



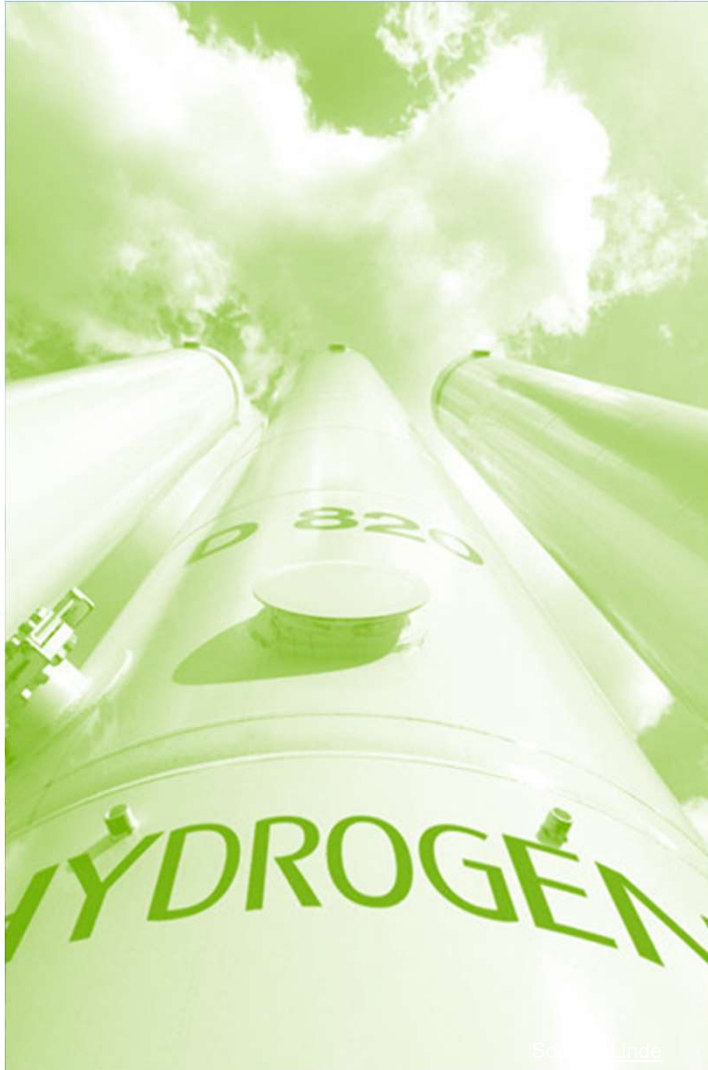
Green H₂ International Partnerships

Hertie Fireside Chat

Dr. Karoline Steinbacher | 25 April 2022

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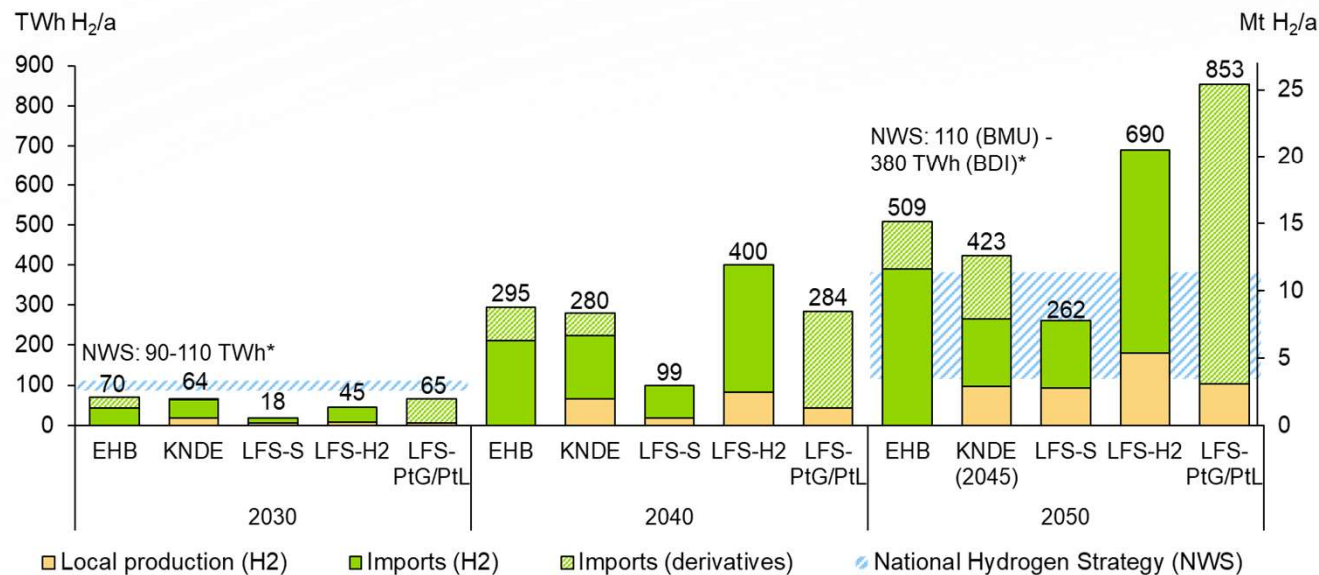


International Partnerships for Green Hydrogen

- Import needs and rationale for cooperation
- Potential exporters for green H2
- Germany's Energy Partnerships and instruments
- Wrap-up
- Q&A

