Baringa

The geopolitics of hydrogen – navigating the new world order

The increasing presence of hydrogen in global energy flows has the power to reshape geopolitical dynamics, energy policy and foreign affairs priorities.

In this report, our experts set out how the initial endowments of different geopolitical groups will shape their hydrogen strategy and competitive advantage.

Five key trends

01	02	03	04	05
The global energy map will be fundamentally changed with new geopolitical groupings influenced by a country's **natural resource availability, existing leverage, competitive advantage and relationships**.	**Existing energy superpowers diversify their commodities exports** to avoid being displaced by new players and to secure continued economic opportunities for their economies. They can count on leveraging their existing market advantage and resources.	**New energy exporters must act quickly to enter the growing market** and compete with existing exporters. This requires policy innovation, grid decarbonisation and major infrastructure investment.	Net energy importers' policy towards hydrogen emphasises **security of supply and diversification of imports**, with great associated infrastructure. Particular attention is given to decarbonisation costs to avoid deindustrialisation as a result of prolonged high energy prices.	Major economic and energy superpowers seek to increasingly **dominate the supply chain of hydrogen equipment and secure critical raw materials**, striving towards domestic energy security and new avenues of geopolitical influence.

The new geopolitical blocs of the hydrogen economy

Hydrogen has the potential to fundamentally reshape energy flows and geopolitical dynamics, establishing a new world energy order. New geopolitical blocs will emerge, defined by their hydrogen export potential, hydrogen demand potential and existing oil and gas skills and infrastructure.

- **Old world energy exporters** are current hydrocarbon exporters with widespread oil and gas infrastructure, expertise and various degrees of renewable resources. They can leverage those assets to produce, store and transport large hydrogen volumes.
- **New energy exporters** are countries with cheap, abundant renewable energy potential (e.g. solar, wind, hydro) and low domestic demand for hydrogen.
- **Energy importers** are countries that can become significant hydrogen demand hubs but, without means to produce sufficient hydrogen cheaply, are set to be net importers of hydrogen.
- **Mega economies** are countries with large domestic market with projected significant use of hydrogen in their economy and high production potential.

	High hydrogen export potential	High hydrogen demand potential[1]	Existing hydrocarbon exporter	Competitive advantage
Old world energy exporters	✓	✗	✓	**Oil & gas expertise and infrastructure**
New energy exporters	✓	✗	✗	**High renewable energy potential**
Energy importers	✗	✓	✗	**No export comparative advantage**
Mega economies	✓	✓	—[2]	**Scale**

1: defined by assessing a country's potential demand for hydrogen from national industry, heating and transport.
2: variable

Assessing hydrogen export potential

The ability to export energy commodities is the crucial parameter that impacts the geopolitical posture of the blocs.

Countries with a high potential to export large volumes of hydrogen are likely to have large amounts of specific natural resources or the possibility to leverage existing oil & gas infrastructure, low projected levelised costs of hydrogen and a favourable policy environment.

However, natural resources alone are not sufficient: ambitious hydrogen policy, targeted government support, enabling infrastructure and the economic environment of the country are crucial to incentivise the development of the hydrogen economy, especially in the growing market.

Selected criteria for a country's high hydrogen export potential

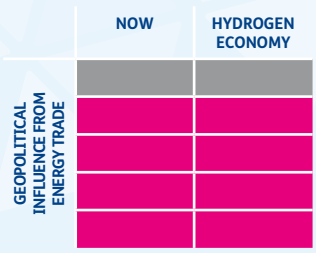
	Natural resources	Oil & gas infrastructure	Costs	Country profile	Policy environment	
Context	HIGH ⊕	EXISTING ⊕	LOW ⊕	ATTRACTIVE ⊕	FAVOURABLE ⊜	HIGH HYDROGEN EXPORT POTENTIAL
	Is there excess renewable energy generation once domestic demand has been accounted for? Is there enough water supply for green hydrogen production through electrolysis? Are there hydrocarbon reserves that can be leveraged for blue or gold hydrogen production?	Can existing refinery, export, transport infrastructure be leveraged (e.g. pipelines)? Can existing gas fields be leveraged for blue hydrogen production (e.g. for carbon storage)? Is there a skilled oil and gas workforce and supply chain?	What is the cost curve for hydrogen production? Is there plenty of potential storage (such as geological features and salt caverns available?	What is the economic environment? Are there well-connected trade routes?	Have there been hydrogen policy announcements? Do they outline concrete steps and provide the detail of support mechanisms? Are their hydrogen targets credible and durable (e.g. able to withstand political cycles)?	

