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Policy Paper

Hydrogen without Illusions: MENA, China, and the New Geopolitics of Energy Corridors

By Frank Tetzel

Executive Summary

The global hydrogen market has crossed a decisive threshold. What for years was treated as a technological promise has, by 2025 and 2026, become a real and highly competitive industrial system. Yet, this system does not follow the classic patterns of global commodity markets. Hydrogen is not moving toward a unified global market with transparent prices and broad fungibility. It is taking shape through physical and politically defined corridors that link production, transport and demand.

At the centre of this emerging architecture stands the Middle East and North Africa (MENA) region. With investment commitments exceeding $150 US dollars and structurally lower production costs than Europe, MENA has become the key supply region. At the same time, China, as an industrial system provider, is shaping the technological and economic foundations of this development, while Europe is increasingly assuming the role of a highly regulated but structurally dependent demand market.

The escalation of the conflict with Iran in 2026 has further accelerated this shift while also exposing its fragility. The disruption of key maritime routes, particularly the Strait of Hormuz, has demonstrated that hydrogen is not insulated from geopolitical risk, but is deeply embedded within it.

This paper analyses the various hydrogen strategies emerging across the MENA region, China's role as a systemic actor, and the consequences for Europe. It demonstrates that decarbonisation has evolved into a matter of industrial power.

1. The global hydrogen market: From promise to reality

The period between 2023 and 2025 marked a phase of adjustment in the global hydrogen market. Delays in project development, rising financing costs, and regulatory uncertainty tempered earlier expectations. This should not be interpreted as a failure, but as a transition from politically driven narratives to industrial reality.

The underlying dynamics remain strong. Globally, more than $110 billion has been committed to hydrogen, alongside off-take agreements covering over four million tonnes through 2030. At the same time, there is a clear geographical asymmetry. Production costs in China are around $3.21 per kilogramme, compared to nearly $8 in Germany. This difference is not only driven by energy prices, but also reflects structural differences in infrastructure, regulation, and industrial organisation.

As a result, the market is not developing uniformly. It is taking shape through regional clusters. In China, Saudi Arabia, and parts of Scandinavia, a phase of industrial scaling has already been reached. Other regions are still in the early stages of development.

2. From market to corridor: the new logic of hydrogen

The decisive structural change in the hydrogen system is that a globally integrated market is not emerging. Unlike oil or LNG, hydrogen will not become a freely available, globally interchangeable commodity with liquid spot markets and uniform reference prices. Instead, it is developing along physical, infrastructure- bound corridors shaped by long-term contractual relationships and political decisions. This is not a temporary phenomenon, but a reflection of the molecule's technical and economic characteristics.

Hydrogen is difficult and costly to transport. Its low volumetric energy density, along with the need for liquefaction, conversion, or compression, means that value is generated not solely at the point of production, but across the entire chain. Production, transport, storage, and use are tightly interconnected. Markets do not emerge in abstraction, but where these elements align and function together.

This is why hydrogen systems take the form of corridors. A corridor is not a single infrastructure project, but a spatially and functionally defined structure linking

multiple elements. It begins with a production cluster, where renewable energy is available at scale and electrolysis can operate efficiently. This is followed by conversion facilities, where hydrogen is processed into transportable derivatives such as ammonia, methanol, or synthetic fuels. Transport infrastructure follows, either in the form of specialised shipping routes or, in the future, via pipelines. At the end of the corridor are industrial consumers who use hydrogen not as a universal energy carrier, but in specific applications such as in the chemical industry, steel production, and maritime transport.

These elements cannot develop independently. Electrolyser requires guaranteed demand. Ports will not invest in ammonia terminals if no supply flows are foreseeable. An industrial company will not convert its processes if long-term supply is not guaranteed. As a result, the hydrogen market does not emerge through price signals alone, but through the coordination of investments across the entire value chain. This coordination is typically secured through long-term off-take agreements, government guarantees, and strategic partnerships.

In this system, traditional market mechanisms lose relevance. There is no global arbitrage to balance price differences. Prices, instead, reflect specific corridors, shaped by production costs, transport routes, and regulatory frameworks. The price of hydrogen in Europe is not determined by a global equilibrium, but by the cost structure of a specific corridor, such as between Oman and the Netherlands or between Morocco and Spain. Price formation thus becomes an infrastructure-dependent phenomenon.

This development has far-reaching geopolitical implications. Corridors are not merely economic structures, but also instruments of political control. Control over a corridor means control over flows, pricing conditions, contractual access, and, in extreme cases, the ability to disrupt supply. The transition from a market-based to a corridor-based economy, therefore, signifies a shift from competition towards strategic control of infrastructure and relationships.

Compared to fossil fuels, this creates a new form of dependency. Oil is globally traded and relatively substitutable. Hydrogen, by contrast,binds producers and consumers into more rigid, infrastructure-based relationships. Once established, these corridors create path dependencies that can only be altered at great cost. This path dependency is not only technical, but also political. It creates long-term relationships similar to traditional energy partnerships, but more institutionalised and less flexible.

Within this emerging system, the MENA region gains strategic centrality. Its geographical location between Europe, Asia, and Africa makes it a natural hub for

potential corridors. At the same time, the region possesses several structural advantages that are crucial for the development of such systems. These include very low costs for renewable energy, large areas available for industrial projects, existing export infrastructure, and extensive experience in managing large-scale energy exports.

This combination enables MENA to act not only as a production hub, but also as the architectural framework for the entire system. From here, both maritime corridors to Europe and Asia, as well as potential pipeline connections to the Mediterranean, can be developed. Projects such as the planned Duqm-Amsterdam corridor, Morocco's integration into European energy systems, and pipeline initiatives such as the SoutH2 Corridor show that this development is already taking concrete shape.

At the same time, this central role comes with risks. The geography that positions MENA as a hub is also tied to geopolitical tension. The Strait of Hormuz, the Red Sea, and the Suez Canal are not only trade routes, but also potential conflict zones. The events of 2026 have shown how quickly these vulnerabilities can materialise. This makes it clear that the hydrogen corridor economy not only enables efficiency gains but also creates new exposure.

Ultimately, the logic of hydrogen lies not in globalisation, but in the regional structuring of energy flows. Markets are replaced by infrastructure, competition by interdependence, and short-term transactions by long-term commitments. In this system, what matters is not only the ability to produce, but the ability to build, secure, and control stable corridors.

3. Oman: The geostrategic architect of a maritime hydrogen system

Within the emerging hydrogen order, Oman plays a role whose full significance becomes apparent only on second glance. Whilst many strategies in the Global South, as well as in Europe, remain strongly influenced by technological narratives or political objectives, Oman is pursuing a notably pragmatic approach. It is neither primarily technology-driven nor symbolic, but conceived in systemic terms. The focus is not on how much hydrogen can be produced, but on the conditions under which it becomes a tradable and deliverable commodity.

This is where the architecture of the Omani model becomes clear. The Hydrom platform functions not merely as a coordination centre, but as the central orchestrator of a fully integrated industrial system. The allocation of project sites in Duqm and Dhofar does not take place in isolation, but within clearly defined development clusters, in which energy generation, electrolysis, processing, and export logistics are designed together from the outset. This directly addresses one of

the core challenges of the global hydrogen market: the lack of synchronisation along the value chain.

The choice of locations is by no means random. Duqm is more than just a port. It is a strategically planned industrial complex with direct access to the Arabian Sea, outside the Strait of Hormuz chokepoint. This location is of central importance in the current geopolitical context. Whilst a significant proportion of global energy exports passes through the Strait of Hormuz, Duqm allows hydrogen derivatives to be shipped directly to open sea, avoiding this chokepoint. In doing so, Oman reduces a key systemic risk, as demonstrated during the Iran conflict in 2026.

At the same time, this advantage is relative. Geographically, Oman remains within the immediate sphere of influence of the Persian Gulf. The security of maritime routes in the Arabian Sea and the Indian Ocean remains closely tied to the regional security environment. Oman cannot eliminate this risk, but it can mitigate and diversify it. This is precisely where it differs from the more exposed export models.

A second key component of Oman's strategy is the deliberate avoidance of technological lock-in. Whilst many European strategies focus heavily on specific carrier substances or applications, Oman allows developers considerable flexibility. Ammonia, methanol and potentially liquid hydrogen are all envisaged. This openness reflects a clear understanding of market dynamics. In a system where both transport modes and end-use applications remain uncertain, technological neutrality creates a decisive competitive advantage.

This flexibility also has a strategic dimension. It allows Oman to avoid dependence on a single market. Whilst pipeline-based models tend to lock producers into specific destinations, a maritime approach enables broader reach. Oman can supply both European and Asian markets, thereby diversifying demand risk. This capacity is a central component of Oman's risk strategy.