Germany's import needs motivate cooperation

Hydrogen demand in Germany: local production and imports, 2030-2050



Projections: NWS: National Hydrogen Strategy, EHB: European Hydrogen Backbone, KNDE: Climate-Neutral Germany 2045, LFS: Langfristszenarien (-S: electricity scenario, -H2: hydrogen scenario, -PtG/PtL: power-to-liquid/power-to-gas scenario).

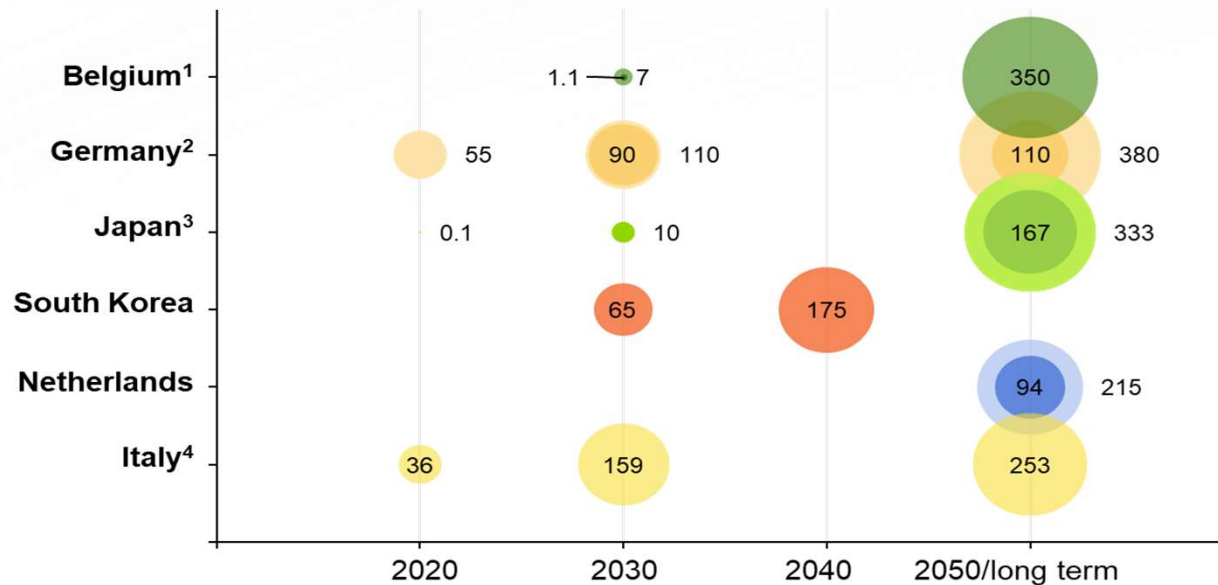
* Includes both hydrogen and PtG/PtL demand.

