

Hydrogen Global Governance Overview and the Impact on the Precious Metals Market

November 2022

About The Hydrogen Standard

News, market analysis and insights. One stop shop for everything related to hydrogen.

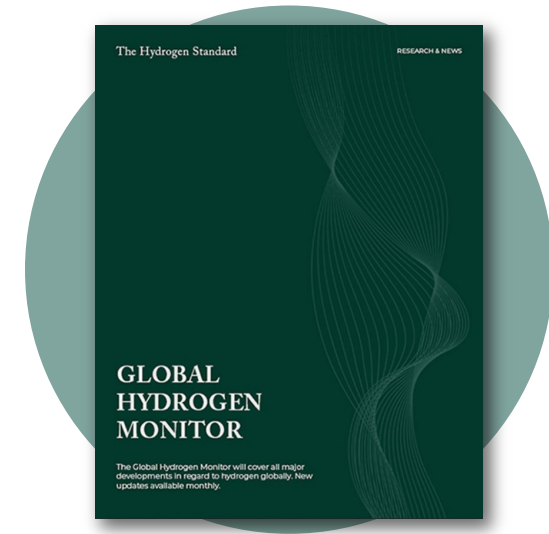
Research:



Quarterly The Hydrogen Magazine Standard

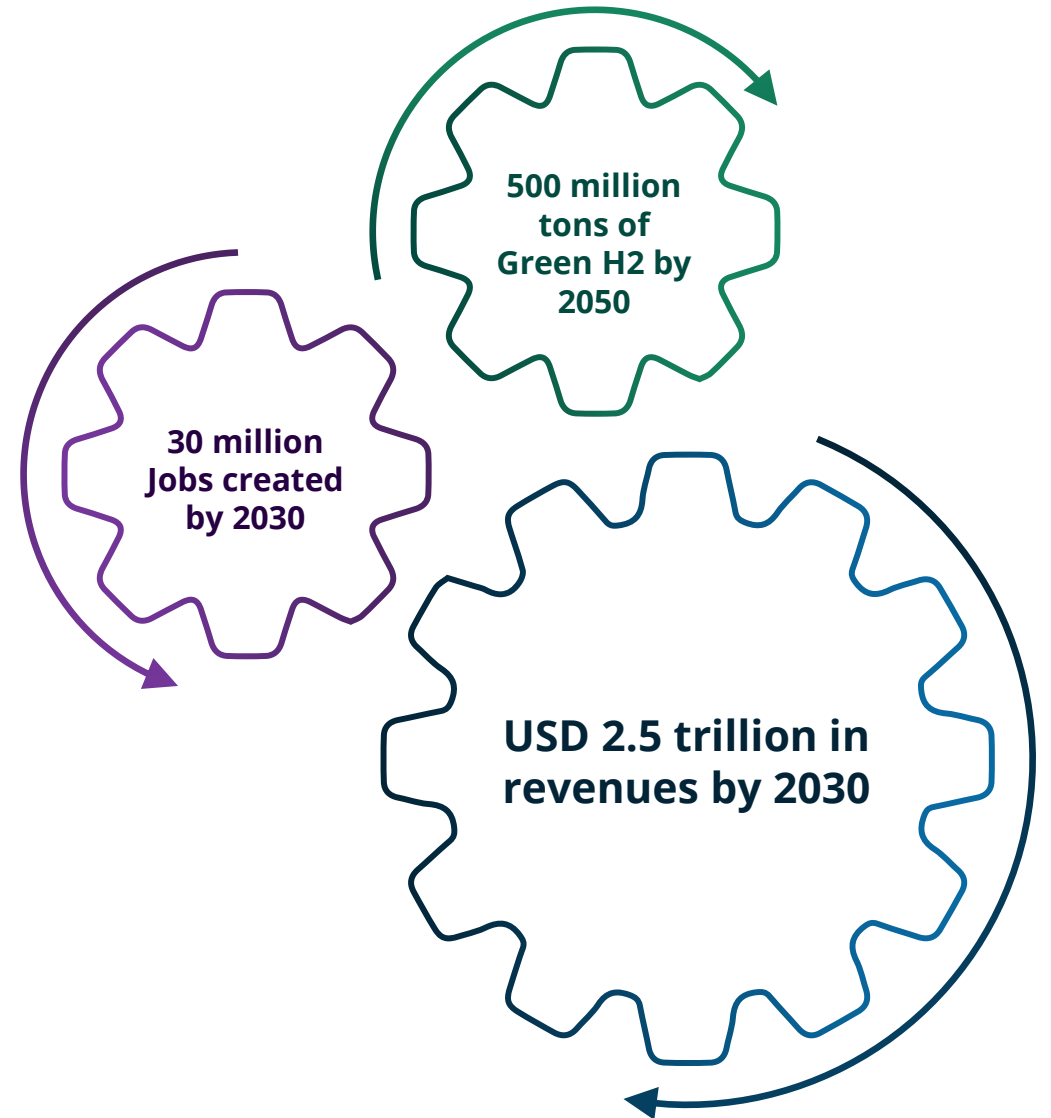


Monthly China H2 & FC Monitor

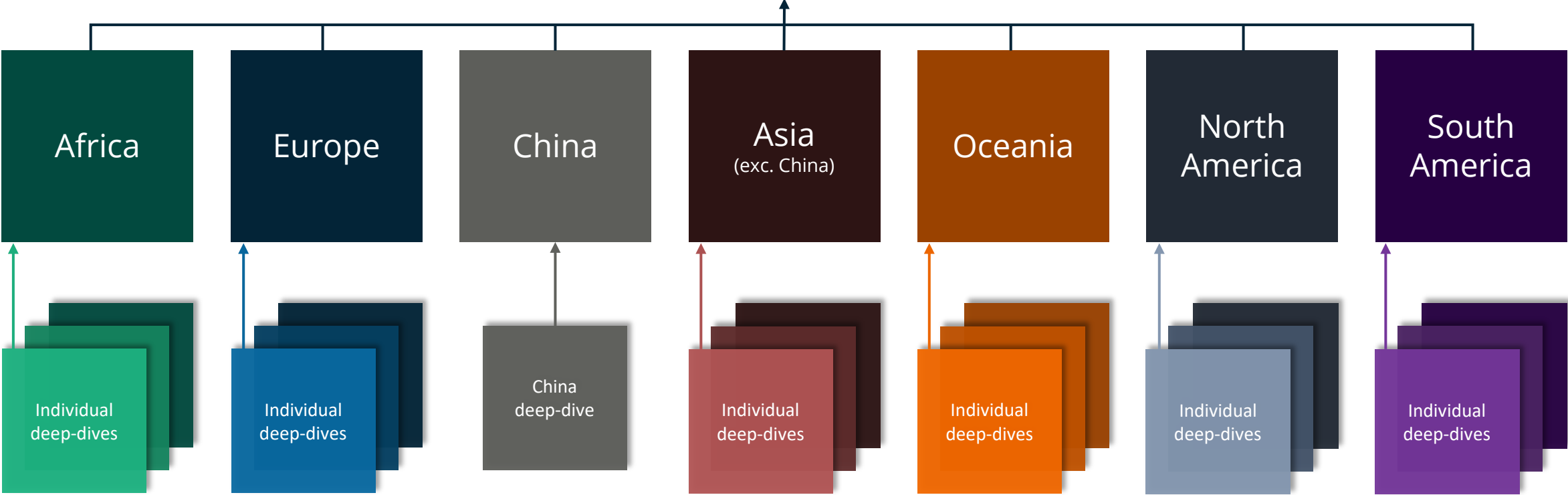


Global Hydrogen Monitor

Hydrogen Global Governance Report