The core of Oman's position, however, lies in developing specific corridors. The planned Duqm-Amsterdam corridor is particularly significant. It is not merely an infrastructure project, but an attempt to redefine the entire logic of hydrogen trade. Unlike other initiatives that focus on individual elements of the value chain, this corridor aims for full integration. Production, conversion, transport, unloading, and industrial use are conceived as a single system.

This systemic approach also reshapes the role of the stakeholders involved. Oman is no longer merely a producer, nor Europe merely a consumer. Both sides become part of a shared system whose functionality depends on the stability of all its

components. The corridor thus creates a form of interdependence that goes beyond traditional trade relations.

At the same time, this highlights one of the key challenges of the Omani model. Whilst infrastructure and project development are well advanced, demand remains less clearly secured. There is still a limited number of publicly visible, long-term off-take agreements that would guarantee economic viability. This is not unique to Oman, but reflects a broader structural feature of the global hydrogen market. Nevertheless, addressing this gap will be crucial in the next phase.

A clear contrast emerges with Saudi Arabia. Whilst Saudi Arabia has already established concrete off-take agreements through projects such as NEOM, achieving greater short-term planning certainty, Oman is focusing more on building the enabling infrastructure. It is investing in the structure of a future market, rather than prioritising immediate monetisation.

This strategic orientation takes on additional significance against the backdrop of current geopolitical developments. The Iran conflict has exposed not only the vulnerability of existing energy flows but also the importance of system resilience. In this context, Oman's approach can be seen as an attempt to design a system that is not only efficient, but also structurally robust from the outset.

At the same time, Oman remains part of a larger geopolitical framework beyond its control. The stability of maritime trade routes, regional conflict dynamics, and global demand trends will ultimately shape the success of its model. Oman can design the system, but not the environment in which it functions.

Overall, Oman can be described as a state that approaches hydrogen not as a production competition, but as a question of system architecture. It is not about being the largest producer, but about creating the conditions under which production, transport, and demand can align. In a system where hydrogen is developing not as a global market but as a network of corridors, this capability may become a decisive competitive advantage.

Digression: Oman, the RFNBO, and the European Union's credibility problem

Oman is not only a geostrategically relevant location for green hydrogen, but also a revealing test case for the external trade impact of European regulation. Hardly any other potential exporting country in the MENA region has aligned its hydrogen strategy so visibly with the requirements of the European Union as Oman. For projects targeting the European market, this is not a technical detail,

but a cornerstone of the investment rationale. Anyone wishing to export to the EU must supply hydrogen that is recognised under European rules as RFNBO, i.e., as a renewable fuel of non-biogenic origin. This is precisely where a broader issue emerges: the EU has created a highly complex regulatory framework, while already debating its future flexibility. This affects not only certification issues, but also concerns about Europe's credibility as a reliable regulatory partner.

At the heart of the RFNBO regulatory framework is Delegated Regulation (EU) 2023/1184. It sets out the conditions under which electricity-based hydrogen is considered renewable. Key principles include additionality – i.e., the requirement to link hydrogen production to new renewable electricity – as well as geographical and temporal correlation between electricity generation and electrolysis. Until the end of 2029, a monthly allocation is generally sufficient; from 2030, a stricter hourly correlation is expected. These rules apply not only within the EU, but also to third countries exporting into the European market. Oman has structured its project development early on in such a way that these very requirements were taken into account. This effectively made the country a showcase for EU-compatible export architecture.

This is why the current debate in Europe is so sensitive. Since 2025, industrial actors have pushed for a relaxation or at least earlier review of RFNBO criteria, especially regarding strict electricity sourcing rules that may increase costs and limit plant utilisation. At the same time, the European Commission has begun to broaden the scope of its hydrogen policy, for instance by giving greater consideration to low-carbon hydrogen in policy and funding decisions. While this does not formally dismantle the RFNBO framework, it sends a clear political signal: Europe itself is shaking up a framework that it previously presented to partner countries as reliable and forward-looking.

For Oman, it creates a structural risk. The Sultanate has based its hydrogen strategy not only on affordable renewable resources and maritime corridors, but also on the assumption that Europe would be a predictable premium market for compliant green hydrogen. However, if regulatory conditions become uncertain or shift over time, producers may bear higher costs of stricter regulation without assurance that these will be rewarded in the market in the long term. The Omani Minister of Energy has already voiced this concern publicly: investors need clear, stable standards over several years so that final investment decisions can be made at all.

The EU's credibility problem has three dimensions. Economically, there is a risk that early projects will have had to calculate under stricter conditions than later competitors if the rules are relaxed. In terms of foreign trade, the EU's reliability as

a long-term partner is called into question. Geopolitically, Europe risks pushing its most closely aligned partners towards diversification. For Oman, this means that the less predictable Europe appears as a regulatory end market, the stronger the incentive to shift its export strategy towards Asia, flexible derivatives, or corridors that are not exclusively European.

Conclusion: Oman serves as a prime example of how closely hydrogen projects in third countries are now intertwined with European regulation. Precisely because the country has aligned itself relatively closely with EU standards, it highlights the risks of regulatory inconsistency. The real danger for Europe, therefore, lies not only in a slower market development, but in a loss of trust. If even highly compliant partners can no longer be certain that the EU will stick to its own guidelines, this weakens Europe's position as a standard-setting regulatory power in the emerging global hydrogen system.

4. Saudi Arabia: NEOM between industrial reality and geopolitical projection

Saudi Arabia is pursuing a strategy within the global hydrogen system that differs fundamentally from Oman's. Whereas Oman approaches the market from the perspective of corridors, infrastructure, and flexibility, Saudi Arabia focuses on scale, state control, and industrial visibility**.** Here, hydrogen is not primarily treated as a commodity but as a strategic instrument to extend the country's role in energy policy in a post-fossil fuel world.

At the centre of this strategy lies the NEOM project. It is more than an energy project; it is a politically charged symbol of the Kingdom's transformation under Vision 2030. In technical terms, NEOM combines key elements of the hydrogen value chain: large-scale renewable power generation, electrolysis capacity, and conversion into ammonia as a transportable energy carrier. With planned production of around 650 tonnes per day, it ranks among the largest projects of its kind worldwide.

A key distinction from many other projects lies in demand security. Air Products serves as a long-term off-taker, purchasing the entire output and marketing it globally. This contractual structure addresses one of the central challenges of the hydrogen market: the mismatch between supply and demand. In this respect, NEOM is not a speculative project, but a commercially structured system with a defined customer base.

At the same time, this strength should not obscure its dependence on external factors. The project's economic viability is closely linked to the development of global

demand. There must be sufficient demand for hydrogen and its derivatives at prices that justify the substantial investment costs. This, in turn, depends on the pace of decarbonisation in Europe and Asia, as well as on political support mechanisms.

A second critical factor is price trends. Whilst Saudi Arabia generally has a competitive advantage due to low renewable energy costs, it remains unclear to what extent this advantage is reflected in actual market prices. Transport costs, conversion losses, and infrastructure investments offset part of this advantage. Pricing is therefore determined not only at the point of production, but across the entire corridor.

The third and increasingly decisive factor is the stability of the transport routes. It is precisely here that the Saudi model's greatest vulnerability lies. The Kingdom's export strategy depends heavily on maritime routes through the Red Sea and the Persian Gulf. Both regions are not only key trade routes but also geopolitical flashpoints.

The Iran conflict in March 2026 exposed this vulnerability. The temporary blockade of the Strait of Hormuz and the disruption of shipping traffic demonstrated how quickly physical energy flows can be interrupted. While such risks are well known in fossil fuel markets, they are even more critical in hydrogen markets. Unlike oil, hydrogen lacks established global supply chains that would allow for rapid rerouting. Its export model is highly dependent on specific infrastructure routes. When these routes are disrupted, alternatives are limited, costly, and slow.

In this context, the discussion about alternative corridors is gaining in importance. The India-Middle East-Europe Economic Corridor (IMEC) was conceived as a strategic response to precisely these risks. By linking ports, rail, and digital infrastructure, it aims to create a new trade axis between the Indian Ocean and Europe, bypassing existing bottlenecks. Hydrogen and its derivatives were intended to be an integral part of this system.

However, the Iran conflict raises fundamental questions regarding the feasibility of this corridor. IMEC requires a stable security environment, particularly in relations between the Gulf states, Israel, and the participating transit countries. The current escalation, however, highlights the fragility of these conditions. Without a robust security architecture, IMEC remains a concept whose realisation depends on political developments beyond the control of the economic actors involved.

This reveals a structural tension that extends beyond Saudi Arabia. The strategy of maximum scaling presupposes that the quantities produced can be reliably transported to global markets. At the same time, it is precisely these transport routes

that are the most vulnerable elements of the system. The economic logic of scale collides with the geopolitical reality of fragmented and unstable trade areas.

Against this backdrop, NEOM can also be understood as a project of geopolitical projection. It signals technological ambition, industrial scale, and a willingness to play a central role in the global hydrogen market. At the same time, this projection partly obscures the structural risks associated with such a model. The core challenge lies not in production but in securing the entire value chain amid political uncertainty.