Sources: based on *Guidehouse/EHB (2021)*, *Climate-Neutral Germany 2045 (2021)*, *LFS (2021)*, *National Hydrogen Strategy (2020)*

- Germany's green H₂ production potential is **limited**.
- Studies expect a **strong dependence on imports** already in 2030. Import demand could reach **12-70 TWh in 2030** and **170-750 TWh in 2050** (all tbc).
- Importing hydrogen and derivatives from overseas via **ships** will be key in the near term.

Growing H₂ demand in net importing countries

Overall H₂ demand in selected importing countries' strategies (TWh)



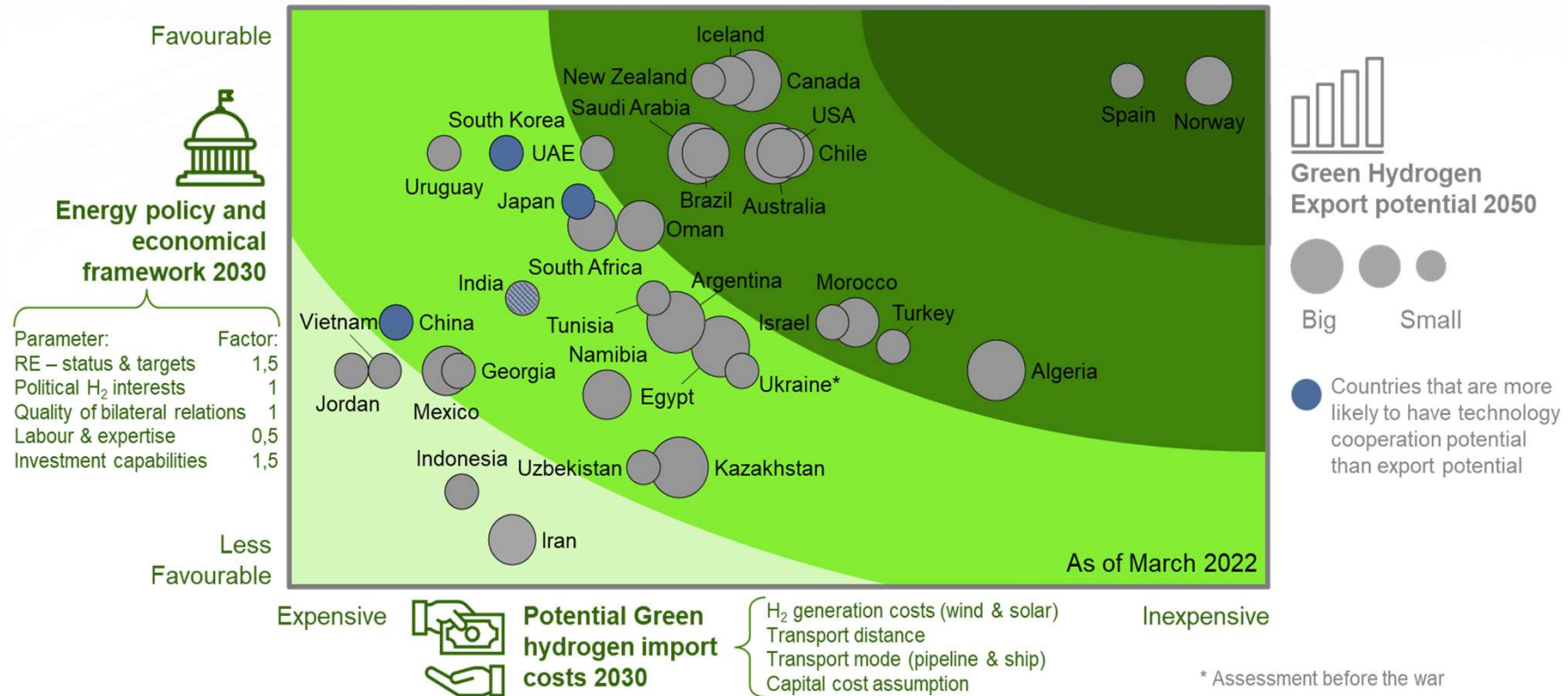
Bubble size and corresponding labels show the targeted lower (inside bubble) and upper (outside bubble) range of annual demand for hydrogen and derivatives in TWh.