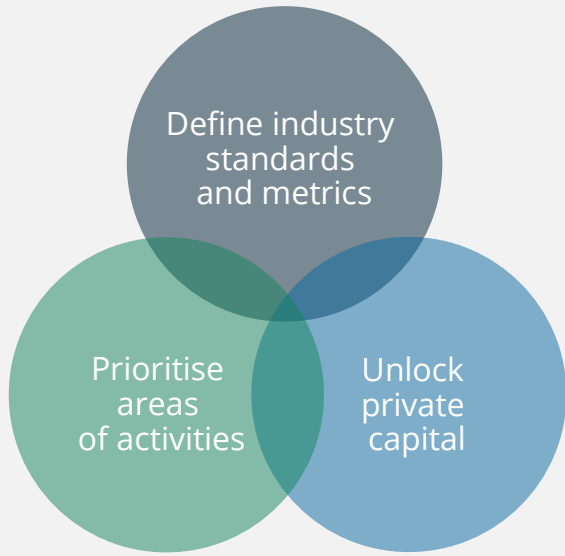
Global Landscape



Governmental Tools



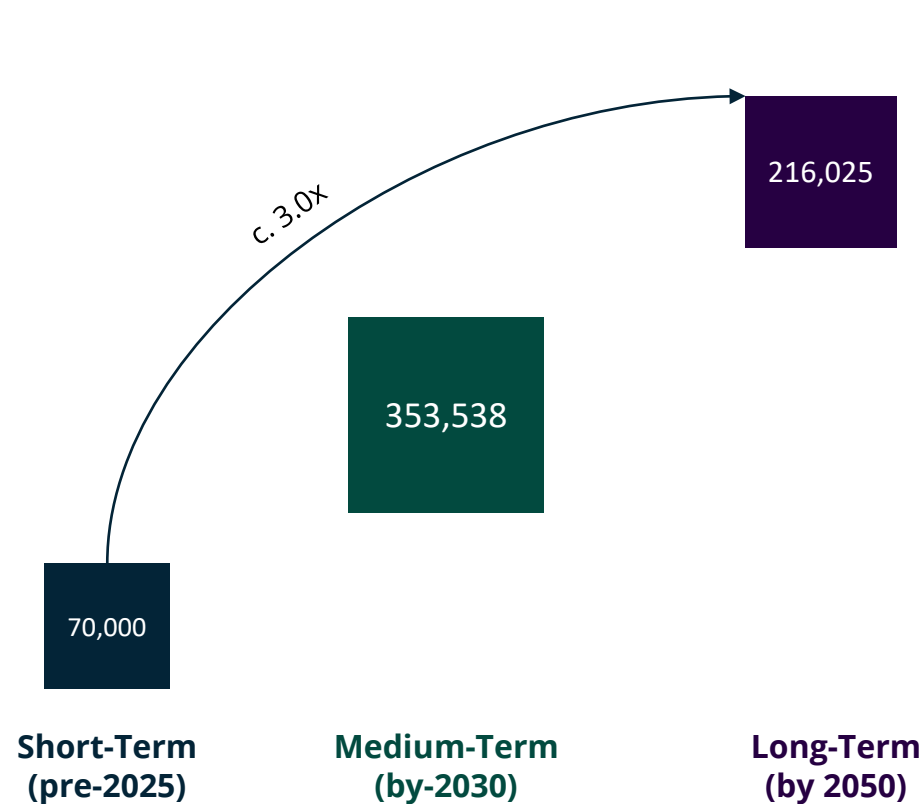
Industry Divers



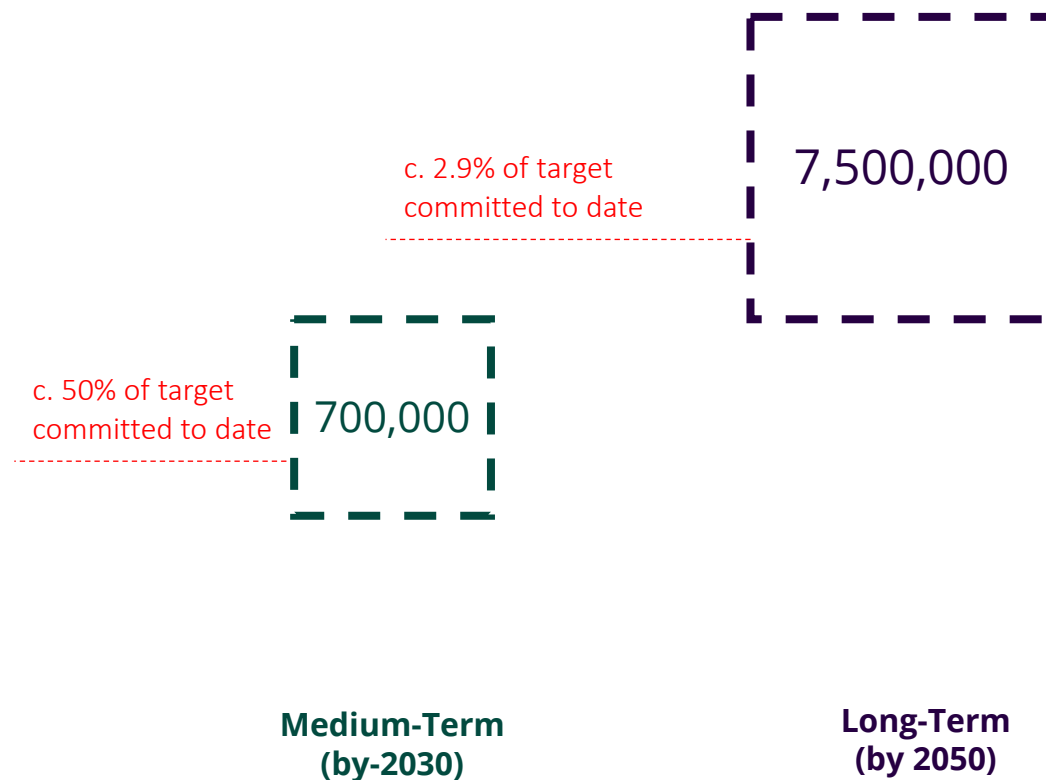
Outcome



Funding Made Available in USD Mn



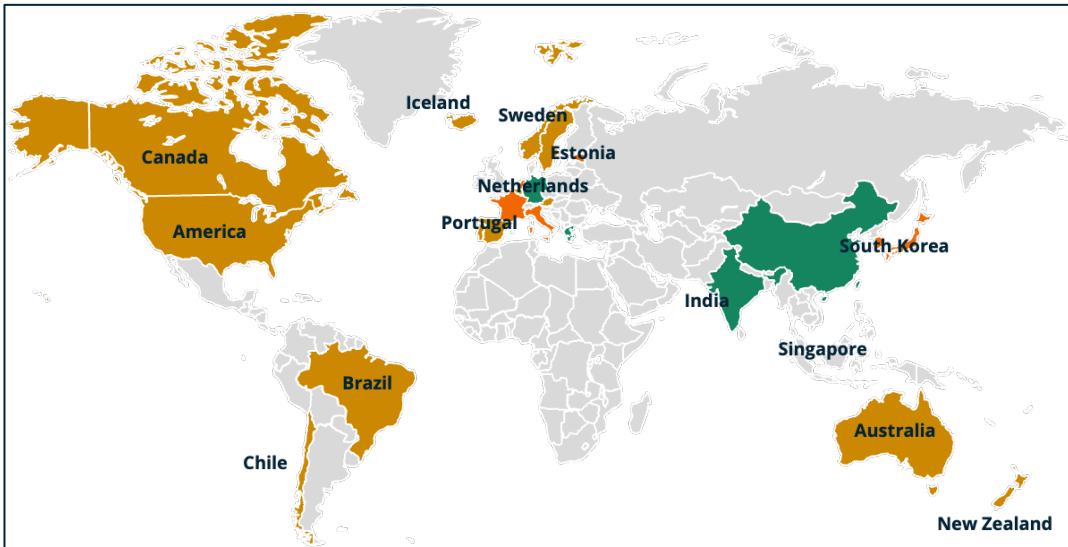
Global Funding Targets in USD Mn



Funding commitment levels for 2030 are on the rise. However, for the time being they are not at par with the global and regional needs to develop hydrogen at full potential.