Geopolitics of hydrogen

Countries within the same geopolitical bloc are likely to exhibit common strengths, weaknesses, and geopolitical strategic objectives. How different blocs act will vary according to the opportunities they want to achieve and the risks they're seeking to mitigate.

Geopolitical group	Example countries/ regions	Competitive advantage	Objective	Opportunity	Risk
Old world energy exporters	 QATAR  SAUDI ARABIA  RUSSIA	Oil and gas expertise and infrastructure	Diversification of exports	Attract hydrogen-intensive industries*	New producers and exporters competition
New Energy exporters	 MOROCCO  CHILE  SOUTH AFRICA	High renewable energy potential	Market entry	New domestic industry	Competition with incumbents and status of local infrstructure e.g. national power system
Energy importers	 EUROPE  JAPAN	No export competitive advantage	Security of supply	Accelerated decarbonisation and cost efficiency	De-industrialisation
Mega Economies	 UNITED STATES  CHINA  INDIA	Scale (economic and resources)	Energy independence	Influence over importers and supply chain dominance	Supply chain shocks

*: including industry with demand for hydrogen derivatives.

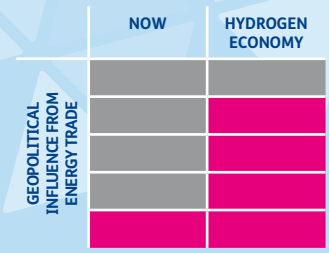


Focus: Old world energy exporters

The geopolitical approach of old world energy exporters is focused on maintaining global exporter status and geopolitical leverage while securing long-term opportunities for their economies. Countries in this bloc are positioning themselves to provide the world with energy exports throughout the energy transition, from continued hydrocarbon (fossil fuels) exports to hydrogen and its derivatives.

Objective: **Maintain export status**	Opportunity: **Attract industrialisation**	Risk: **New producers and exporters' competition**	Hydrogen strategy: **In parallel with oil and gas exports**	Policy recommendation: **Strategic partnerships**
Old world energy exporters are well placed to leverage their existing production, transport, storage and export legacy hydrocarbon infrastructure, in addition to a highly skilled oil and gas workforce, to produce hydrogen.	Access to cheap hydrogen, methanol and ammonia can attract heavy industries such as steel, or fertiliser production, and their associated downstream economies, which generate greater value-add than commodity exports.	Due to global demand for hydrocarbons continuing to increase, old-world energy exporters could hesitate towards diversification of energy exports. However, competitors which embrace hydrogen quicky will move sooner along the cost curve and secure market share, even locking it in for several years through long-term contracts.	In the short and medium-term, existing hydrocarbon exporters will likely approach hydrogen as a parallel industry to oil and gas activities. This enables them to test the market, maintain oil and gas revenues, develop hydrogen expertise and establish the supply chain.	Strategic partnerships with importers can strengthen trade relationships as exporters can offer continued hydrocarbon exports alongside a progressive switch to hydrogen in traded volumes. This is valued by importers as it can increase cost efficiency and security of supply as the transition unfolds.

Country	Hydrogen opportunity	GREEN HYDROGEN / BLUE HYDROGEN / GREY HYDROGEN
QATAR		Qatar is focussing on blue hydrogen production in the short-term (including a $1bn blue ammonia production plant) thanks to existing natural gas reserves and infrastructure. There is potential towards a mix of blue and green hydrogen in the long-term as its power sector decarbonises (Qatar has a target of 20% of its electricity being generated from renewable sources by 2030).
SAUDI ARABIA		Saudi Arabia has high potential for green hydrogen production thanks to renewables resources, high land availability for solar PV, and the government's commitment to generate at least 50% of its power from renewable sources by 2030. However, further efforts are needed in decarbonising the power grid. In the short-term, the focus is set to be on green hydrogen with co-located generation such as the NEOM project, with potential opportunities for gold hydrogen.
RUSSIA		Russia presents a case for grey hydrogen exports, with a potential switch to blue hydrogen in the long-term, should further carbon capture, utilisation and storage developments take place. However, any opportunities are dependent on the evolution of international sanctions and the return of a stable and internationally credible business environment.

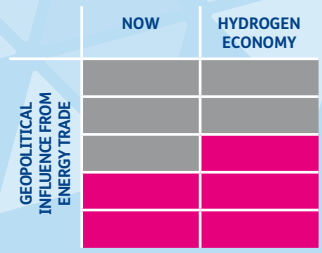


Focus: New energy exporters

The geopolitical approach of prospective energy exporters is focused on establishing themselves as trusted commercial partners and securing key relationships for future energy trade, increasing their geopolitical weight in a hydrogen economy. For example, Morocco has potential for hydrogen pipelines to Europe, while Chile for long range maritime transport locked in with long-term contracts.