Nevertheless, Saudi Arabia remains an indispensable actor in the emerging hydrogen system. No other country in the MENA region combines capital availability, state coordination, and scaling capacity to the same extent. The Kingdom is able to realise projects that would fail in other regions due to financing or coordination problems.

At the same time, the analysis of NEOM shows that size alone is no guarantee of stability. The future of the project will be decided not only in Saudi Arabia, but along the corridors that connect its products to global markets. In a system defined by infrastructure and routes, control over connections is as important as control over production itself.

Saudi Arabia therefore represents a strategy built on maximum industrial presence, yet whose success depends to a large extent on factors that can only be controlled to a limited extent at the national level. This is the core of NEOM's ambivalence: it is simultaneously one of the most advanced and one of the most fragile projects in the global hydrogen landscape.

5. Israel: Selective Hydrogen in a Corridor-Dominated System

Compared with the large-scale hydrogen strategies emerging across the MENA region, Israel occupies a structurally different position. Oman is building integrated export corridors, Saudi Arabia is scaling industrial production through NEOM, Egypt is embedding hydrogen into the Suez-centered industrial system, and Morocco is stabilizing its strategy through domestic demand while remaining export-capable. Across all these cases, hydrogen is conceived as part of a corridor-based energy order, in which production, transport, and demand are tightly coupled and geographically structured.

Israel does not compete within this logic. It does not aim to become a large-scale exporter, nor to anchor transnational hydrogen corridors. Instead, its strategy reflects a different starting point: limited land availability, constrained renewable expansion, and a security-sensitive energy system. Hydrogen is therefore not treated as a central

pillar of a future export economy, but as a selective, functional instrument within a broader energy and resilience strategy.

This difference is most evident in how hydrogen is conceptualized. While many MENA countries define hydrogen primarily as a scalable commodity for international markets, Israel approaches it from the demand side. The focus lies on sectors where electrification reaches its limits, particularly heavy transport, certain industrial processes, and long-duration energy storage. Hydrogen is thus not imagined as a volume to be produced and exported, but as a problem-solving molecule integrated into specific applications.

This demand-driven approach also explains Israel's technological openness. Unlike the strongly green-hydrogen-focused narratives in Europe and parts of the MENA region, Israel does not commit to a single production pathway. It considers electrolysis-based hydrogen alongside other options, including gas-based pathways with carbon management. This flexibility reflects structural constraints rather than political hesitation. In a system with limited renewable capacity, technological optionality becomes a necessity.

At the same time, Israel has begun to translate its strategy into tangible structures. The planned Hydrogen Valley in the Negev illustrates a deliberate shift from abstract policy to system experimentation. Unlike the mega-projects of the Gulf, this initiative is not designed for scale, but for integration. Production, storage, mobility applications, and regulatory frameworks are meant to be tested together in a controlled environment. In this sense, the Negev project addresses, at a smaller scale, the same coordination problem that defines the global hydrogen economy: the need to align all elements of the value chain simultaneously.Similarly, discussions about a national hydrogen pipeline indicate that Israel is beginning to think of hydrogen as infrastructure rather than purely as innovation. Yet even here, the orientation remains domestic. The purpose is not to connect to international export corridors, but to link internal production sites, industrial users, and mobility clusters. This reinforces the impression of a system designed for internal functionality rather than external scale.

Where Israel clearly differentiates itself is in the role of innovation. Without the physical conditions for large-scale hydrogen production, the country relies heavily on its technological ecosystem. Investments are spread across pilot projects, applied technologies, and international collaborations rather than concentrated in a few mega-installations. This creates a different form of strategic positioning. In a hydrogen economy defined by complex, integrated systems rather than liquid global markets, the ability to design and optimize such systems may become as important as production itself.

A final distinguishing feature is the weight of security considerations. In most hydrogen strategies, climate and industrial competitiveness are the dominant factors. In Israel, hydrogen is increasingly linked to energy resilience. It is seen as one element in a system designed to withstand disruptions, reduce import dependencies, and maintain functionality under geopolitical stress. This aligns, in a different form, with the broader insight of the MENA corridor logic: hydrogen is not detached from geopolitics, but deeply embedded in it.

In sum, Israel represents neither a scaled-down version of the Gulf model nor a delayed entrant into the hydrogen race. It embodies a distinct category. While the major MENA players are building the external architecture of a corridor-based hydrogen system, Israel is developing a selective, innovation-driven and resilience-oriented hydrogen model. It does not aim to dominate flows, but to ensure that hydrogen works within the constraints of a complex national system. In a world where hydrogen markets are shaped by infrastructure, geopolitics, and system integration, this approach may prove less visible, but strategically coherent.

6. Egypt: The Suez Corridor as a geopolitical anchor of stability – Deep Dive

At first glance, Egypt's hydrogen strategy appears less spectacular than Saudi Arabia's megaprojects or the highly publicised export narratives of the Gulf. Yet this is precisely where its strategic strength lies. Cairo is not relying on symbolic scale, but on structural integration: on existing industry, on geographic position, and on the ability to develop hydrogen not as a standalone future promise, but as an extension of an already existing energy and logistics system. The key difference is that Egypt is not waiting for a fully developed global market. Instead, the country is building viability through existing industrial demand, port logistics, and its role as a transit power along the Suez Canal.

The core of this model lies in the Suez Canal Economic Zone, and specifically in Ain Sokhna. There, a green hydrogen ecosystem is not being built from scratch, but integrated into existing industrial structures. This is central from an industrial policy perspective. In Egypt, hydrogen is not treated as an abstract energy carrier, but as a precursor for green ammonia, directly linked to existing chemical and fertiliser value chains. This integration improves project bankability. The success of the ‘Egypt Green Hydrogen' project in Sokhna, announced in 2024 under the H2Global mechanism, demonstrated that European demand, Egyptian production, and existing industrial capacity can be translated into a viable business model. SCZONE itself valued the contract at 397 million euros for exports to Europe.

This structural integration is confirmed by further projects. The Damietta project is particularly revealing, bringing together Scatec, ECHEM MOPCO, and Yara Clean Ammonia in a coordinated structure for renewable ammonia production. Hydrogen is not to be exported in isolation, but processed within an existing industrial platform. The Heads of Terms of Agreement with Yara Clean Ammonia is strategically significant because it reinforces a clear pattern: Egypt is linking its hydrogen ambitions to real industrial buyers and existing facilities. Whereas elsewhere production is often developed first and off-takers sought later, Egypt is attempting to bring both sides of the equation together from the outset. This does not eliminate all risks, but it shifts the logic from a speculative project to an industrially anchored building block of the corridor.

Geopolitically, Egypt's model gains significance because it operates within a different risk geography from the Gulf states. Although the country is deeply integrated into the region's energy and trade dynamics, its export capacity does not depend on the Strait of Hormuz to the same extent. This becomes particularly relevant in the context of the 2026 war with Iran. Since the outbreak of the conflict and the de facto closure of the Strait of Hormuz, a significant share of the Gulf's energy and shipping flows has been severely disrupted. Reuters reported an almost complete interruption of regular maritime traffic, emergency measures by the IMO, and tens of thousands of seafarers stranded in the Gulf region. At the same time, governments and markets are warning of longer-term damage should the crisis persist.

In this context, the relative attractiveness of various hydrogen production locations is shifting. Whilst the Gulf states enjoy favourable production conditions and strong capital resources, their export models are heavily reliant on maritime routes that are currently under massive security pressure. Egypt, by contrast, functions as a relative buffer zone. This does not mean immunity - the Suez Canal and Red Sea are also exposed to geopolitical pressure - but Egypt is less directly linked to the most immediate chokepoint of escalation. If Hormuz disruptions persist, Egypt could emerge as a more attractive export platform for Europe: closer, industrially compatible, and less exposed to Gulf-related risks.

A second, often underestimated factor is Egypt's role as a regional convergence point. The country connects the Arab world, the Eastern Mediterranean, and Africa. This positioning could prove decisive in a future hydrogen order. If production expands in East Africa or parts of North Africa, Egypt is predestined to function as a logistical and industrial hub. Its role would then lie not only in exporting its own molecules, but also in aggregating, processing, and relaying regional production

flows. This reflects a different model from Gulf exporters: less a centralised export platform, more a hub-and-spoke economy.

7. Morocco: Independent industrial logic and strategic multi-orientation – Deep Dive

Morocco occupies a special position within the MENA region because its hydrogen strategy is driven not primarily by export logic, but by domestic industrial policy. This is the key difference compared to many other projects in North Africa and the Gulf. While much of the international debate focuses on which countries will be able to supply Europe with green molecules in the future, Morocco's approach has been more firmly rooted in the domestic economy from the outset. The focus is not primarily on European import requirements, but on the transformation of its own industrial base, particularly the fertiliser and chemical sectors centred around OCP. OCP has officially set the target of producing 1 million tonnes of green ammonia annually by 2027 and 3 million tonnes by 2032, in order to decarbonise and secure its ammonia supply. This provides Morocco with a domestic demand anchor that many other hydrogen-producing countries lack.