Funding Commitments Classification

Short-Term Funding Levels (pre-2025) – Map Visual



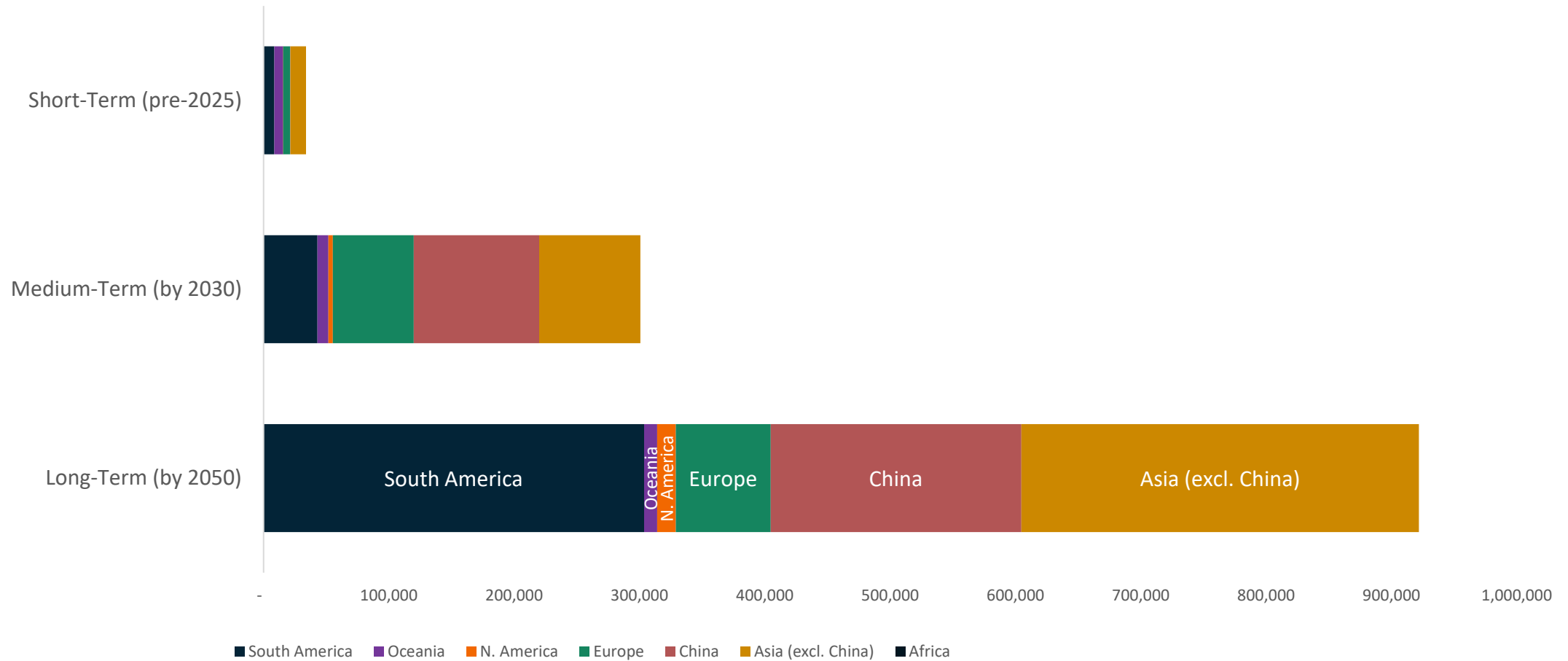
Funding Qualification Scale
 Low < \$1bn
 Medium = \$1bn - \$5bn
 High > \$5bn

Funding Classification Evolution – Country Distribution

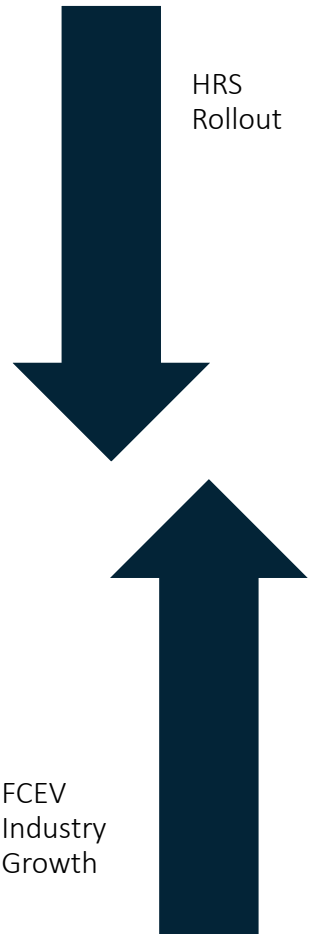
	Low	Medium	High
Short-Term (pre-2025)	14	6	4
Medium-Term (by 2030)	10	6	18
Long-Term (by 2050)	9	7	18

