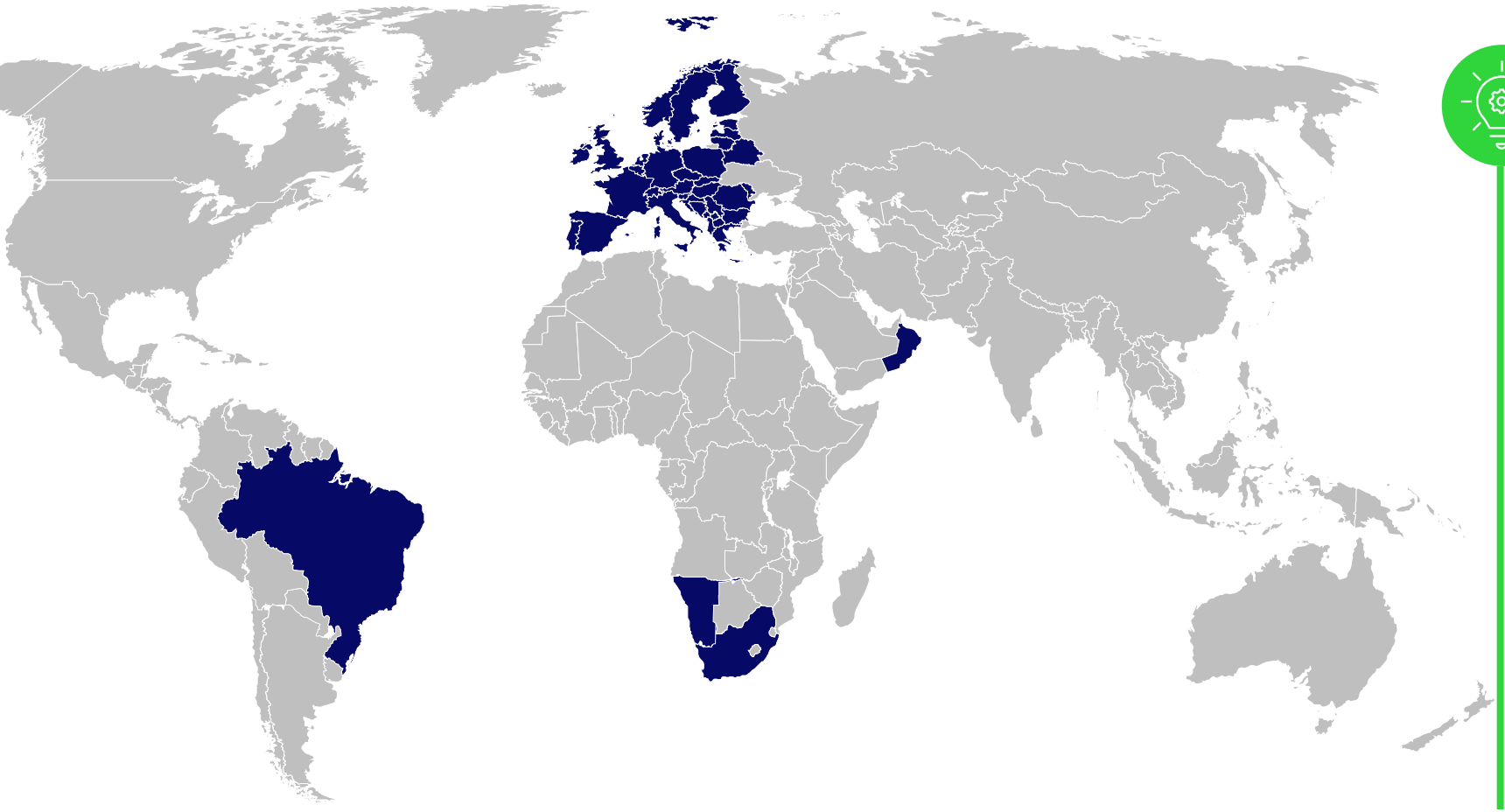
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Case studies

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Conducted case studies on export infrastructure development