This domestic logic is strategically significant because it alters the project risk profile. In many exporting countries, the economic viability of new projects depends almost entirely on future off-take contracts with Europe or Asia. Morocco, by contrast, can absorb part of its production within existing value chains. This reduces vulnerability to a global market still characterised by uncertainty, long lead times, and, in some cases, overly ambitious political targets. In other words, Morocco does not need to wait for a fully developed international hydrogen market to emerge. The country can integrate early production into existing, globally connected industrial systems. This is precisely what lends credibility to the Moroccan strategy.

This logic is most evident at the Jorf Hydrogen Platform complex. Initial production of around 100,000 tonnes of green ammonia per year is planned, supported in 2025 by a €30 million grant from KfW's PtX Development Fund. While often framed in Europe as an export platform, its primary significance lies in its integration with OCP's existing industrial demand. Even where export potential is taken into account, domestic use remains a stabilising factor. This distinguishes Morocco from strongly export-oriented narratives, where infrastructure and export terminals are prioritised over local industrial integration.

At the same time, Morocco is deliberately expanding its export capabilities. Its proximity to Europe remains a fundamental structural advantage. It is geographically

closer to major demand centres in Southern Europe than most Gulf producers, and with ports such as Tangier Med and Jorf Lasfar, it possesses well-suited logistics infrastructure for exporting ammonia and related derivatives. There is also a second dimension that is particularly relevant for European strategists: Morocco is not only close to Europe, but lies at the very heart of the infrastructure and corridor considerations that Europe is currently developing in the hydrogen sector. Spain is expanding its national hydrogen backbone, and projects such as H2Med and the BarMar connection between Barcelona and Marseille are intended to link high-potential production areas to industrial demand in Central Europe.

For Morocco, this means that even without a direct hydrogen pipeline today, it is already positioned within an emerging European corridor system. Enagás also refers to existing or adaptable interconnection frameworks between Spain and Morocco in its documents. As a result, Morocco is more than just a 'nearby exporter' in the European debate: it becomes a potential connection point to the future European hydrogen landscape. This is precisely what makes the Moroccan model particularly attractive from a European perspective.

At the same time, Morocco's strategy is not exclusively oriented towards Europe. In fact, Rabat is pursuing a deliberate multi-partner approach, aimed at maximising flexibility rather than committing to a single alignment. This is evident in the composition of its investor base. In March 2025, Morocco approved several major green hydrogen projects totaling around 319 billion dirhams. What is decisive here is not only the scale, but the origin of the participating players: alongside European and Gulf companies, a Chinese consortium comprising United Energy Group and China Three Gorges was also included in the selection. China is not merely a distant technology supplier, but part of Morocco's emerging project structure.

Geopolitically, this is significant. While Europe often views Morocco as a natural partner, this perception is only partially accurate. Morocco does not behave like an upstream production site for European industrial policy, but rather like a state that derives its bargaining power from ambiguity and optionality. It exploits European demand, German subsidies, Spanish infrastructure logic, and Chinese and Gulf investments simultaneously, without committing itself exclusively to one side. From a Moroccan perspective, this is rational. A country seeking to finance and secure its own industrial transformation is unlikely to tie itself to a single external pole, as long as multiple capital and technology hubs compete with one another. For Europe, this is the core challenge: Morocco is close but not available; willing to cooperate but not exclusively; strategically compatible but not politically containable.

This multi-directional strategy becomes even more relevant given the uncertainty surrounding European demand. Although the EU has set ambitious hydrogen import targets, doubts remain about their feasibility within the projected time frame. This shifts the perspective on Morocco once again. If European demand grows more slowly than politically anticipated, Morocco's domestic logic proves even more valuable. OCP's demand thus serves not only as an industrial foundation, but also as a strategic risk buffer against European uncertainty. In other words, Morocco needs Europe, but it is not dependent on its short-term import capacity.

There is a broader political dimension. Morocco's model is not only economically more robust, but also politically more compatible with a national development strategy. Hydrogen is not presented there as a mere export commodity, but as a tool for upgrading its own industry, reducing import dependencies and strengthening national value creation. It is what gives the strategy domestic political legitimacy. In many other countries, hydrogen risks becoming a new form of external raw material logic: production for export, with limited local integration. Morocco is consciously trying to avoid this, which is one of its core strengths.

For Europe, this leads to an ambivalent conclusion. On the one hand, Morocco is one of the most attractive potential partners: geographically close, industrially grounded, politically relatively stable, and compatible with European infrastructure considerations. On the other hand, it is precisely this attractiveness that offers no guarantee of an exclusive partnership. Europe's strategic challenge is not simply to invest, but to recognise that Morocco operates according to its own industrial and geopolitical logic.

Morocco's true significance lies in the combination of three factors. First, a credible domestic demand anchor in OCP. Second, thanks to its location and infrastructure, it possesses real export potential towards Europe. Third, a multi-partner approach balancing European, Chinese, and Gulf interests. It is precisely this combination that makes Morocco one of the most strategically relevant actors in the MENA region for hydrogen. It is neither merely an export platform nor merely a domestic market, but a hybrid hydrogen system defined by flexibility and strategic autonomy.

8. Algeria and Tunisia: Pipeline geopolitics and European integration – Deep Dive

In the hydrogen debate, Algeria and Tunisia are often treated as secondary players alongside more high-profile projects in Saudi Arabia, Oman, Egypt, or Morocco. However, this classification is misleading. From a European perspective, both

countries are strategically important not because they are already leading green hydrogen producers in the region, but because they possess a key structural advantage that the Gulf states do not: proximity and potential for direct physical connection to Europe via pipelines. This is where their geopolitical relevance lies. In a context where maritime routes through the Red Sea and the Gulf have become more fragile, attention is inevitably shifting towards models that rely less on shipping and more on pipeline-based integration.

Algeria occupies a special position in this regard. No other MENA country currently has a comparable level of energy infrastructure integration into the European market. Through existing natural gas connections to Europe, particularly via TransMed to Italy and Medgaz to Spain, Algeria has long been part of the Mediterranean energy network. This legacy is highly relevant for hydrogen, as it creates a fundamentally different starting point compared to countries that must build their export infrastructure from scratch. Where pipelines, compressor stations, and interconnection points already exist, hydrogen becomes a question of adaptation rather than creation.

This is where the SoutH2 Corridor comes in. Backed by Snam, TAG, Gas Connect Austria, and bayernets, the project aims to connect North Africa to industrial demand centres in Germany via Italy and Austria. The project foresees a network of approximately 3,300 kilometres, with over 65 per cent consisting of repurposed pipelines and an import capacity of more than 4 million tonnes of green hydrogen per year, with operations planned for the early 2030s. This is not merely an infrastructure plan, but a geopolitical concept: Europe is seeking to establish a new southern import corridor that is less exposed to maritime disruption and builds on the logic of its previous gas import system.

For Algeria, this creates a dual strategic pathway. On the one hand, the country could extend its role as a traditional energy supplier to Europe in a modified form. From a European perspective, this is attractive, as trust, contractual experience, and physical proximity are already stablished. On the other hand, Algeria's hydrogen sector has not yet reached the same level of maturity as its gas export infrastructure. Its advantage lies in infrastructure, but its industrial hydrogen base remains underdeveloped. This is reflected in the ALTEH2A initiative – the Algeria to Europe Hydrogen Alliance. Established in 2024 through a Memorandum of Understanding between Sonatrach, Sonelgaz, VNG, Snam, SeaCorridor, and Verbund, the project is currently focused on assessing the technical and economic feasibility of large-scale hydrogen production and export via the SoutH2 Corridor. Initial findings are expected in the second half of 2026. This wording alone shows where Algeria stands:

no longer in the purely speculative realm, but still clearly some way from finalising a market-ready green export model.

This intermediate position is particularly revealing from a political and scientific perspective. Algeria is not attempting to abruptly leave its fossil fuel past behind. Rather, a transition strategy is emerging in which the country is using its gas ties with Europe, its state-owned energy companies, and its infrastructure as a basis for a gradual shift towards hydrogen. Reuters reported in October 2025 that Algeria plans to invest around $60 billion in the energy sector between 2025 and 2029. The majority of this investment will continue to flow into upstream activities, refining, and petrochemicals, while a smaller portion will support diversification, including hydrogen. This underscores a central ambivalence: hydrogen is politically prioritized in Algeria, but not yet the dominant focus of energy policy. For the time being, the country remains a fossil fuel exporter with a growing decarbonisation component, rather than a fully developed hydrogen economy.