Major Funding Disbursements

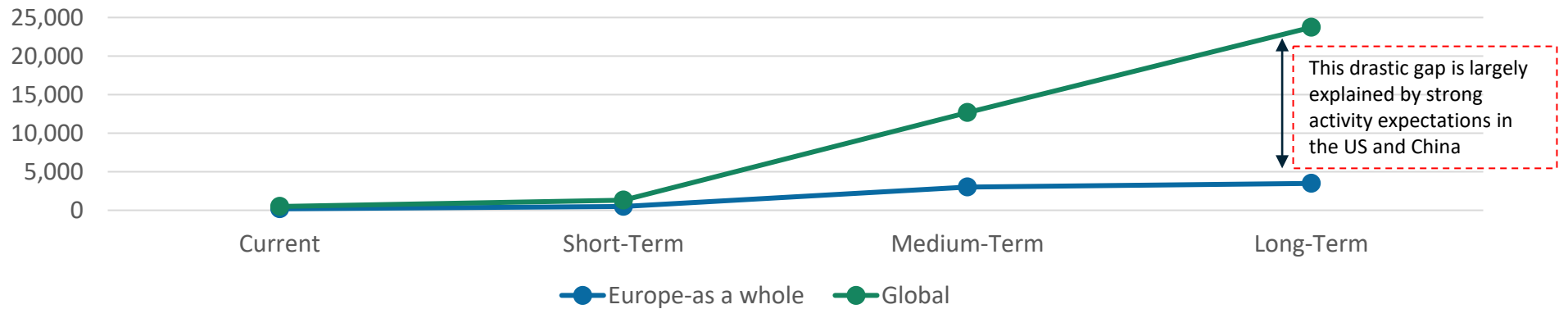
Electrolyser Capacity Rollout in MW



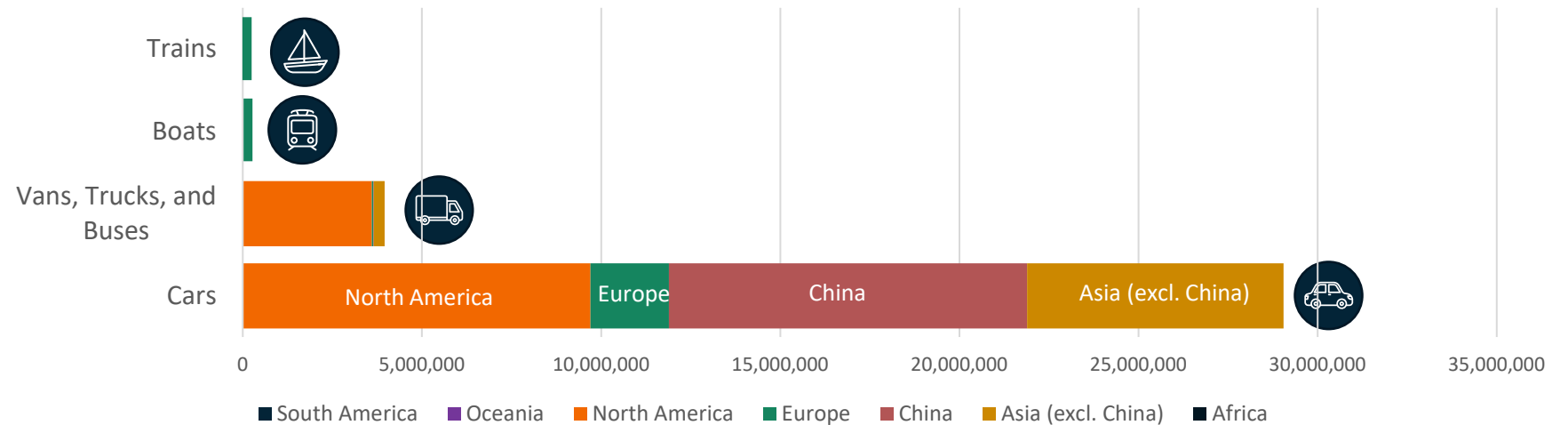
Major Funding Disbursements



HRS Rollout Global View



Cumulative Number of FCEVs by Region - by 2050

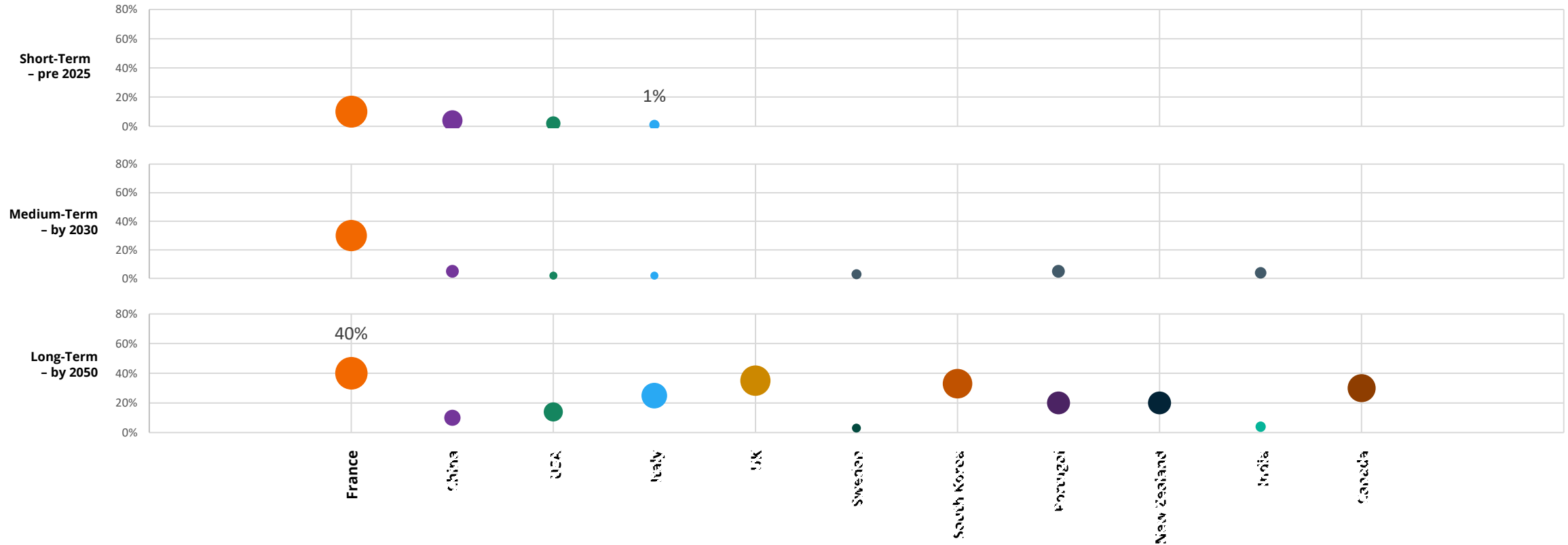


Announced Policy Support and Regulatory Governance

	Strategies and Plans			General Regulatory Framework							Taxes and Incentives									
	Hydrogen Roadmap	Hydrogen Roadmap Planned	Other National Strategy addressing Hydrogen	Hydrogen Use and Deployment Policies	Hydrogen Blending and Production Policies	State Funding Backing Hydrogen Deployment	Classification as energy source or fuel	Promotion of an FCEV ecosystem	Policies in Support of an H2 Economy	Coordination between Industry and Research	Subsidies for planning and construction	Tax and Charges Exemptions	Special Tax Rate - Hydrogen Vehicles	Carbon Emission Based Tax Rates	Reward - Replace Subsidies	FCEV Subsidies	HRS Subsidies	Favorable Export Regulation	Workforce Training Incentives	Investors Incentives
China																				
Austria	2019																			
Canada																				
Denmark	2021																			
France																				
Germany																				
India																				
Italy																				
Japan																				
South Korea																				
Spain																				
Sweden																				
Switzerland																				
UK																				
USA																				
UAE																				
Uzbekistan																				
Other																				

Frameworks and Incentives

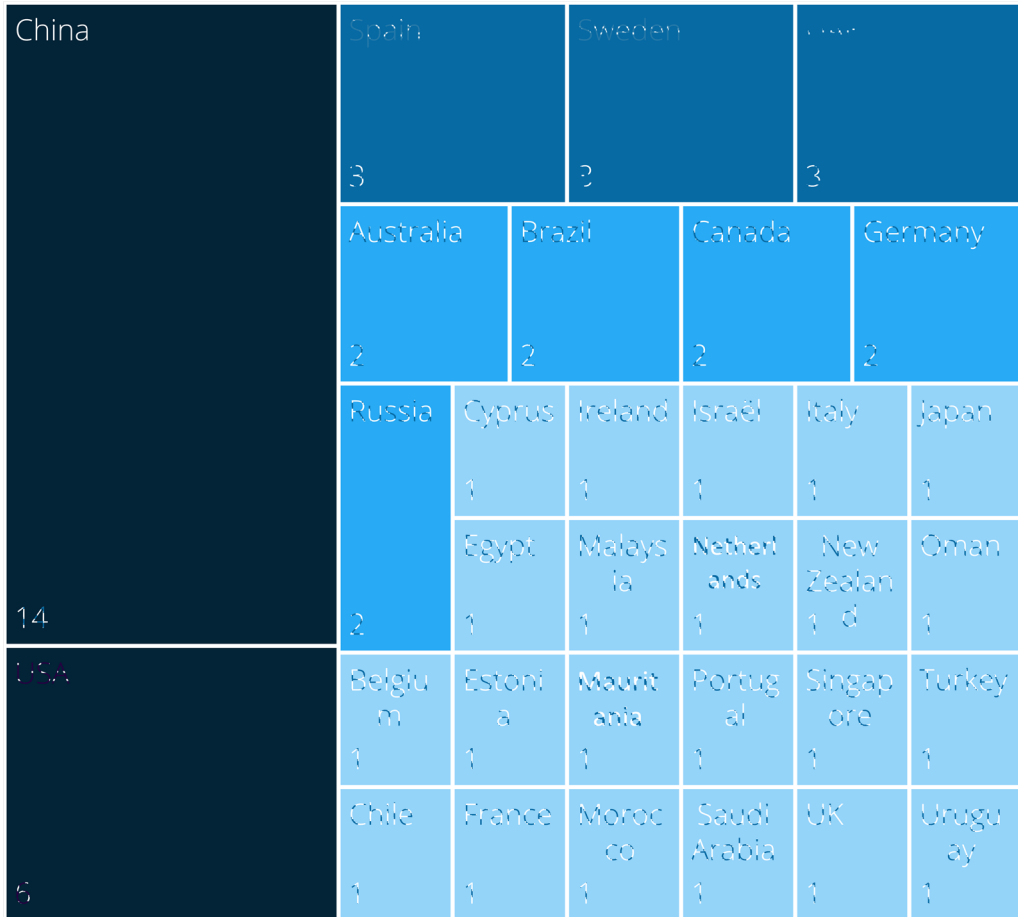
Recorded commitments for hydrogen as a % of primary energy generation



Strong national commitments of this nature, can be a strong indicator as to the trajectory of the industry.