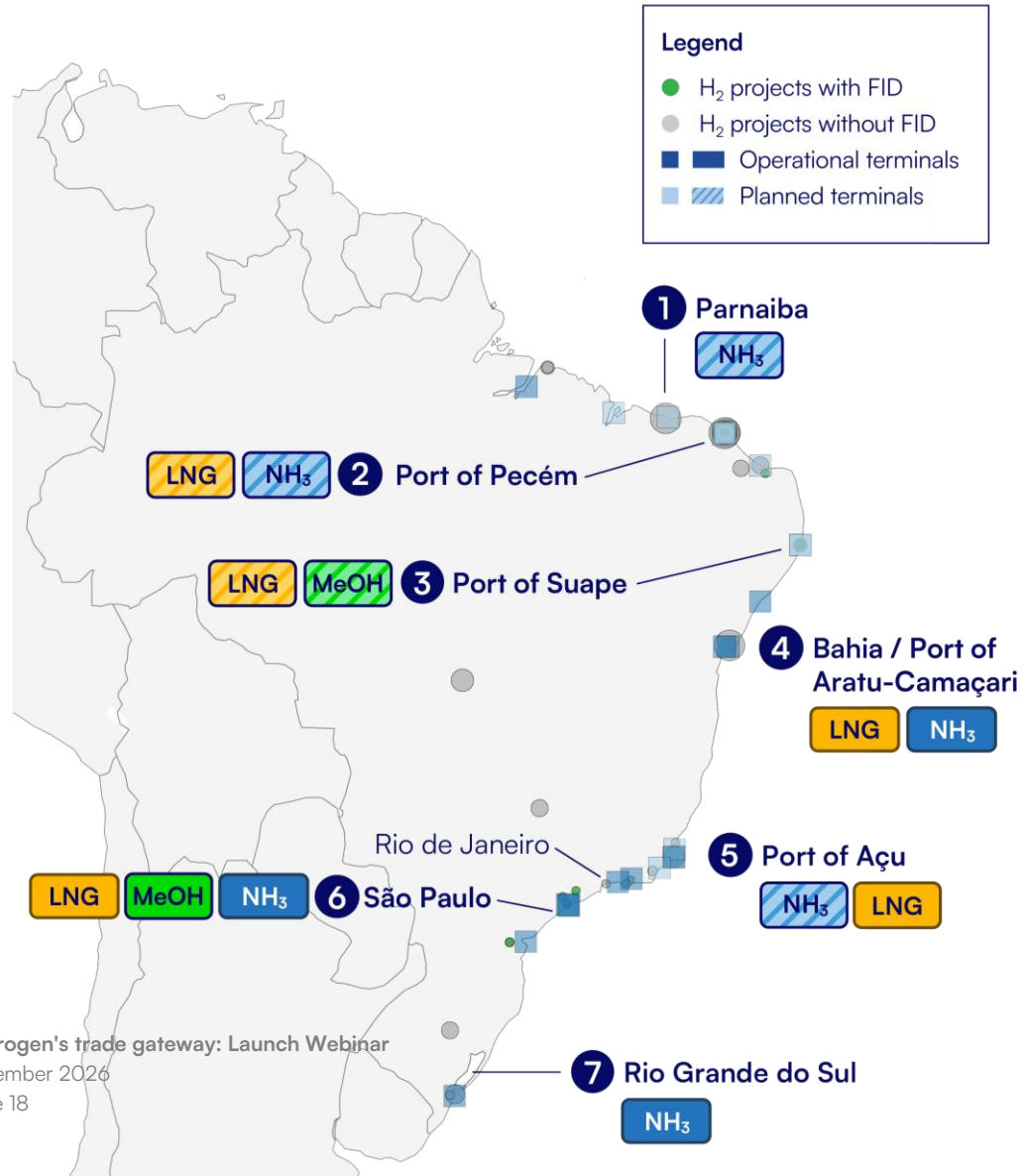
Key insights

- **Oman**: Shows how national master planning can align production projects with shared enabling infrastructure.
- **South Africa and Namibia:** Contrasts port-led coordination with anchor-led development.
- **Brazil**: Shows how ports can prepare land and coordinate infrastructure for multiple prospective exporters.
- **Europe**: presents how shared cross-border pipelines can advance before demand is firm.

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Brazil: Port-led development of hydrogen hubs



Starting point

At Pecém, 18 announced projects (~4.1 Mtpa $H_{2\text{-eq}}$) need new ammonia export assets; Açu's 10 projects (~0.7 Mtpa $H_{2\text{-eq}}$) can build on an established port.