This is precisely where Algeria's strategic advantage lies. In a market under geopolitical pressure, it is not necessarily the earliest or most ambitious green strategy that matters, but the ability to transform existing systems to enable connectivity. The Iran conflict has exposed the vulnerability of maritime corridors. As the Strait of Hormuz and, indirectly, the Red Sea are perceived as high-risk areas, the value of pipeline options rises accordingly. Algeria benefits not because its green hydrogen economy is fully developed, but because its geographic and infrastructural position offers Europe an alternative to ship-based imports. This marks a fundamental geopolitical difference compared to Saudi Arabia or Oman.

Tunisia complements this picture in a different way. The country lacks Algeria's tradition of energy exports, as well as its depth of capital and resources, and is therefore not a potential hydrogen giant. This is precisely what makes Tunisia analytically interesting: it illustrates how a smaller North African state is positioning itself within an emerging European-Mediterranean hydrogen order without seeking to dominate the market itself. Tunisia's national hydrogen strategy outlines a phased approach, beginning with domestic industrial use and gradually transitioning towards export-oriented corridors. Officially, Tunisia targets 300,000 tonnes of hydrogen exports to Europe by 2030, 1.6 million tonnes by 2040, and, in the long term, 6.3 million tonnes of green hydrogen and derivatives by 2050. The strategy explicitly links these targets to ‘Corridor A North Africa & Southern Europe', alongside investments in pipelines, storage facilities, compression, and electricity and water infrastructure.

What sets Tunisia apart from many other countries is the combination of a relatively modest industrial starting point and a clearly defined corridor focus. From the outset, the country has framed its hydrogen strategy in relation to Europe. The strategy emphasises both the expansion or repurposing of existing pipelines – for example in the Nawara-Gabès area – and the integration into downstream PtX value chains. This means Tunisia is focusing less on spectacular individual projects and more on positioning itself within a broader, Europe-driven network of pipelines and demand. It is this approach that gives the country a strategic role that stems not from scale, but from integration.

Furthermore, European grid and infrastructure operators now treat Tunisia itself as a serious component of this system. Snam's 2025 documents refer to the national hydrogen strategies of both Algeria and Tunisia, citing production targets for Tunisia of 13 TWh by 2030, 43 TWh by 2035, and 83 TWh by 2040, and for Algeria 40 TWh by 2040. More importantly, Snam indicates that developers intend to use the SoutH2 Corridor to transport hydrogen from Tunisia to northern Italy, Austria, and Germany. While it remains uncertain whether these volumes will be realised, this demonstrates a clear political shift: Tunisia is no longer a peripheral case, but part of the European infrastructure vision for the emerging hydrogen market.

It is what makes the Algeria–Tunisia partnership interesting. Algeria brings to the table the historical energy partnership, proximity to the pipeline network, and the possibility of a gradual transformation of existing export logic. Tunisia offers fewer advantages, but a high degree of political compatibility with European infrastructure plans and an early willingness to align its national strategy with the logic of the European import system. Together, they form the core of a North African pipeline option that could provide strategic relief for Europe, competing with maritime corridors from the Gulf. At the same time, this prospect remains subject to numerous uncertainties: the technical feasibility of repurposing existing pipelines, regulatory harmonisation, sustained demand in Europe, and the willingness of investors in North Africa to commit to long-term development.

This is where the deeper geopolitical dimension becomes evident. Pipeline geopolitics differs from maritime geopolitics not only in technical terms but also politically. Shipping allows for diversification and rerouting, whereas pipelines create stronger mutual interdependence. A hydrogen corridor from North Africa to Germany would not simply be a trade route, but a highly institutionalised relationship between producers, transit states, network operators, and industrial consumers. This can enhance stability, but also introduces new forms of path dependency. While Europe could reduce its exposure to maritime chokepoints, it

would simultaneously create new dependencies on North African partners, both politically and in terms of infrastructure.

For Algeria and Tunisia, this ambivalence presents an opportunity. Both countries can offer Europe something that the Gulf states cannot provide in the same form: physical continuity of supply without reliance on shipping. In a context where the war in Iran, the militarisation of sea lanes, and rising insurance and security costs are diminishing the appeal of maritime routes, this option is gaining in significance. However, it is not automatically superior. It requires high upfront investment, political stability, technical standardisation, and, above all, Europe's willingness to translate its hydrogen strategy into tangible infrastructure, not just auctions and targets.

The real significance of Algeria and Tunisia, therefore, does not lie in the current position as leading green hydrogen exporters in the MENA region. It lies in their role in shifting European thinking from a shipping-based logic to a pipeline-based logic. Algeria represents the possibility of transforming a fossil fuel partnership into a future hydrogen relationship, while Tunisia extends this model into a complementary space with closer political alignment to Europe. Together, they demonstrate that the hydrogen landscape of the Mediterranean will be shaped not only by production costs, but by the form of connection – whether ship or pipeline, flexible route or fixed link – and by which model proves more resilient under conditions of geopolitical uncertainty.

9. UAE: Logistics, Diversification and Geopolitical Resilience

The United Arab Emirates is pursuing a strategy in the hydrogen and energy sector that differs significantly from the more production-centred models of Saudi Arabia or Oman. The core of the Emirati approach lies not in maximising the production of green molecules, but in controlling trade flows, diversifying export routes, and safeguarding geo-economic capacity to act under crisis conditions. This is not a marginal distinction, but reflects a state whose economic power has traditionally relied less on resource endowment alone than on its ability to organise global trade hubs. In the context of hydrogen, this logic is being extended: the UAE aims not only to be a producer, but also a platform, transhipment hub, trader, and infrastructure owner within an emerging market for hydrogen and its derivatives. At the same time, these ambitions are formalized in the National Hydrogen Strategy 2050, which seeks to position the UAE as a producer and supplier of low-emission hydrogen by 2031 and to establish several ‘hydrogen oases' and new supply chains.

However, particularly in light of the Iran war in March 2026, it is clear that the UAE's strengths and vulnerabilities are closely intertwined. Since the outbreak of the war on 28 February 2026, Iran has largely blocked the Strait of Hormuz. Reuters reported in mid-March that nearly all regular shipping had come to a halt, affecting around one-fifth of global oil and LNG flows. For the UAE, this is not an abstract threat, but an immediate test of its entire geo-economic model, as a major energy exporter, regional logistics hub, and closely intertwined with global trade chains. On 17 March, Anwar Gargash, a senior diplomatic adviser to the UAE President, indicated that the Emirates could join a US-led initiative to secure shipping. At the same time, Reuters reported that the UAE had been more heavily affected by Iranian attacks than any other state in the region, including Iranian strikes on an Emirati port outside the Gulf used for oil exports.

It is at this point that Fujairah becomes strategically central. The port is important not because it is merely another export hub, but because it is geographically situated outside the Strait of Hormuz, on the Gulf of Oman, effectively allowing the region's most critical chokepoint to be bypassed. In an analysis dated 14 March, Reuters highlighted Fujairah's outstanding position for the oil markets, noting that the port sold around 7.4 million cubic metres of marine fuel in 2025, making it the world's fourth-largest bunkering hub. This is of great significance for the hydrogen and ammonia sector: A location already integrated into global shipping, storage, tank infrastructure, and transhipment that possesses the foundations that can later be utilised for hydrogen derivatives. Fujairah is, therefore, not just an alternative port, but a precursor to a post-fossil logistics platform, provided the UAE successfully integrates its hydrogen strategy with its existing trade infrastructure.

However, the war has also shown that 'outside the Strait of Hormuz' is not a guarantee of safety. Reuters reported on 16 March that ADNOC had to temporarily suspend crude oil loading in Fujairah after a drone attack triggered a fire at the export terminal. Just the day before, Reuters had reported on new Iranian threats against Fujairah, Jebel Ali, and Khalifa Port. This is analytically crucial: Fujairah is a bypass, but not a geopolitically neutral space. The Emirati logic of resilience is therefore not based on immunity, but on the ability to spread risks and circumvent individual bottlenecks. This is what makes the Emirati model more complex than often assumed. It is not a matter of stepping outside the conflict zone, but about maintaining operational capacity within it.

Perhaps the most important material basis for this capacity to act is the Habshan–Fujairah pipeline. On 17 March, Reuters used data and maps to show that the UAE had massively increased exports through this pipeline to circumvent the

blockade of Hormuz. According to IEA figures cited by Reuters, flows between 1 and 10 March averaged 1.8 million barrels per day, reaching reported maximum capacity; prior to the crisis, they stood at around 1 million barrels per day. This is highly relevant for hydrogen analysis, even though it currently still concerns oil. The pipeline is evidence that the UAE has long been considering its energy geography in terms of strategic diversification and export resilience. Applied to hydrogen, this suggests that the Emirates bring an institutional and infrastructural advantage of experience to the emerging molecular economy. They recognise that in the Gulf region, it is not only production costs that count, but above all, how energy reaches the market when the most direct route is politically blocked.