Key Impact Areas

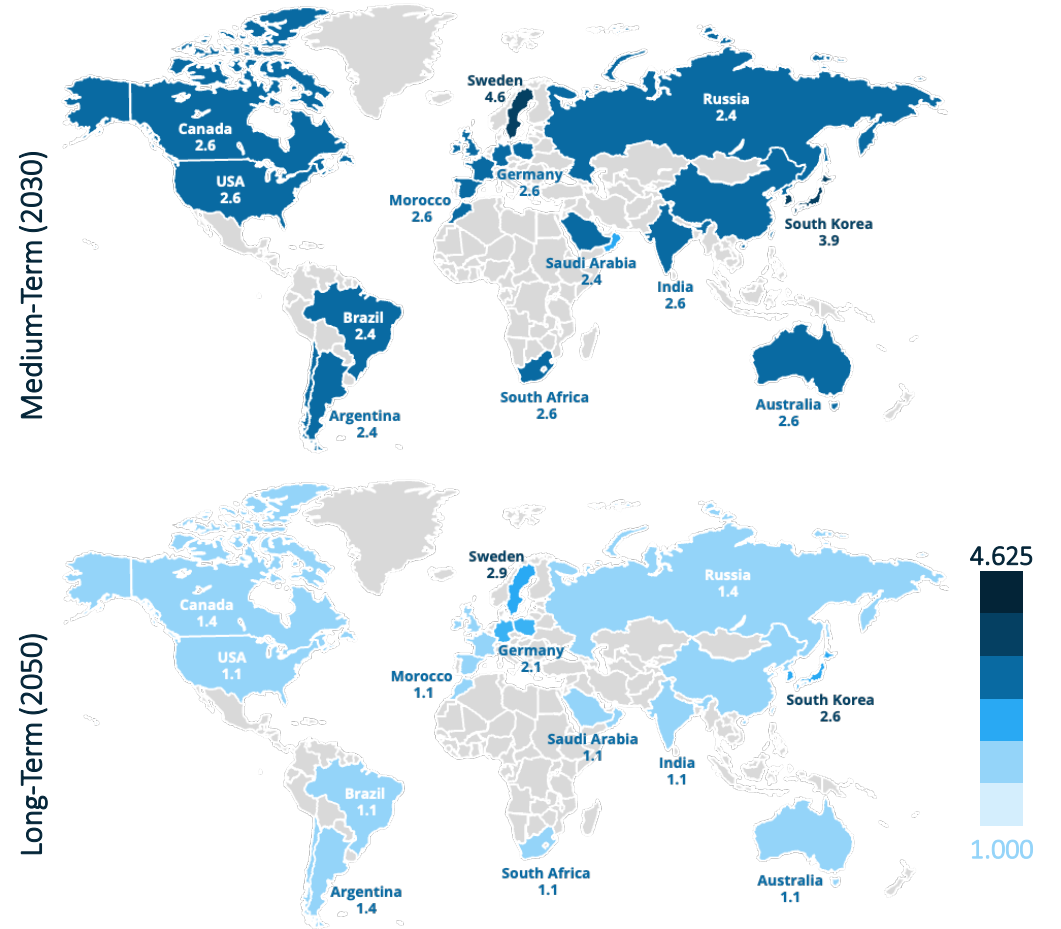
R&D Initiatives



Announced and Planned



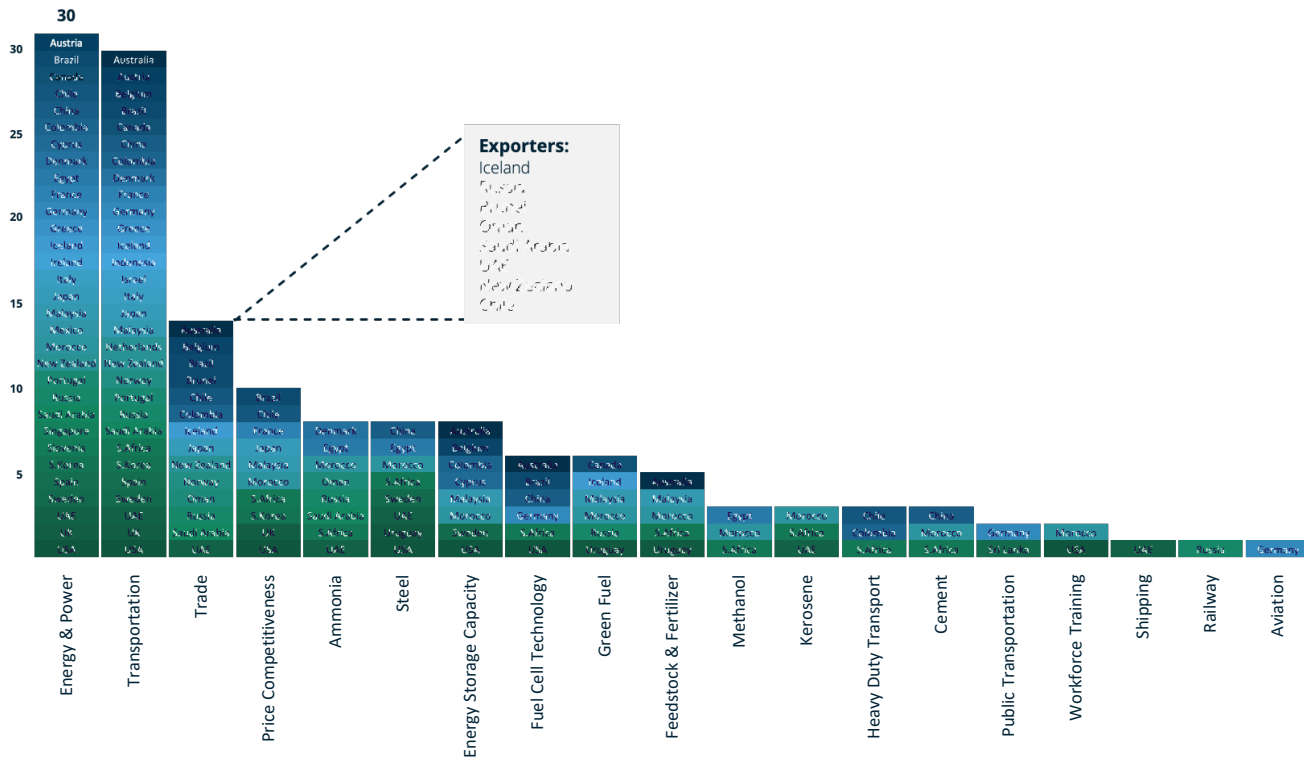
Cost evolution of green hydrogen production (in euros per kilogram)



Key Impact Areas

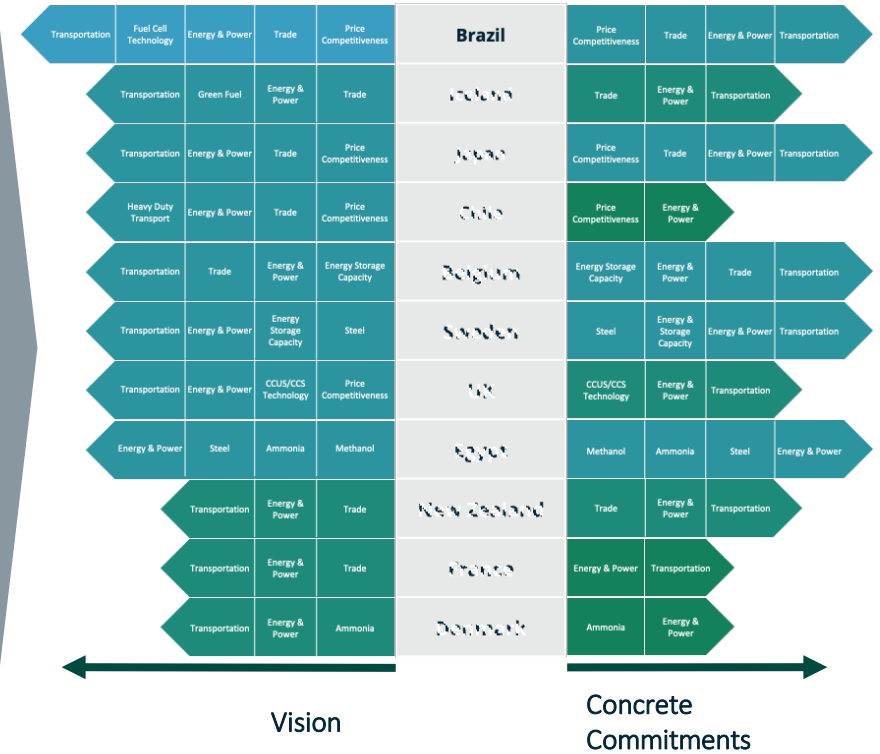
Sector Development

By Sector

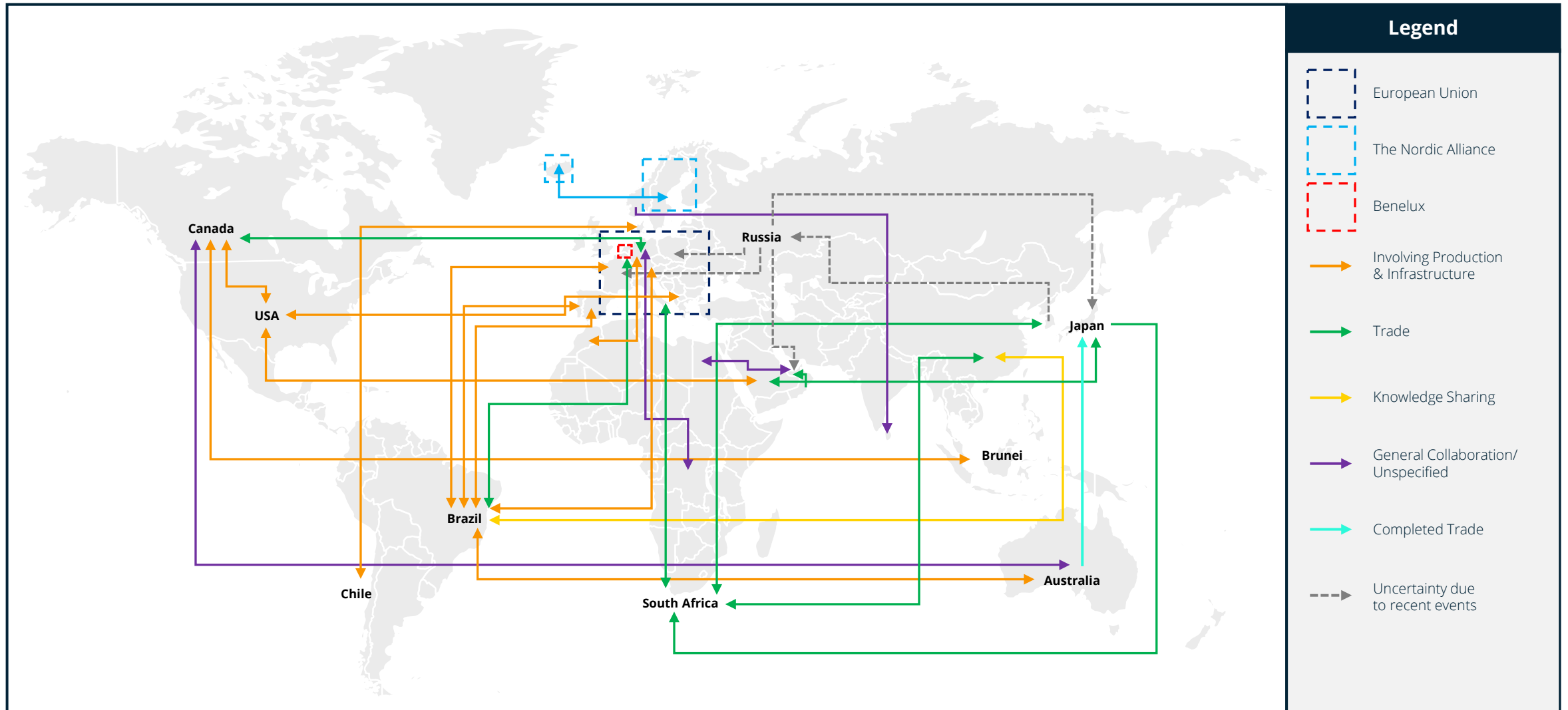


Deep-dive per Country

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Transcontinental Trades and Collaborations