Sources: adapted from [LBST \(2020\)](#), based on: ¹ [Trinomics & LBST \(2020\)](#) and [FPS Economie \(2021\)](#), ² [NWS \(2020\)](#), ³ [METI \(2017\)](#), ⁴ estimate based on [Guidehouse/EHB \(2021\)](#)

- Germany will figure among important green H₂ **importers**, but other net importers have comparable overall demand.
- Cooperation and coordination **with other major importers** makes sense to scale up global H₂ economy.
- Exact import needs are to be defined and **hydrogen strategies are evolving** (not only in Germany).

Diverse potential for H₂ trade partners

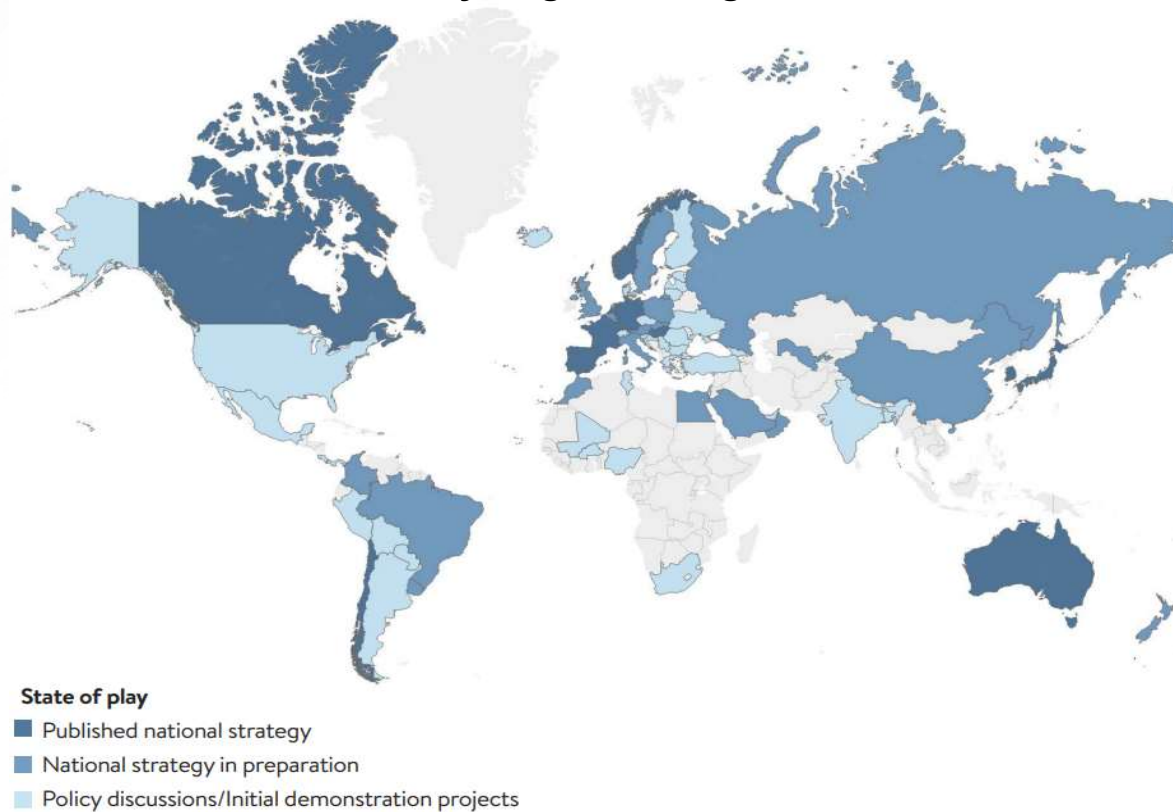
Qualitative assessment of international cooperation and trade potential with partner countries