Development approach

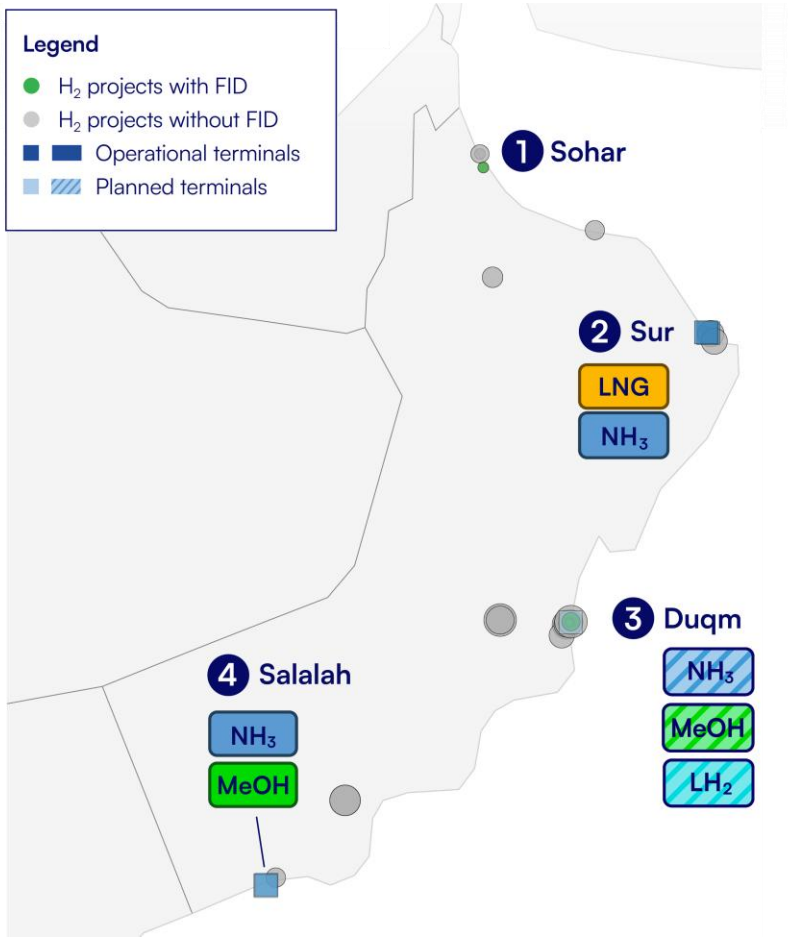
Ports allocate land and coordinate infrastructure providers. Pecém plans shared electricity, water and ammonia links; Açu licenses land and leverages port services.

Key lesson

Port-led coordination reduces project barriers. Phase shared assets around credible projects without requiring ports to finance every terminal.

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Oman: Government-led development of an integrated hydrogen ecosystem



Starting point

Duqm's projects plan ~4.0 Mtpa $H_{2\text{-eq}}$ and need major new export assets; Salalah plans ~0.90 Mtpa $H_{2\text{-eq}}$ versus ~0.06 Mtpa $H_{2\text{-eq}}$ of existing ammonia export capacity.