Regional Profile - Europe

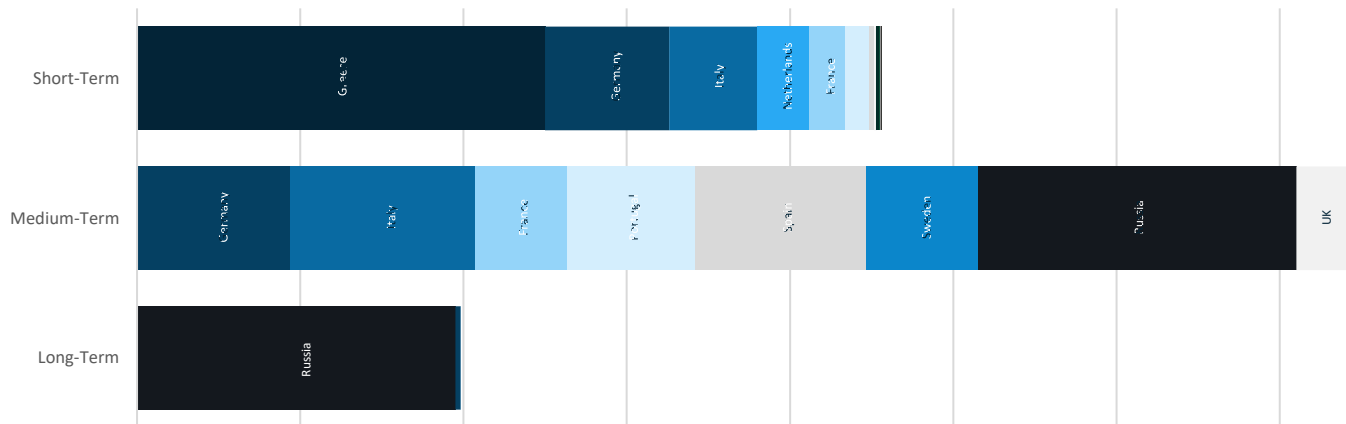
Framework

In 2019 the Helsinki Declaration set the Nordic region to become the World's most sustainable and integrated. In May 2021, the European Parliament passed a motion backing the use of low-carbon hydrogen made from fossil gas - as a bridge to 100% renewable production. These plans were further accelerated by the Russian invasion of Ukraine. Since the beginning of the humanitarian crisis, the EU has announced plans for a €300 million funding package for hydrogen as well as the Hydrogen Accelerator initiative from REPowerEU, to reduce dependency on Russia for various energy sources by 2030.

As it stands, Europe needs 54 Mn tons of hydrogen by 2030 to completely replace coal and gas. The continent is currently on track to produce 3 Mn tons of green hydrogen a year by 2030 but the REPowerEU sets new targets of 10 million tonnes of domestic renewable hydrogen production and 10 million tonnes of renewable hydrogen imports by 2030. The main sub-targets are industry (75%) and transport (5%).

Funding Committed in USD

Despite the very ambitious goals of Europe for the development of a Hydrogen economy, mobilization on a national level is still lacking and confirmed commitments are not up to the task yet. Much like the expected gross added value, funding commitments for the long term are still very unclear.



Milestones and Targets

	2030	2050
	\$300 Bn	\$1.1 Tr
		24% of total
	\$2.7 Trn	\$2.85 Trn
	\$1.3 Trn	\$1.8 Trn
	\$1.2 Trn	\$1.2 Trn

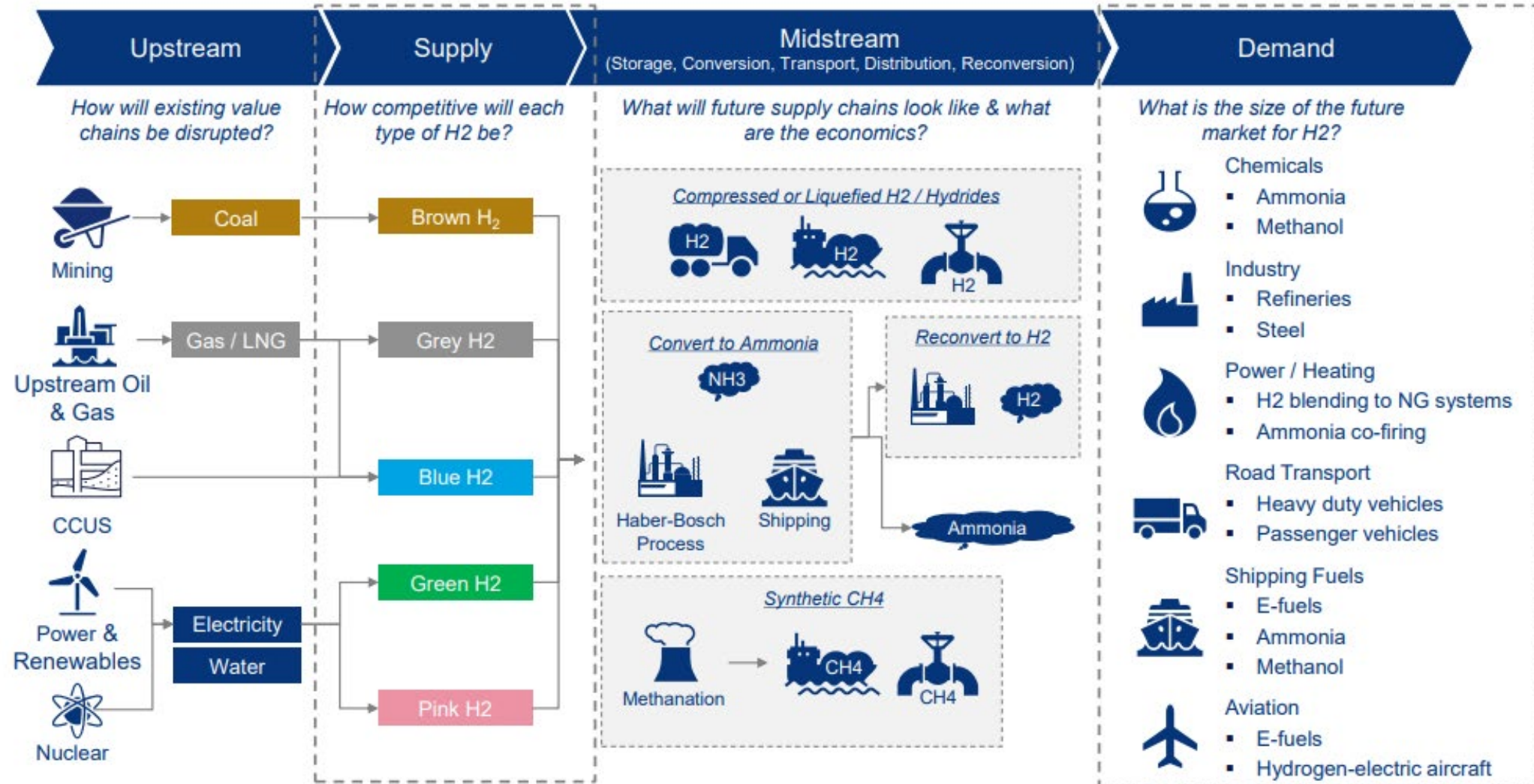
UK

The UK's hydrogen strategy has incited high activity and commitments announcements in the short term.

Further, compared to the countries, the UK's targets and announcements are well balanced and ambitious.