Objective: **Market entry**	Opportunity: **New domestic industry**	Risk: **Competition with incumbents and status of national power system**	Hydrogen strategy: **Green focus**	Policy recommendation: **Whole system planning**
New energy exporters are most commonly countries with significant renewable energy potential capacity, with potential to produce large volumes of hydrogen at competitive costs. Domestic demand is also likely to be less than production, leading to large export volumes.	The access to renewable energy could sustain a new domestic industry, focused on the production and export of green hydrogen. This also presents significant spillover effect to the national economy, such as growth in adjacent industries and increase in employment.	Countries in this bloc must act decisively to create the regulatory, policy and economic environment needed to promote hydrogen uptake and secure investors' confidence. There are significant challenges: hydrocarbon reliance is common in the power sectors of Morocco and Chile, with South Africa currently experiencing system wide blackouts. Power sector decarbonisation has the potential to delay market entry for new players, leaving incumbents with first mover advantage.	New energy exporters' competitive advantage lies in green hydrogen production, thanks to high renewable energy potential. Costs need to be low enough to be competitive in instances where export infrastructure requires major investments and where distances to demand hubs are elevated.	Policies should incorporate principles of whole system planning as production subsidies alone are insufficient to stimulate export activities. Grid, transport, storage infrastructure and trained workforce play a crucial role, not least in promoting investor confidence.

Country	Hydrogen opportunity	GREEN HYDROGEN · BLUE HYDROGEN · GREY HYDROGEN
MOROCCO		Morrocco's national hydrogen strategy focuses on green hydrogen. By 2030, it forecasts a local hydrogen market of 4 TWh and an export market of 10 TWh. The latter is set to grow to 115TWh by 2050, aided by stricter global environmental regulations, the production and export of green hydrogen, green ammonia and synthetic fuels. However, significant efforts in power sector decarbonisation and increase in desalination capacity are needed. There is potential for pipelines to export hydrogen to Europe.
CHILE		Chile's hydrogen strategy is an ambitious policy centred around green hydrogen exports. By 2025, Chile targets 5 GW of renewable energy capacity dedicated specifically to electrolysis and Chile intends to produce 25GW of green hydrogen by 2030, and make the country one of the top three exporters of the fuel by 2040. Production costs are particularly important as the country is at relative disadvantage due to its distance from hydrogen demand hubs and will rely on hydrogen carriers for long range transport.
SOUTH AFRICA		The South African Hydrogen Society Roadmap (HSRM) is focused on green hydrogen and ammonia export through the development of hydrogen valleys. South Africa is developing partnerships with prospective import markets, with Germany agreeing to assist in developing markets, facilitating imports and linking producers with technology partners. Significant challenges remain for green hydrogen offtake in South Africa, such as further investment in renewable capacity and grid infrastructure.

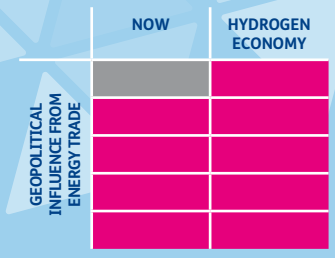


Focus: Energy importers

Energy importers are set to continue to face challenges around security of supply and availability, but they can exert some geopolitical leverage over their exporters, especially in co-dependency relationships. Moreover, because hydrogen production requires a conversion process (as opposed to an extraction one), importers can count on higher domestic production potential compared to hydrocarbons and a higher number of potential exporters, leading to higher geopolitical resilience.

Objective: **Security of supply**	Opportunity: **Accelerated decarbonisation and cost efficiency**	Risk: **Deindustrialisation**	Hydrogen strategy: **Demand**	Policy recommendation: **Flexibility & optionality**
Energy importers are likely to continue to face challenges related to supply security and availability. Connected importers (e.g. Europe) are likely to benefit from better commercial terms than islanded importers thanks to possible pipeline infrastructure or relative proximity to supply hubs.	This bloc aims to decarbonise in an optimal way from a cost perspective. A dual approach of increasing domestic production, while importing large volumes of hydrogen from low-cost producers, provides an accelerated decarbonisation pathway and could increase cost efficiency.	Should energy prices remain elevated for long periods of time, and should diversification of imports bring insufficient relief to price levels, net importers will see worsening domestic deindustrialisation as energy intensive industries offshore to regions with lower prices.	A demand-based approach enhances security of supply via diversification of imports and demand applications. This includes a focus on transport infrastructure, industry and R&D.	To hedge against technological uncertainty, demand, scalability and costs associated with different hydrogen carriers, importers' policy should incorporate principles of flexibility and optionality. For example, this may include developing import facilities for different carriers in key ports, or designing research and development subsidies to incentivise pilot projects across multiple technologies.