Source: Guidehouse, updated chart (2022) based on Guidehouse, giz, adelphi, dena (2020)

National H₂ strategies and alliances multiply

Countries with national hydrogen strategies

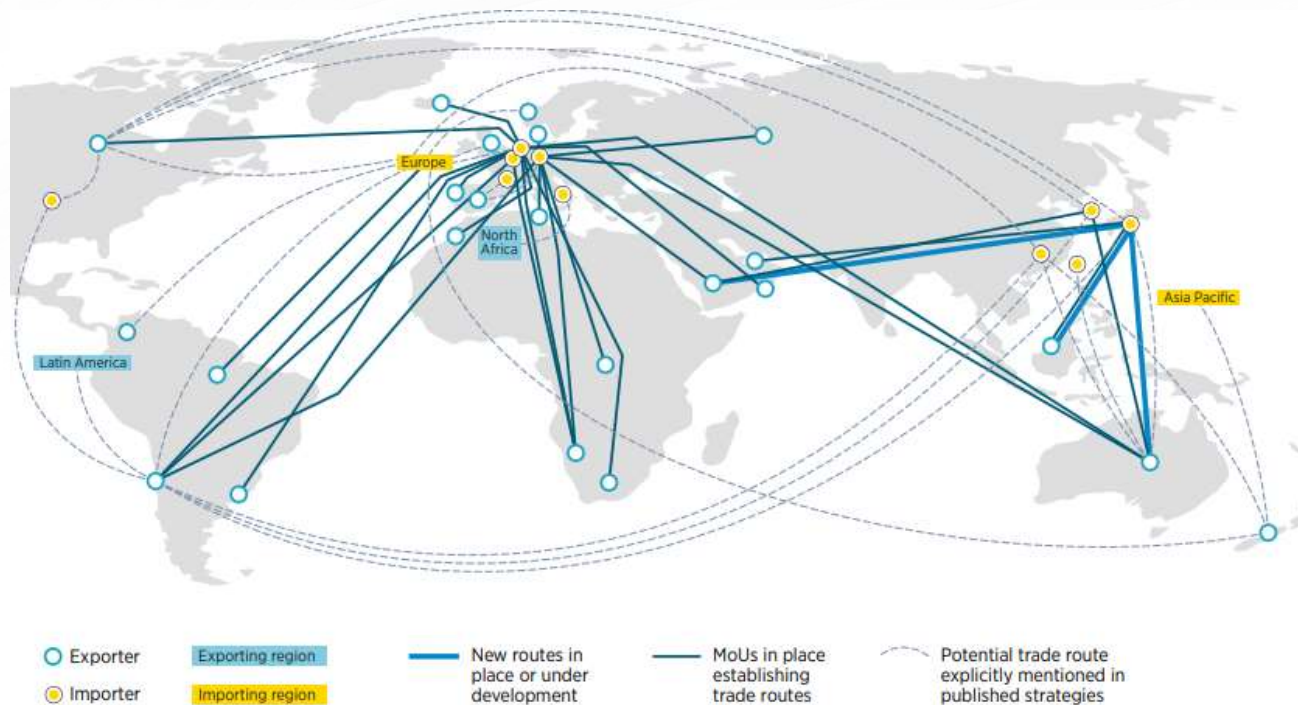


Source: [World Energy Council 2021](#)