In March 2026, in particular, a contrast emerges with Saudi Arabia and Oman. Saudi Arabia is focusing heavily on scaling and maritime export routes, while Oman emphasises corridor architecture and flexible derivatives. The UAE, by contrast, is positioning itself as a logistics and trading hub with built-in resilience to disruption. This makes its model particularly attractive for a fragmented hydrogen market. In a stable geopolitical environment, this advantage might be secondary to pure production costs. However, in an environment where Iran effectively keeps the Strait of Hormuz closed, ports and terminals are under attack, and insurance premiums and transport risks escalate, control over alternative routes become a value-adding factor in its own right. The UAE is thus selling not only molecules, but reliability under conditions of uncertainty – or at least the capacity to organise it.

Furthermore, the UAE's hydrogen strategy is not limited to a single instrument. According to the National Hydrogen Strategy 2050, the UAE aims to expand its position as a producer and supplier of low-emission hydrogen. Industry estimates put the target at 1.4 million tonnes per year by 2031 and 14.9 million tonnes by 2050. ADNOC identifies hydrogen and carrier gases as a key new business area, while Masdar aims to be among the leading producers of green hydrogen by 2030. This shows that the UAE does not intend merely to act as a conduit for foreign molecules but to participate directly in production and global supply chains. At the same time, its strategic identity differs from that of countries such as Morocco or Egypt: the focus is less on domestic industrial demand anchors and more on linking production, exports, trade, port economies, and international partnerships.

This is particularly evident in the international footprint of Emirati players. As early as 2023, Masdar signed an MoU with the Port of Amsterdam, SkyNRG, Evos Amsterdam, and Zenith Energy to establish a green hydrogen supply chain from Abu Dhabi to the Netherlands. Fertiglobe, a UAE-based company, was awarded a contract in 2024 under Germany's H2Global mechanism for at least 259,000 tonnes of green

ammonia between 2027 and 2033 – albeit from a project in Egypt. From a geopolitical perspective, this is revealing: the UAE is building its position in the global hydrogen market not only through domestic production, but also through networks, investments, and trading activities across national borders. In doing so, it is exporting not just a product, but a business model.

The war with Iran, however, is altering the operational interpretation of this model. Before the war, Fujairah and the UAE's diversification strategy could be interpreted as a forward-looking safeguard. By March 2026, this has become a real-time stress test. ADNOC CEO Sultan Al Jaber stated on 23 March that no country should take the Strait of Hormuz 'hostage', while emphasising that energy stability is a prerequisite for economic stability. This statement is more than market communication. It shows that the UAE now views the conflict as a direct challenge to its geo-economic identity. As trade flows, ports, and export routes themselves become targets of military or hybrid attacks, the UAE is increasingly compelled to view its hydrogen and energy policy through a stronger security lens. Under these conditions, hydrogen is no longer only part of the energy transition, but part of a broader question: how the state sustains its role as a reliable export and logistics hub within a conflict-prone regional order.

This explains the ambivalence at the core of the Emirati model. Fujairah provides a genuine strategic advantage, as it embodies the logic of bypassing Hormuz and offers an alternative to the most immediate chokepoint. Yet the war in March 2026 shows just as clearly that this resilience is relative, not absolute. Fujairah can bypass Hormuz, but not the entire conflict geography of the Gulf. The UAE can divert flows, but it cannot depoliticise them. This is where the analytical core of the Emirati model lies: it exemplifies a hydrogen and export strategy driven less by production economics than by the ability to organise trade under geopolitical stress. In an increasingly fragmented energy system, this capability may become a decisive competitive advantage – provided the Emirates succeed in transforming their existing fossil-fuel logistics infrastructure into a resilient hydrogen-and-derivatives architecture.

10. China: The industrial system architect of the global hydrogen market – Deep Dive

In the emerging hydrogen system, China is not simply another major producer among many. Rather, it is shaping the industrial framework of the entire market. Whilst in Europe and parts of the MENA region, hydrogen is still often treated as a

politically desirable future field, in China it has long been embedded in a broader industrial policy focused on scaling, standardisation, cost leadership, and infrastructure integration. This is where the real difference lies. China does not view hydrogen primarily as a decarbonisation narrative, but as a component of a wider industrial ecosystem in which power generation, electrolyser manufacturing, grid and pipeline expansion, port logistics, and industrial demand are systematically integrated. The IEA's *Global Hydrogen Review 2025* highlights this position, noting that China leads in both the manufacture and deployment of electrolysers, as well as in cost competitiveness. Production costs are estimated at around $3.21 per kilogramme of hydrogen in China, compared to $7.93 in Germany, while electrolyser costs stand at approximately $70,000 per MW in China versus $342,000 in Europe. The IEA further confirms this structural leadership by noting that China accounts for around 60 per cent of global electrolyser manufacturing capacity.

This dominance is not merely a matter of cheaper components. It reflects a pattern already apparent across several industrial sectors: first in photovoltaics, then batteries and electric vehicles, and now increasingly in hydrogen technologies. The IEA explicitly notes that China's position in hydrogen mirrors the trajectory of the solar and battery sectors, where other regions were early innovators, but China captured industrial mass production and thus cost leadership. Crucially, China not only manufactures but also coordinates production capacities, supply chains, project implementation, and infrastructure at great speed. In 2025, a 500-MW electrolysis project went into operation in China, currently the largest of its kind in the world according to the IEA. This is not merely a technical milestone. It demonstrates that China is scaling hydrogen to a level where scale itself becomes a market instrument.

This is significant in the global context because it gives rise to a new division of labour. Many countries in the MENA region possess strong natural conditions for green hydrogen production: favourable solar and wind resources, available land, state capital, strategic ports, and export experience. What they often lack, however, is the same depth of industrial manufacturing, standardisation of components, and the same speed in ramping up entire supply chains. This is precisely where China positions itself as a partner in industrial systems. Unlike Europe, which often relies on subsidy frameworks, certification, and demand-side instruments, China brings what is critical for large-scale project execution: cost-effective technology, project implementation, manufacturing capacity, and, in many cases, financing and a willingness to invest. The result is a system in which resources, electricity, and locational advantages are concentrated in the MENA region, while significant parts of industrial value creation and technological sovereignty come from China.

This functional interdependence is already visible in the MENA region. In Morocco, Chinese actors were explicitly included in the major projects approved in 2025, worth around $32.5 billion. Reuters reported that United Energy Group and China Three Gorges are set to jointly implement an ammonia production project. This involvement is geopolitically significant. Morocco is often perceived in Europe as a preferred hydrogen partner, yet even in this case, Chinese companies become key players in the emerging project landscape. This demonstrates that while Europe is geographically close, the industrial substance of this proximity is not necessarily European. China is not merely a background supplier, but a co-creator of the infrastructure and production capacities that Europe aims to access.

A similar pattern can be observed in Oman. In early 2025, it was announced that Sungrow Hydrogen would supply electrolysers for a 320-MW green ammonia project developed by ACME. Industry reports described this as the market entry of Chinese electrolyser technology into a major MENA project. For the purposes of this analysis, it is not so much the individual manufacturer's name that is decisive as the pattern: even where Oman is building an export architecture oriented towards European corridors, project implementation relies on Chinese technology. This underscores that MENA and China do not constitute competing counter-worlds, but in many cases complement each other functionally: MENA supplies resources and sites, China the industrial hardware.

In Saudi Arabia, the Chinese role is visible at a different level. The focus is not only on the supply of components, but on the localisation of electrolyser production and broader technology partnerships. In 2025, it was announced that the Chinese manufacturer Hygreen, together with Saudi partners, would establish a joint venture to localise electrolyser and hydrogen technology for the Saudi, regional, and wider MENA markets. This is highly revealing from an industrial perspective. China is not only exporting technology, but also embedding parts of its production base within strategic partner countries. For Saudi Arabia, this aligns with the vision of domestic industrialisation. For China, it secures access to a growing regional market and to major of political priority projects. The result is a partnership in which Chinese technology is not merely imported, but integrated into regional industrial policy.

In the United Arab Emirates, the situation is somewhat different. The UAE approaches hydrogen and its derivatives primarily through the lens of trade, logistics, and global supply chains. The Chinese dimension is therefore present in a less visible, but no less significant, way - not through headline electrolyser projects, but through the broader deepening of economic and energy relations. As early as 2023, Reuters reported on a Masdar agreement with the Port of Amsterdam and other partners to

establish a green hydrogen supply chain from Abu Dhabi to Europe. At the same time, the strategic partnership between the UAE and China in energy, industry, and infrastructure has deepened in recent years, even if its hydrogen-specific dimension remains less defined than in Oman or Saudi Arabia. For geopolitical analysis, however, the key point is that the Emirati model operates in a region in which China is fundamentally present as a technological and industrial partner, while Emirati actors link their global hub strategy across both Asian and European markets.