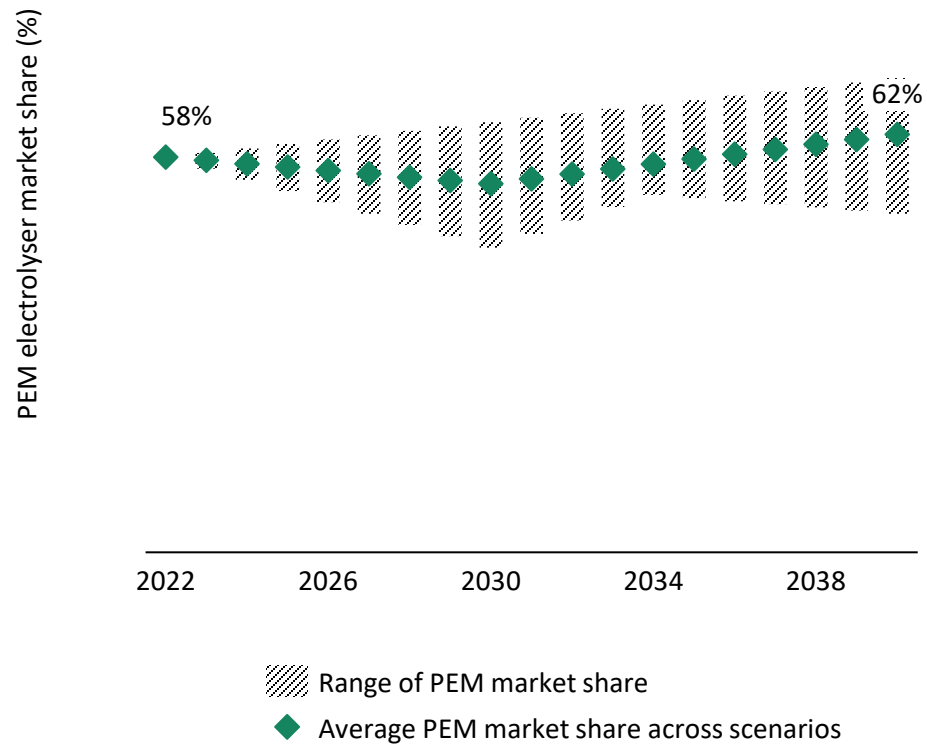
	Short-Term Up to 2024	Medium-Term by 2030	Long-Term By 2050
Electrolysis Capacity Target		30GW	37TWh
Cumulative Investments		GBP 4 Bn	£ 240 Mn for H2 And £ 120 Mn for FCEVS
Policy Support & Governance	First 10-point hydrogen map released in Nov. 2020 which the Environmental Audit Committee (EAC) urged to ramp up Government Publication on Decarbonizing by 2050 UK H2Mobility consortium		
Target Sectors	Transportation: <ul style="list-style-type: none"> • Launch the first UK hydrogen power car "Apricale" by UK start-up Viritech planned for 2023 • BRUNEL project in Darlington - £14.6 Mn for zero emissions hydrogen-fuelled engines • BMW UK BEV Oxford - £26.2 for electric batterie • CELERITAS project in Birmingham - £9.7 Mn for ultra-fast charging batteries • REEcorner in Nuneaton - £41.2 Mn to develop light and medium FCEVS • 65 Re-fuelling station planned to cover the early market Energy: Coupling one of the largest offshore wind farms in the world with the largest carbon emitting industrial zone in the UK (Gigastack)		Up to 1.6 Mn FCEVs including 4,000 hydrogen buses and 1,100 refuelling stations to cover all users 20-35% of the UK's primary energy could be hydrogen based by 2050
Infrastructure	Flagship renewable hydrogen project Gigastack-phase 2 outcomes indicate a 40% reduction in costs Over 20 electrolytic production projects planned and 9 CCUS enabled Production projects	Completion of the 100MW scale electrolyser system by 2025	
Contribution to the Economy		Nationwide: Up to 60,000 new jobs created by 2030 Gigastack project alone: £2.5Bn of gross value added and 1,700 jobs by 2030	Up to 250,000 new jobs by 2050 Gross value added £13 Bn by 2050
International	Qatar Energy and Shell agreement to pursue joint investments in Blue and Green H2 in the UK		
R&D	£2.5 Mn funding for R&D competition for Hydrogen Transports pilot in the Tees Valley Area Cadent, SGN and National Grid Gas Transmission developing a hydrogen program to concretize the net zero vision for London by 2030		