- By mid 2021, 12 countries and the EU had published their **national hydrogen strategies**;
- Another 19 countries were already working on strategies.
- Partnerships and hydrogen corridors are multiplying – e.g., Chile-Netherlands export import corridor, German Energy Partnerships

National H₂ strategies and alliances multiply

Trade routes are established through bilateral MoUs



Source: [IRENA 2022](#)

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German Energy Partnerships and Dialogues



Algeria | **Australia**
Egypt | Brazil
Chile | Japan | Canada
Morocco | **Namibia**
New Zealand | Nigeria
Oman | Russia
Saudi Arabia | South Africa
South Korea | Tunisia
Turkey | Ukraine
USA | **UAE**

*Countries with formalized H2
Cooperation*

Source: Guidehouse 2022 based on BMWi 2021

Potential exporters are gearing up



UAE Hydrogen Leadership Roadmap (2021): targeting a 25% market share in key import markets for low carbon hydrogen by 2030.



- The **first green electrolyser** of the MENA-region was taken into operation in the UAE (May 2021).



- The „**Green Falcon**“ consortium develops synthetic kerosene (partners include Siemens Energy, Lufthansa & Etihad).



- **Pilot projects** for hydrogen and ammonia production and supply chain development to Germany will deliver first shipments this year.



Potential exporters are gearing up



- Investments of **\$36bn into hydrogen** targeted by 2030 (EU: \$430 bn), hydrogen strategy is to be published.



- **NEOM future region** will have a strong focus on RE and green H₂.
- „**Element One**“ green H₂ pilot project (20 MW ELY)
- „**Helios**“ green H₂ and ammonia production facilities (2 GW+ ELY, 4 GW PV & Wind) involving Air Products, Acwa. \$5bn investment amount.
- German involvement as technology provider (thyssenkrupp Uhde Chlorine Engineers).



Saudi Arabia



Potential exporters are gearing up



- Targeting 10 GW RE for H₂ production by 2030, and **30 GW by 2040**, attract investments & job creation in a “hydrogen-centric society”.

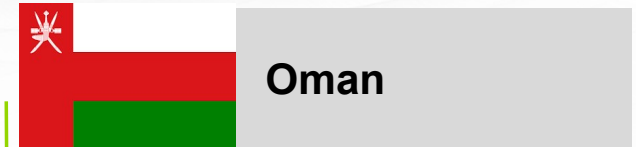


- **Hyport** green H₂ and ammonia project (250-500 MW ELY) under development.

- **Green steel** (35 MW ELY) with Jindal in SOHAR.