This shifts the question of partnerships and dependencies. In a traditional energy policy framework, one would expect Europe to connect directly with MENA countries, thereby creating new import relationships. In the hydrogen, the picture is more complex. Even if future supply reaches Europe from Morocco, Oman, Saudi Arabia, or the UAE, key elements of the industrial base – electrolysers, EPC expertise, control systems, and potentially financing structures – may be shaped by Chinese influence. Europe would thus depend not only on MENA as a production and transport corridor, but also indirectly on China as the technological enabler. Whilst the IEA notes that the use of Chinese electrolysers abroad does not automatically generate dramatic cost reductions, it simultaneously highlights China's structural leadership in manufacturing, deployment, and cost efficiency. For Europe, this is the core strategic dilemma: access to molecules does not equate control of the industrial prerequisites for supply.

At the same time, China does not treat hydrogen merely as an export technology, but as part of its own national industrial and infrastructure strategy. This was already reflected in the Kangbao-Caofeidian pipeline, illustrating China's capacity to physically link production and industrial demand. The IEA has further reinforced this assessment, pointing to rapidly expanding electrolysis capacity and increasing project scale. The implication is clear: China is developing hydrogen not as a fragmented project market, but as an integrated industrial system in which production, transport, industrial clusters, and end-use converge. For MENA, this offers a development model that extends beyond export. For Europe, it raises a structural challenge: the global hydrogen market may be shaped by a player that not only supplies technology, but also defines how value chains are organised.

From a political-scientific perspective, this points to a new form of asymmetrical partnership. MENA countries rely on China to scale more quickly and cost-effectively, while China uses MENA to anchor its industry in resource-rich and geopolitically central regions. Europe, for its part, seeks to secure its role through regulation, demand-side instruments, and geographical proximity, but risks being caught between supplier and technological power. This suggests that Europe faces a dual

dependency: on MENA as a production and transit region, and on China as the industrial system architect. This dependency is not absolute, but it is strategically relevant, as it creates vulnerability at two critical points – in the origin of the molecules and in the technological base that makes them competitive in the first place.

China's significance in the global hydrogen market, therefore, goes beyond market share or production costs. It lies in its ability to combine industrial depth, technological scale, rapid infrastructure development, and international connectivity. In MENA, China is not just an investor or supplier, but a partner in a model that links resource-rich regions with industrial implementation capacity. For Europe, the implication is uncomfortable but clear: relying solely on procurement, regulation, and proximity, without strengthening its own industrial base, risks carrying out the energy transition within a system shaped elsewhere.

What this means for MENA

For the MENA region, China's role initially represents a clear advantage in terms of acceleration. Countries such as Oman, Saudi Arabia, Morocco, and the UAE can draw on Chinese technology, cheaper electrolysers, standardized components, and often faster project implementation to acquire the industrial depth they have not yet fully developed themselves. This lowers entry costs and increases the likelihood that projects are financially viable from the outset. For many countries in the region, this is a pragmatic choice. They possess sun, wind, land, ports, and capital, but often lack domestic manufacturing capacity in electrolysers, systems engineering, and EPC capabilities. China effectively fills this gap.

At the same time, this creates a new form of asymmetric interdependence. If MENA provides the production base while China supplies the central industrial and technological capabilities, there is a risk that the region produces molecules without controlling the most value-intensive segments of the chain. In that case, MENA may emerge as an export power, but not necessarily as an industrially sovereign one. In other words, the region could monetise its natural and geographical advantages, while industrial leverage remains in external hands.

This creates a strategic tension. In the short term, Chinese involvement accelerates development. In the medium to long term, however, MENA countries must decide whether to remain within a ‘resources plus external technology' model or to use hydrogen as a pathway to deeper industrialisation. This is where national strategies diverge. Saudi Arabia is making greater efforts towards localisation of technology.

Morocco is anchoring hydrogen in domestic industrial demand. Oman focuses on corridor architecture and infrastructure. The UAE emphasises on trade and logistics. The key question is whether these approaches evolve into simple export platforms or into more comprehensive regional value chains.

For MENA, this also translates into greater geopolitical leverage. The region can strategically balance between Europe, China, and, to some extent, Asian buyers. The more China acts as a technology partner and Europe as a potential premium market, the greater the opportunity for MENA to balance between them. This strengthens the region's bargaining power. In this context, MENA is no longer just a supplier, but a space where competing industrial and regulatory models intersect. Europe offers regulation, certification, and market access. China brings cost advantages, technology, and scale. This dynamic can work in MENA's favour, provided the region actively exploits this competition rather than drifting into new dependencies.

At the same time, this dynamic carries risks. If too many key elements of the hydrogen sector are shaped externally, MENA could become geographically central, politically visible, and capable of exporting, without developing a robust, autonomous industrial base. In that case, hydrogen would mark a continuation of the region's export model, rather than a shift towards technological self-reliance. The real risk is that the region will shift from a fossil-fuel export model to a post-fossil one without fundamentally altering the structure of its dependencies.

The real strategic implication for MENA

For the MENA region, the central question is therefore not how much hydrogen it can produce, but how much of the associated industrial and technological control remains within the region.

If MENA is to derive long-term advantage from its position, it needs more than cheap electricity and favourable geography. It requires:

- greater localisation of component manufacturing,
- its own industrial demand anchors,
- regional processing rather than simple molecule exports,
- and contractual frameworks that secure not only sales, but also strengthen technology transfer and local value creation.

China offers the MENA region the fastest route into the global hydrogen economy. But this speed carries risk. Without parallel industrialisation, it can translate into a new form of dependency. The strategic challenge for MENA is therefore clear: to use China as an accelerator without becoming a production hub defined by external

technological control. Ultimately, success will not be measured by export volumes alone, but by whether hydrogen becomes an instrument of regional industrial power.

11. Geopolitics: The Iran conflict as a system test

The war over Iran is not an external disruption to the emerging hydrogen system. It is a reality test of its physical and geopolitical foundations. Since the start of the US-Israeli war against Iran on 28 February 2026 and the subsequent de facto blockade of the Strait of Hormuz, it has become clear that the infrastructure of the energy transition remains fully embedded in traditional power politics. Reuters reported in early March that Japanese shipowners had stopped operating around Hormuz, and tanker traffic quickly collapsed. By mid to late March, around 95 per cent of pre-war traffic had ceased, with key energy and cargo vessels stranded in the Gulf.

For hydrogen, this is of fundamental importance. The system depends even more heavily on tightly defined corridors than oil or LNG. Oil can be more easily rerouted, blended, and substituted at short notice within a global market. Hydrogen and its derivatives cannot. They rely on a far more fragile configuration: electrolysers, conversion plants, ports, terminals, off-take agreements, and certification systems must function simultaneously. Reports on the current crisis show that disruptions in Hormuz affect not only oil and gas, but also petrochemical feedstocks, fertilisers, sulphur, and other critical industrial flows. This is the real warning for the hydrogen sector: even ‘green molecules' depend on the same geopolitically exposed routes, port facilities, and insurance mechanisms as the fossil fuel world they are meant to replace.

The events of March 2026 reinforce this assessment. Reuters reported on 17 March that Iran had effectively closed the Strait of Hormuz, while Gulf producers such as Saudi Arabia and the UAE were scrambling to reroute exports via bypass pipelines. At the same time, the UN Security Council began discussing measures to protect shipping, with Bahrain even calling for a mandate allowing “all necessary means”. The fact that such discussions are taking place at all shows that the sea route is no longer treated as a normal trade corridor, but as a potentially militarised chokepoint. For hydrogen investors, transport is no longer just a commercial variable, but part of the core security risk of every project.

For the MENA region, this shifts the strategic landscape. Gulf hydrogen strategies have been built largely on maritime export models: on ammonia, methanol and, in

the future, liquid hydrogen shipped to Europe or Asia. The war in Iran shows the vulnerability of this model at its most critical point. Even where producers such as Saudi Arabia or the UAE can redirect flows via alternative pipelines to ports outside the Strait of Hormuz, the wider system - ports, tankers, insurance, and sea routes - remains politically vulnerable. Reuters also reported that rising insurance premiums, rerouting, and the de facto disruption of regular shipping have significantly increased costs and uncertainty. This does not invalidate the maritime hydrogen model, but it does force a reassessment of its risk assumptions.

As a result, pipeline-based systems are gaining relative importance. Under these conditions, North Africa – particularly Algeria and, over time, Tunisia – appears more strategically attractive. Pipeline connections to Europe carry different vulnerabilities from maritime routes. While they create deeper political ties and new forms of interdependence, they are not exposed to the same patterns of disruption seen in Hormuz or the Red Sea. For this reason, it is plausible that European and private investors will reassess Mediterranean pipeline corridors in light of the events of March 2026. The war in Iran is shifting the balance of attractiveness not only between supplier countries, but also between two fundamental models of hydrogen trade: ship versus pipeline, flexibility versus fixed connection.