The Hydrogen Value Chain

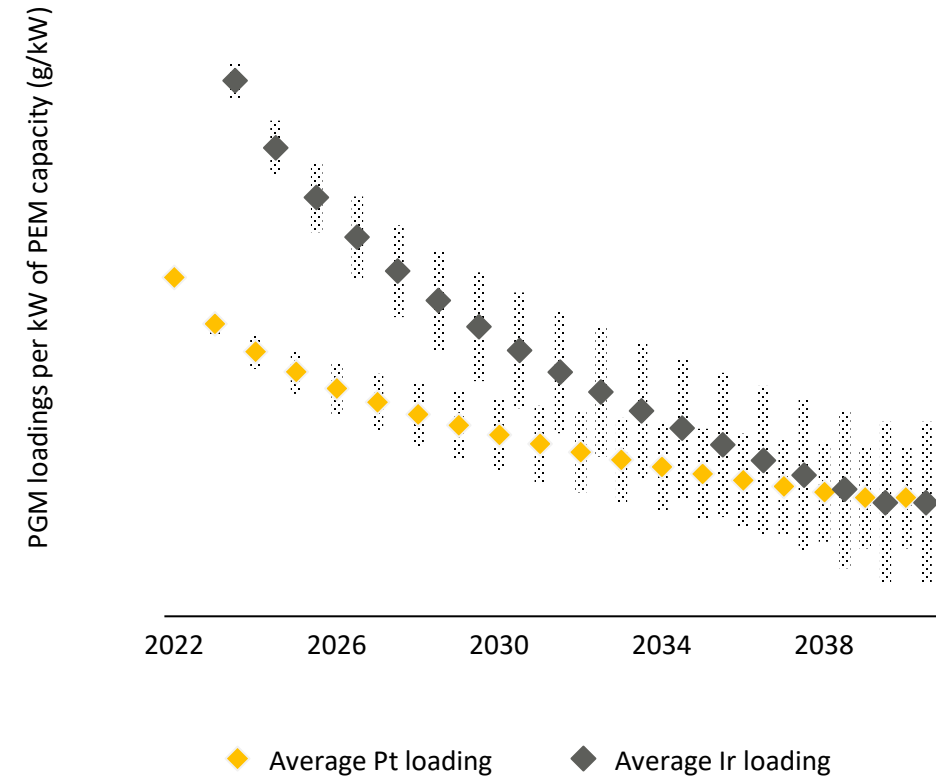


Electrolyser Split Scenarios & PGM Demand for PEMEL

PEM electrolyser market share scenarios

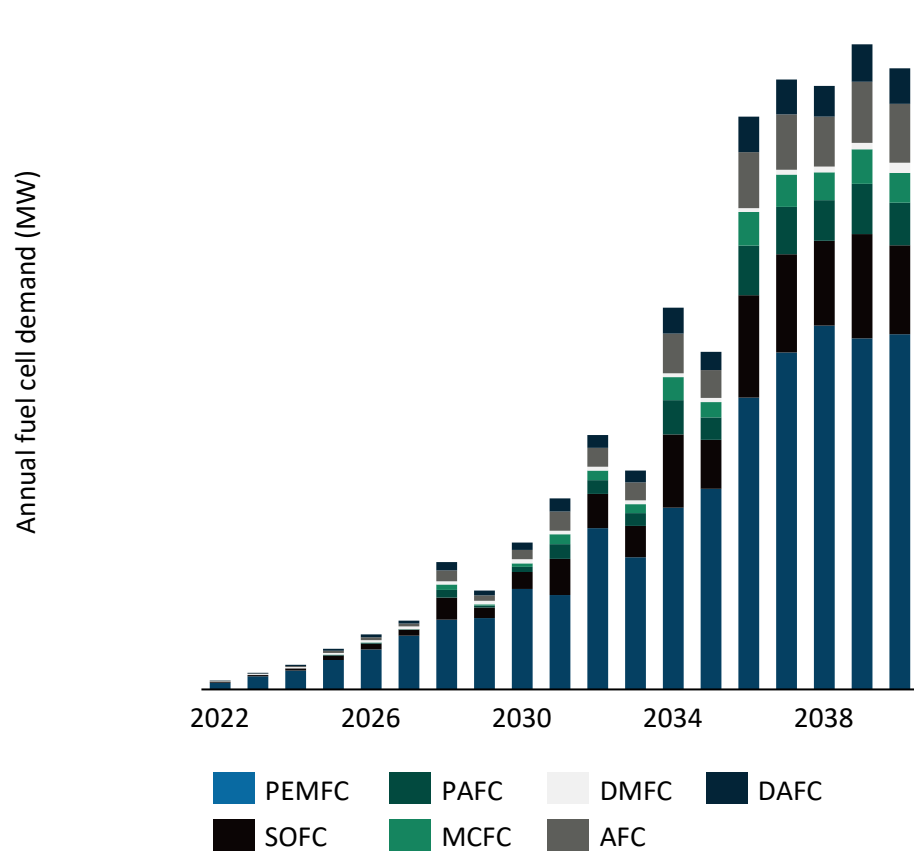


PGM loading for PEM electrolyser scenarios

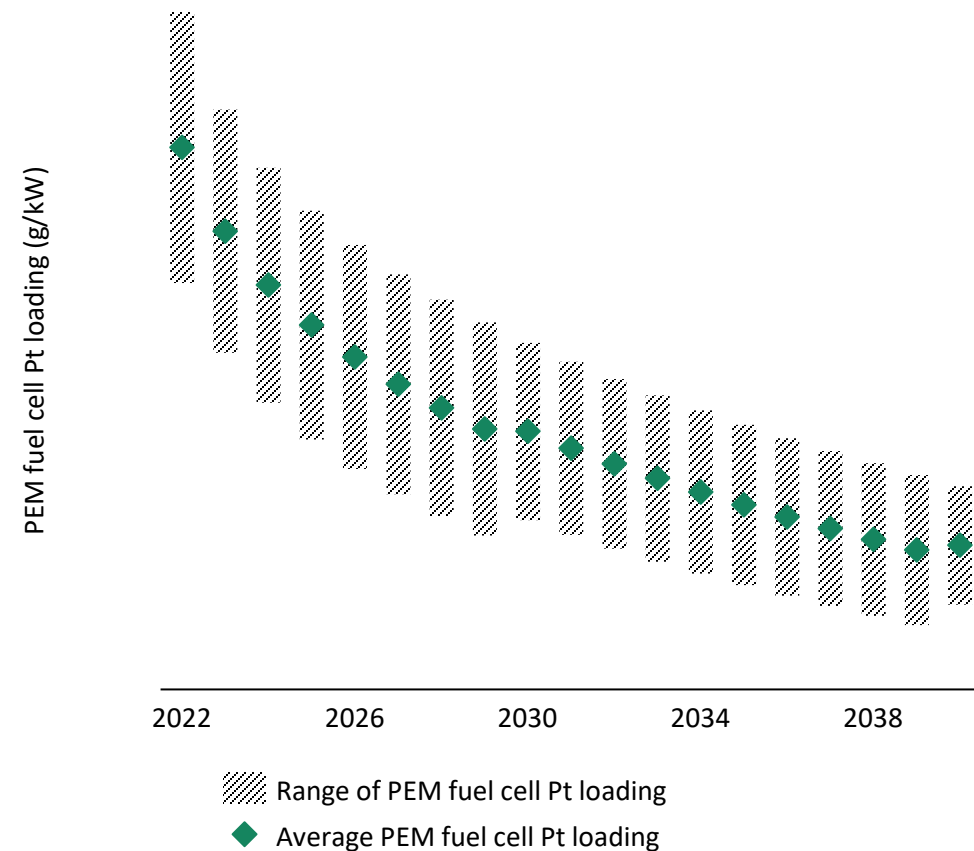


Fuel Cell Demand & PGM Loadings

Global fuel cell demand by fuel cell type*



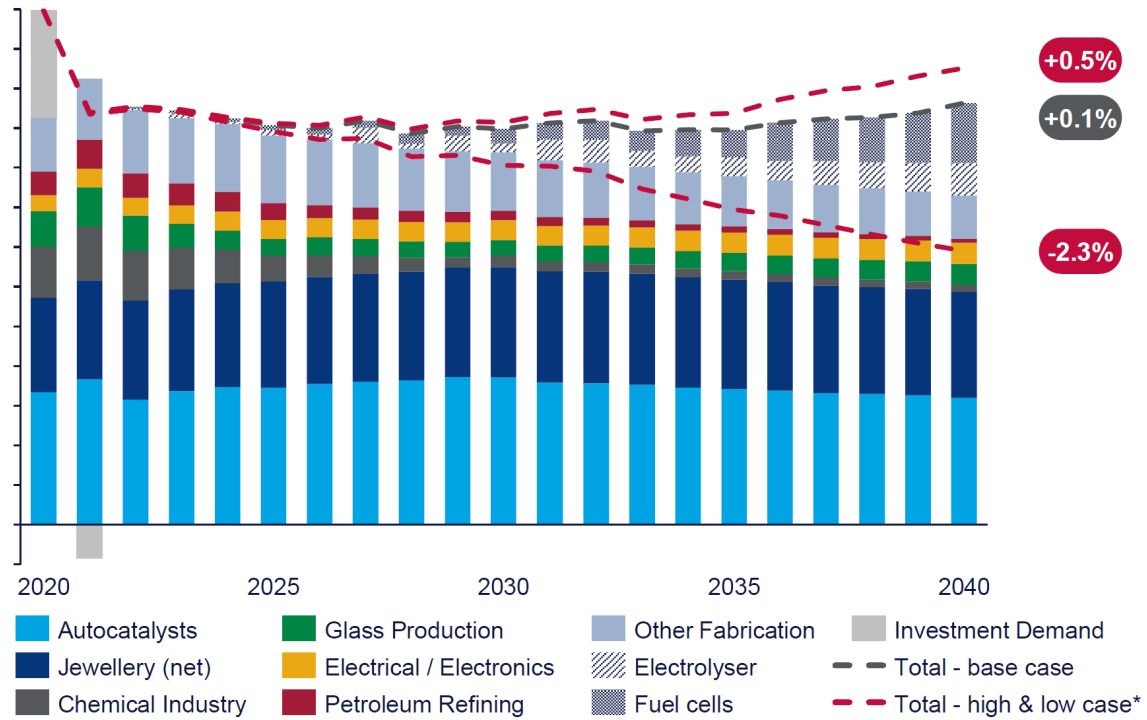
PGM loading for PEM fuel cell scenarios



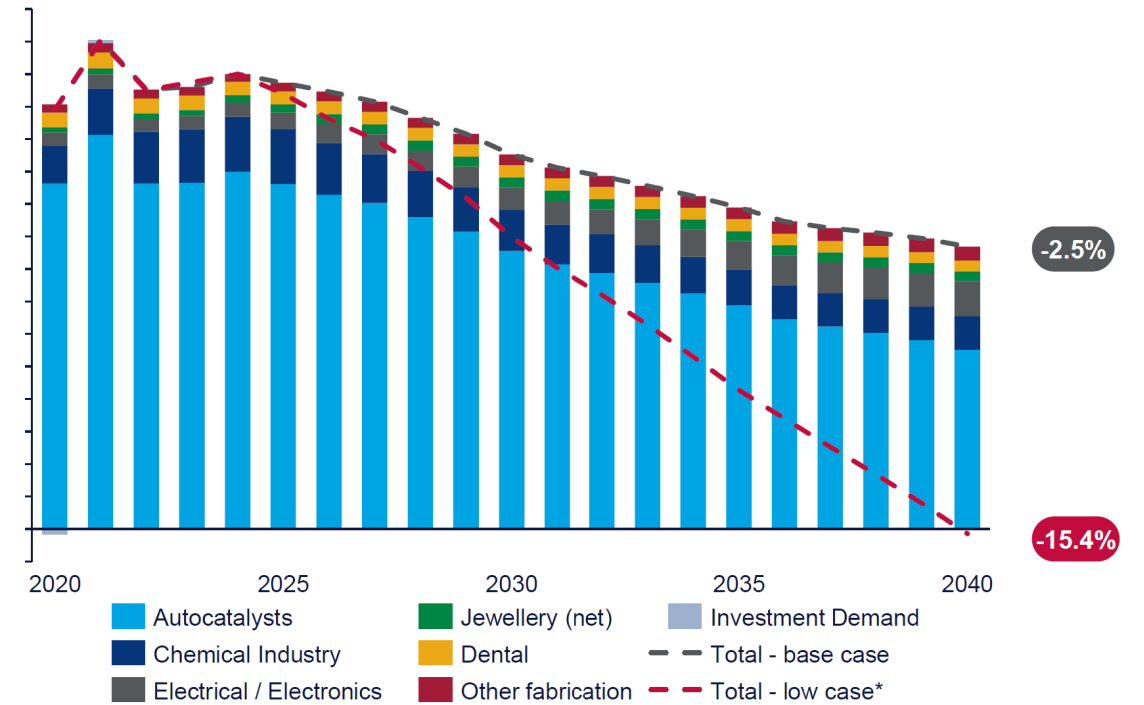
* **PEMFC** - Polymer electrolyte membrane (mostly used in transport applications, incl. other); **SOFC** - Solid oxide (mostly power); **PAFC** - Phosphoric acid (high temp, large scale, good for CHP); **MCFC** - Molten carbonate (high temp, large scale, good for CHP); **DMFC** - Direct methanol; **AFC** - Alkaline (high temp alkaline best suited for heating); **DAFC** - Direct ammonia (shipping & power)

Pt & Pd Market Outlook and the Influence of the Hydrogen Economy

Platinum Demand Outlook



Palladium Demand Outlook



Thank You

Q&A

November 2022

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