Country	Hydrogen opportunity	GREEN HYDROGEN · BLUE HYDROGEN · GREY HYDROGEN
EUROPE		The EU's hydrogen strategy aims to produce 10 million metric tons of renewable hydrogen, ammonia and other clean fuels annually by 2030, with 40GW of electrolysers installed. Moreover, the strategy aims to add another 10 million tonnes through imports and to invest in production, demand and use cases through the European Clean Hydrogen Alliance, and transport infrastructure through the European Hydrogen Backbone initiative.
JAPAN		Japan's strategy is centred on sourcing blue and green hydrogen from low-cost, stable producers globally, and transporting it back to Japan using a diverse array of energy carriers (e.g. ammonia, e-methane, liquid organic hydrogen carriers) on long range tankers. Moreover, the strategy set a goal of increasing hydrogen consumption to three million tonnes per year by 2030, and 20 million tonnes per year by 2050. On the supply side, Japan is set to invest $107 billion in hydrogen supply over the next 15 years and to boost production to 12 million tonnes a year by 2040.



Focus: Mega economies

Large domestically produced volumes of hydrogen carry potential for high geopolitical leverage if exported, with strong domestic demand offering partial mitigation against fluctuations in global demand. The hydrogen supply chain can also unlock new avenues of geopolitical influence.

Objective: Energy independence	Opportunity: New avenues of geopolitical influence	Risk: Supply chain shocks or bottlenecks	Hydrogen strategy: Domestic production & demand	Policy recommendation: Clusters
Maintaining or securing energy independence is a strategic objective for many but often it is large economies that have the relative scale needed to achieve it at competitive costs. Energy independence can insulate the domestic market against price shocks and security of supply risks.	Some mega economies might also seek to capture share of the manufacturing capacity of hydrogen equipment to secure potential leverage over third countries and increase resilience from supply chain shocks. For example, China is aiming to produce large quantities of electrolysers at competitive prices, seeking to mimic its dominance in the batteries and solar panel supply chain.	Especially in early stages, large economies might face challenges to secure the necessary equipment or resources needed to produce increasingly large quantities of hydrogen. Policies such as the Inflation Reduction Act tax credit for green hydrogen mean that the US may be seen as subsidising decarbonisation efforts in other geographies.	Hydrogen strategies of the mega economies are targeted at incentivising domestic production and stimulating domestic demand. There is potential for long-term export of supply chain components if they successfully develop a domestic industry.	Building partnership and industry momentum to incentivise the development of supply and demand hubs can mitigate risks for off takers and reduce costs. Network effects around hubs can also help create a credible, resilient supply chain which performs well, scales up and innovates.

Country	Hydrogen opportunity	GREEN HYDROGEN / BLUE HYDROGEN / GREY HYDROGEN
UNITED STATES		The US hydrogen strategy is focused on domestic production through the clean hydrogen production tax credit (up to $3/kg), which can be combined with renewable subsidies (2.6 cents/kWh). Domestic clean hydrogen production targets are set at: 10 million tonnes by 2030, 20 million by 2040 and 50 million by 2050. Funding for repurposing infrastructure is also available.
CHINA		By 2030, China expects to install 100 GW capacity of electrolysers to produce green hydrogen. China's demand focus is on transport first as it's targeting to bring 50000 hydrogen fuel-cell vehicles on the road by 2025, followed by industrial applications. Moreover, China is rapidly developing its manufacturing capacity for hydrogen equipment, such as electrolysers. China also has significant curtailed wind in Xinjiang, Inner Mongolia, and Gansu regions which could be exploited for green hydrogen production.
INDIA		India's strategy is centred around green hydrogen production and export, with 5 MMT production capacity of green hydrogen by 2030, with an associated 15 GW of electrolysis capacity, and $2.2b incentive for green hydrogen production. India is also aiming to decarbonise its power sectors and it is targeting 500 GW of renewable energy capacity by 2030.

In summary ...

How different geopolitical groups approach hydrogen depends on their initial endowments. Their advantage stems from natural resource availability, existing infrastructure and workforce, location and existing relationships. Their hydrogen strategy will reflect all of the above and will need to consider the opportunities and risks associated with the hydrogen transition. What is clear is that an increasing presence of hydrogen in global energy flows has the power to reshape geopolitical dynamics, energy policy and foreign affairs priorities.

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