Development approach

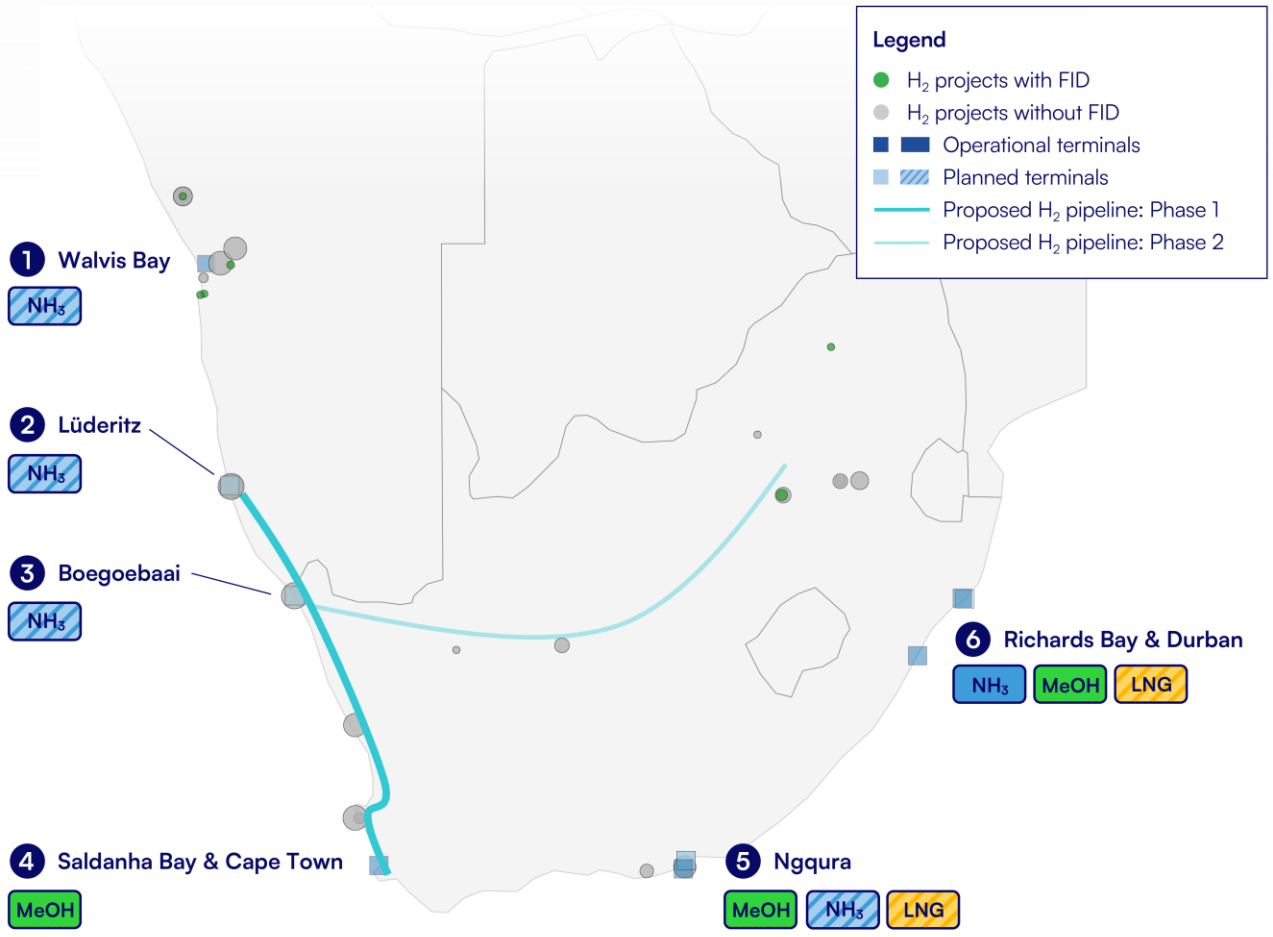
Hydrom auctions land and coordinates shared hydrogen pipelines, power and water (including ~200 km of pipelines planned at Duqm). Export terminals sit outside this CUI framework.

Key lesson

Master planning can avoid duplication, but CUI tariffs, utilisation risk and terminal timing still need to align with production projects.

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Namibia and South Africa:
Emerging export hubs under uncertain infrastructure demand



Starting point

Walvis Bay, Saldanha Bay and Ngqura can build on existing ports; Lüderitz and Boegoebaai need largely new export assets.

Development approach

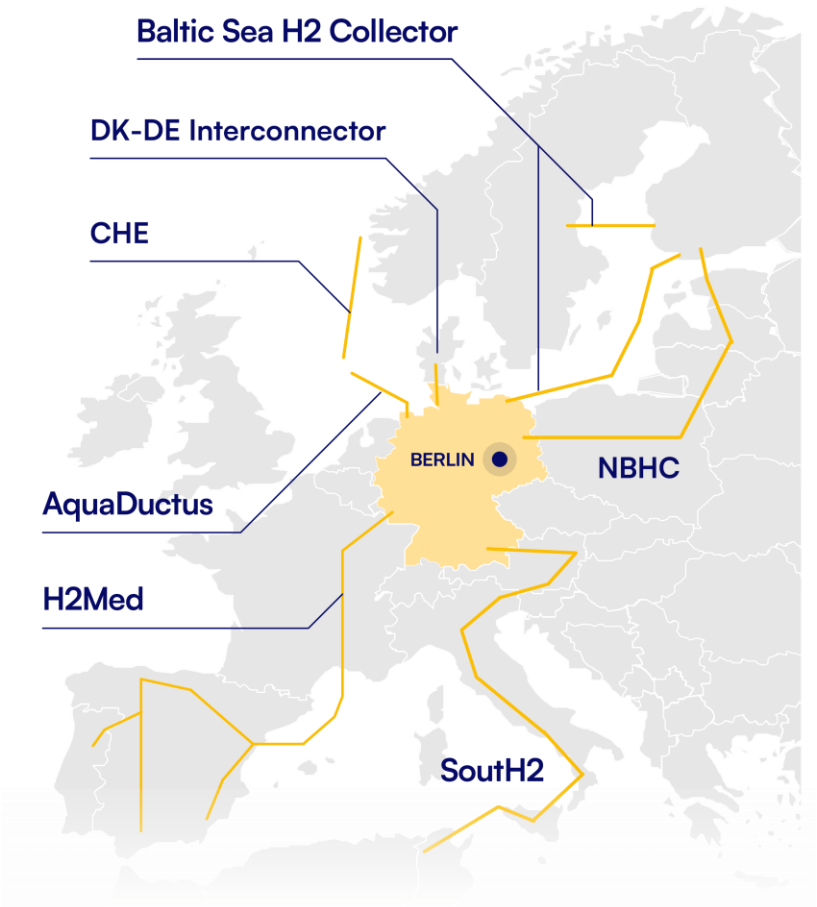
Namport and TNPA prepare hubs; Hyphen anchors Lüderitz. Proposed open-access pipeline: ~800 km cross-border, then ~1,300 km to Gauteng.