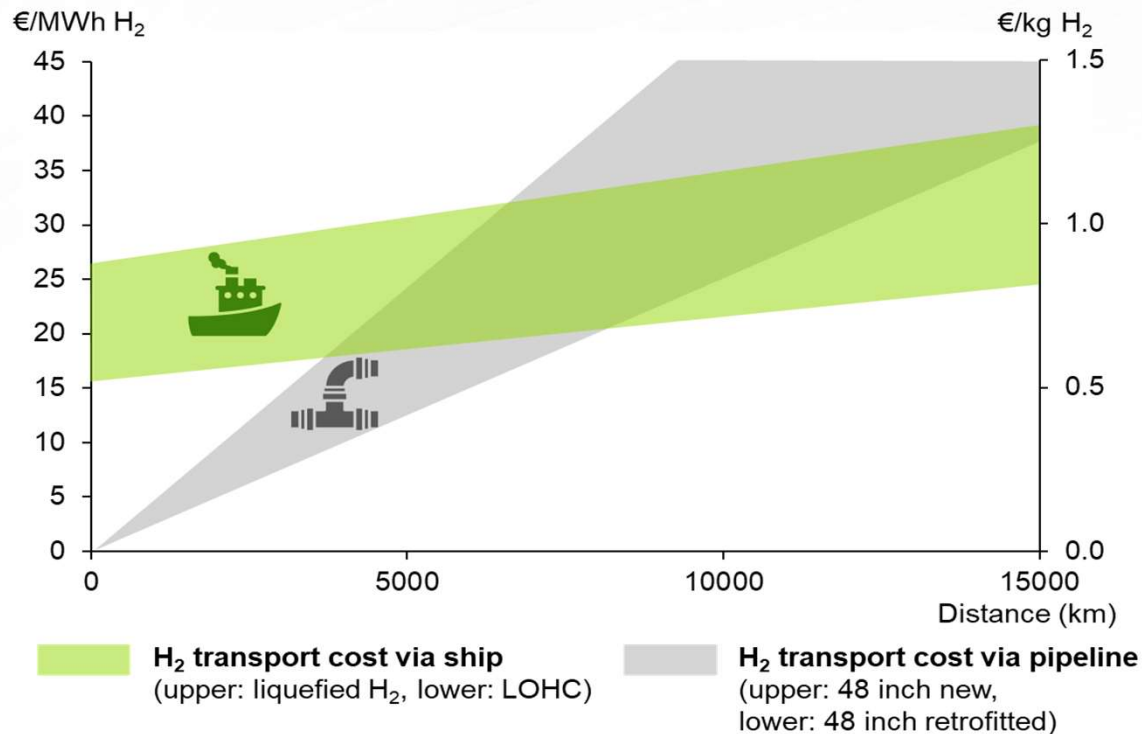


- **Green Energy Oman** (25 GW RE)
- Agreements with **UK** (BP announcement, “multiple GW”) and **Japan**.