Key lesson

Dedicated first-mover terminals may precede shared networks. CUI needs firmer multi-user commitments and risk-sharing.

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European cross-border clean hydrogen corridors: Developing CUI ahead of market demand



Own visualisation based on information from project website

Starting point

Europe can repurpose parts of its gas network, but new cross-border links are still needed to connect emerging H_2 supply with industrial demand. The timing and volume of future flows remain uncertain.

Development approach

TSOs are planning corridors as open-access infrastructure. Calls for interest test potential demand; capacity reservations seek firmer commitments. Where early revenues remain insufficient, public risk-sharing can help bring investment forward.

Key lesson

Market sounding and capacity bookings improve demand certainty. Guarantees or ICA can help bridge the ramp-up gap; support for H_2 trade helps turn capacity into actual flows.

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Recommendations

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Export infrastructure must balance speed, scale and risk



1

Existing assets help, but export gaps remain

Port and liquid-bulk assets can be reused or expanded; their capacity and location may not match new projects.



2

Announced supply is not bankable demand

Few projects are advanced; uncertain volumes and timelines make early infrastructure investment difficult.



3

No single development model fits every location

Master planning, supported CUI, port-led hubs and anchor projects can coexist as markets develop.



4

Sharing lowers duplication but raises ramp-up risk

Dedicated facilities can help first movers advance; large pipelines favour coordinated multi-user planning.

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Five areas for accelerating export infrastructure development



Use existing assets

Reuse and expand before greenfield.



Plan early and allocate risk

Align technical and commercial design.



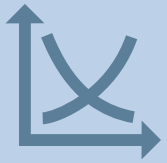
Balance first movers and CUI

Preserve sharing without delaying viable projects.



Match de-risking to capacity

Different roles for public and international capital.



Reduce demand uncertainty

Help projects reach FID and connect export and import markets.

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Matching de-risking approaches to countries' fiscal and institutional capacity

Governments with sufficient fiscal and institutional capacity

- **Bridge ramp-up selectively.** Use guarantees, concessional finance or revenue-stabilisation mechanisms.
- **Give capable public companies a clear mandate.** Use them to develop strategic enabling infrastructure.
- **Make support decline over time.** Transfer utilisation risk progressively to users as the market matures.

Governments with constrained domestic public capital

- **Mobilise MDB and DFI finance.** Use concessional loans, guarantees and blended-finance structures.
- **Engage importing-market partners.** Use equity, joint development or long-term cooperation.
- **Fund project preparation, too.** Support studies, engineering, environmental assessments and commercial structuring.

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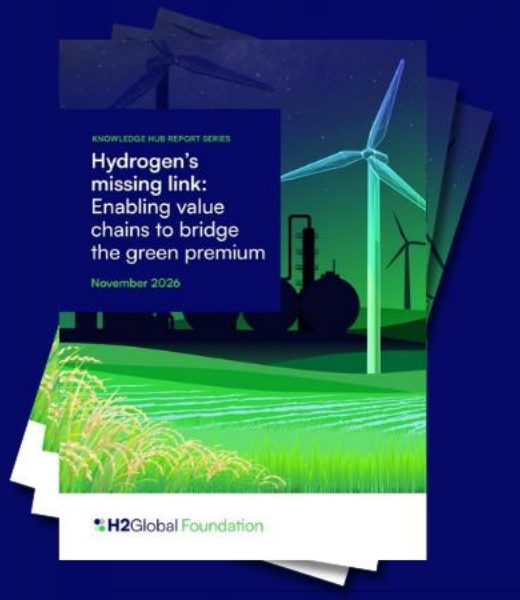
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Hydrogen's missing link

The port is only the first link

Next:

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Watch on demand

Trade Gateway

Who builds the port before the ships arrive?

up next
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