Comparing the cost of H₂ transport options

Pipeline vs. ship transport cost in €/kg H₂ for different options

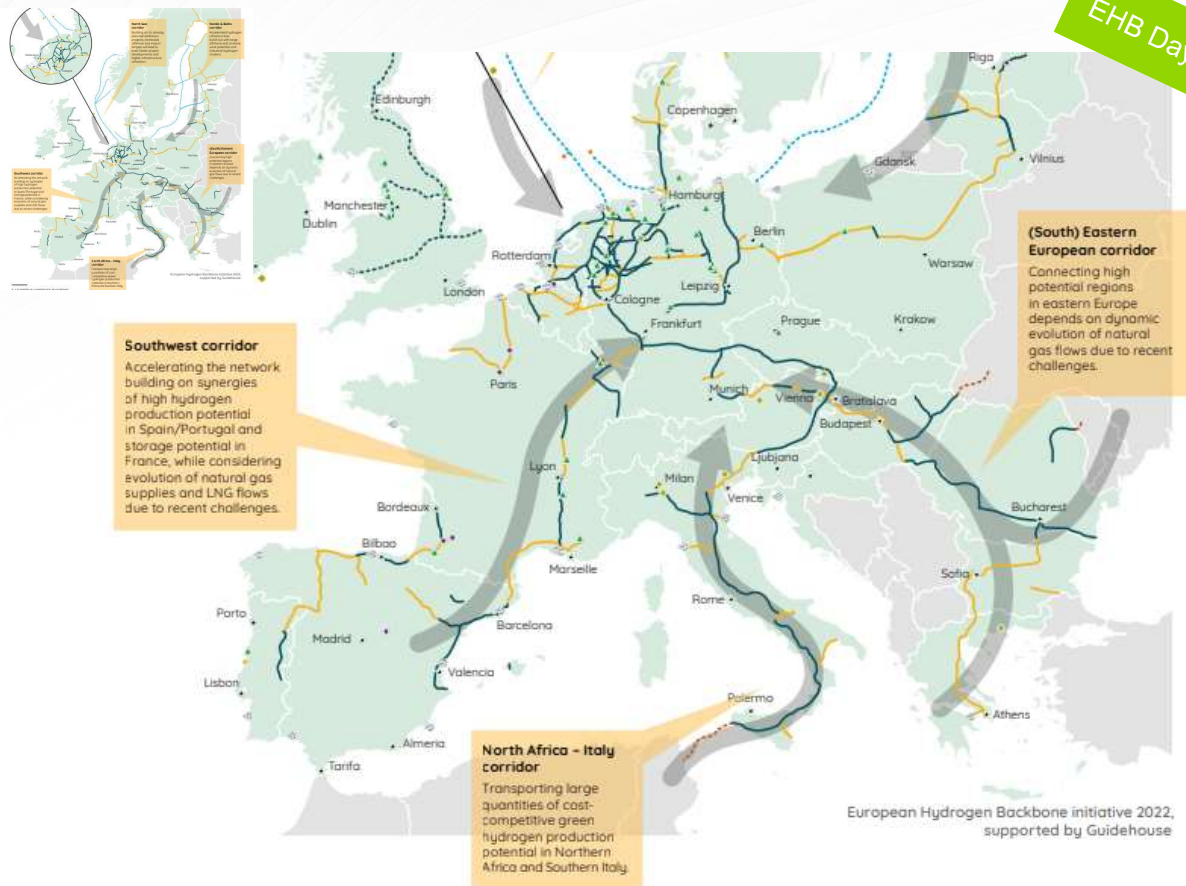


Note: Pipeline transport assumes 48 inch (1200 mm) in thickness, 12.7 GW and 80 bar for both new and repurposed pipelines.

Source: [Guidehouse/EHB \(2021\)](#)

- **Pipeline** transport is the most economical option for transporting large volumes; **repurposed pipelines** can be as cheap as one third the cost of new pipelines.
- **Shipping** can be an option across long distances, for low volumes transported and where pipelines are not available or possible (derivatives) – inevitable for **imports in the short run**.

Connecting H₂ infrastructure to exporters



- A **Southern Corridor** could bring green H₂ from Algeria/Tunisia to Italy.
- **Demand centers** in Southern Germany and Austria could be reached more easily .
- A **combination** of pipeline – ship – pipeline could offer an additional option, e.g. for exports from the Gulf region.
- **Technical feasibility** tbd & rapid investments required.

Source: [Guidehouse/EHB 2022](#)

Instruments promote international H₂ scale-up

Planned and implemented German funding schemes



Auction-based promotion of international green hydrogen projects (**H2Global**)



H2Uppp: Provision of supporting services to small private-sector projects



PtX Growth Fund



National Funding Guideline for bilateral hydrogen projects in non-EU countries

- Grants for projects through Funding Guideline in Saudi-Arabia and Chile in December 2020
- Potential support for a joint project in the UAE in 2022



2bn euros earmarked
for intl. cooperation

Priorities for H₂ Cooperation

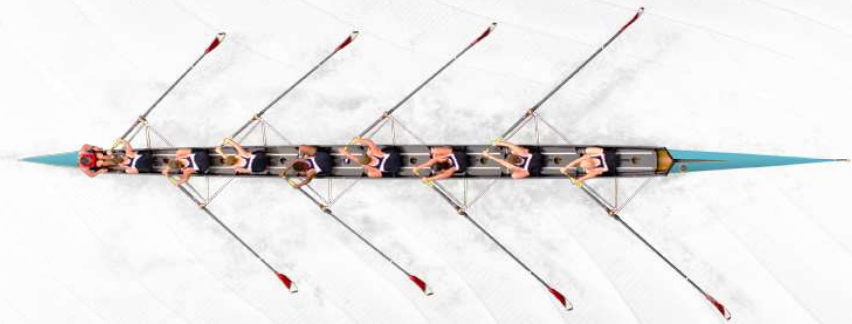
- Deepen and multiply **H2 cooperation** within Energy Partnerships
- Coordinate with other (European) **net importers** of green H2
- Refine and define **import needs**, clarify share of non-EU imports
- Strengthen dialogue around **standardization and regulation**
- Broaden **funding instruments** (addition of dedicated funding windows, Europeanization)
- **Avoid shortcomings** of earlier energy cooperation initiatives

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