A second, often underestimated consequence is that the war is not only reshaping transport routes, but also the macroeconomics of hydrogen demand. Reuters reported on 24 March that Brent prices had risen by around 65 per cent since the start of the crisis, reaching approximately $119.50 per barrel. At the same time, consumer and market expectations in Europe and Asia deteriorated significantly. According to the European Commission and Reuters, eurozone consumer confidence declined sharply as higher energy prices triggered renewed inflation concerns. For hydrogen, this creates a dual effect. On the one hand, the war is increasing political interest in resilience, diversification, and non-fossil alternatives. On the other, it is making investment decisions harder in the short term, as inflation, interest rates, and uncertainty rise. In that sense, it creates a tension: hydrogen becomes more important strategically, but harder to realise financially.

Equally important is that the crisis is affecting not only oil, but, even more so, gas and chemical-related flows. Reuters noted on 24 March that the gas sector is being hit more severely than oil, as diversion is more difficult, storage options are limited, and infrastructure dependencies are stronger. This is directly relevant for hydrogen. In terms of market structure, hydrogen resembles gas, ammonia, and other infrastructure-bound commodities far more than the flexible global oil market. If LNG and gas are already difficult to divert in such a crisis, this applies even more to

hydrogen, whose infrastructure is still emerging. The war in Iran therefore reveals a truth that has been underestimated in many strategy papers: the hydrogen system is at least as vulnerable as the fossil fuel system, and in its early stages, in some respects even more vulnerable.

This also sheds new light on corridor policy. Initiatives such as IMEC were built on the assumption that the trade corridors can be stabilised through political cooperation. March 2026 shows the limits of that assumption. Without a credible security architecture, corridors can quickly turn from strategic visions to exposed lines. If the Strait of Hormuz is blocked, the Red Sea is under pressure, and escalation is possible at any time, it is not only just individual ports that lose attractiveness, but the entire concept of a politically 'normalised' East-West energy corridor becomes more fragile. For the hydrogen sector, this means that infrastructure and diplomacy can no longer be separated. A corridor is not only successful if it functions technically, but only if its security framework is credible.

The most significant long-term consequence is therefore a shift in investment flows. The longer the war lasts, or the more frequently similar crises affect the Gulf's sea lanes, the sooner investors, governments, and consumers will adjust their portfolios. Projects exposed via the Strait of Hormuz or the Red Sea will carry a higher geopolitical risk premium. By contrast, locations that enable pipeline-based integration with Europe or offer alternative maritime routes and robust port infrastructure are becoming more attractive. Reuters' reports on the diversion of global shipping around the Cape of Good Hope and the rise of African bunkering hubs already demonstrate how quickly trade geography can realign under crisis conditions. For the hydrogen market, the implication is clear: investment decisions will depend not only on production costs, but also on route resilience.

The real conclusion is equally clear. The Iran conflict is not a peripheral disruption, but a test case for the real-world conditions of energy transition. It shows that hydrogen is not a geopolitically neutral commodity, but remains embedded in the same power dynamics that have long shaped oil and gas. Future hydrogen strategies must therefore account not only for electricity generation costs, electrolyser prices, and certification rules, but also for sea routes, risks of military escalation, insurability, port vulnerability, and the political robustness of corridors. March 2026 shows that the hydrogen economy is not developing beyond geopolitics, but within an increasingly contested energy infrastructure landscape.

12. Conclusion: The new energy order

The global hydrogen economy is not emerging as a free market, but as an order shaped by politics and infrastructure. This is where its true strategic significance lies. For years, hydrogen has been described as a technological solution to decarbonisation - the molecule of the future, and a key building block for industry, chemicals, steel, refining, aviation, and shipping. This is accurate, but incomplete. Hydrogen is not simply entering an existing market, but it is giving rise to a new system of connections, dependencies, and power structures. The issue is not only electrolysers, certification, or production costs. It is ports, pipelines, insurability, militarily vulnerable sea routes, state-guaranteed off-take contracts, industrial demand anchors, and the political capacity to secure entire corridors under conditions of crises. For this reason, hydrogen is not purely a climate policy project. It is a component of a new energy order.

This new order is regional, not universal. It is corridor-based, not open to the global market, and it is shaped by power politics, not neutrality. Unlike oil, hydrogen will not, for the foreseeable future, be traded in a highly liquid, globally interchangeable market. Its physical properties, conversion costs, infrastructure dependence, and the need for a long-term industrial off-take lead to a system in which energy flows are more constrained, more politically defined, and more institutionally structured. Producers will not simply manufacture hydrogen, but also embed it within a functioning system of production, transport, conversion, and use. This systemic nature makes all the difference. The future of the hydrogen economy will not be determined by where the sun shines most, but by where resources, infrastructure, demand, and political stability can be aligned.

Against this backdrop, the MENA region is becoming the centre of the emerging order. Not because it alone possesses favourable location conditions, but because it combines multiple strategic advantages: low costs for renewable energy, large areas of available land, long experience as an energy exporter, existing port and logistics infrastructure, and a location between Europe, Asia, and Africa. Yet there is no single ‘MENA strategy'. Oman is developing a maritime corridor architecture. Saudi Arabia is focusing on maximum scaling under state control. Egypt combines industrial integration with its position along the Suez Corridor. Morocco links hydrogen to its own industrial demand, particularly in fertilisers. Algeria and Tunisia gain relevance through potential pipeline integration with Europe. The UAE approaches hydrogen through logistics, resilience, and operational capability under stress. This differentiation is crucial. MENA is not a homogeneous production area, but a set of distinct state and infrastructure models that together could shape the southern geography of Europe's hydrogen future.

It would, however, be a mistake to view the region solely as a new supply area for Europe. MENA is no longer just an object of external demand, but increasingly the subject of its own geo-economic strategy. Morocco and Saudi Arabia are using hydrogen to secure their industrial position in a post-fossil economy. Oman is building corridors, not just markets. The UAE is investing in the resilience of its trade geography, not only in production. Egypt is positioning itself as a hub and stabilising force between Africa, Arabia, and Europe. This results in a structural shift: Europe will not be dealing with a reservoir of cheap green molecules, but with a region that derives bargaining power from its location, infrastructure, capital, and strategic alternatives.

At this point, China emerges as the second pole of the system. Its significance lies not in direct involvement in every project, but in shaping the industrial foundation of the market. The low costs of Chinese electrolysers, the depth of the supply chains, the speed of ramp-up, and the ability to integrate infrastructure, manufacturing, and application make China the industrial system architect of the global hydrogen market. For MENA, this represents a significant acceleration advantage: countries can enter the market more quickly and cost-effectively through Chinese technology and implementation capabilities. At the same time, it raises a structural question. If MENA provides the resources and the location, while China supplies essential technology and industrial capabilities, a division of labour may emerge in which the region becomes an export power without achieving technological sovereignty. The strategic question for MENA is therefore whether hydrogen becomes a lever for industrialisation, or a post-fossil continuation of external dependency. For Europe, the implications are different, but equally significant. A dual dependency may emerge: on MENA as a production and transit region, and on China as the industrial enabler.

In this context, Europe's position appears structurally asymmetrical. It remains, for the foreseeable future, the most important potential market for green hydrogen and green derivatives. It holds regulatory influence, industrial demand in hard-to-electrify sectors, and financial instruments such as H2Global. Yet these strengths also expose a limitation. Europe has set standards early on, through RFNBO rules, certification, and import frameworks, but its ability to secure its own industrial depth and create reliable demand pathways remains limited. This creates tension. Europe wants to lead on standards, but risks being caught between MENA and China on the industrial side. It sets requirements for others while facing costs, delays, and regulatory consequences at home. The result is a difficult reality: regulation alone is not enough if production, technology, and supply chains are located elsewhere.

The Iran War in March 2026 subjected this entire architecture to its first real stress test. It demonstrated that the hydrogen economy is not emerging in a post-geopolitical space, but right in the midst of the very same lines of conflict that have already shaped the fossil fuel world. The de facto blockade of the Strait of Hormuz, the disruption to shipping, the rise in insurance premiums, the pressure on ports and sea routes, and the search for alternative pathways have exposed the vulnerability of the energy transition's physical infrastructure. Hydrogen is not a geopolitically neutral molecule. Its derivatives move through contested seas, chokepoints, and zones of political influence. This alters the assessment of locations and corridors. Maritime export models from the Gulf must now be evaluated under new risk assumptions. Pipeline-based Mediterranean options, particularly via North African connection, gain relatively attractiveness. Ports outside the Strait of Hormuz, such as Fujairah, emerge as geopolitical assets. And corridors such as IMEC reveal their dual nature: strategically visionary, but operationally only as resilient as the security framework that underpins them.

The systemic implication is clear. The hydrogen market is not determined by production costs alone, but by the ability to organise resilience. This includes not only security of supply, but also the political, technical and military safeguarding of energy flows. Building a corridor requires more than financing electrolysers. It demands terminals, storage facilities, certification, off-take agreements, insurability, diplomatic relations and, where necessary, security policy protection frameworks. In this sense, the hydrogen does not mark a break with traditional energy geopolitics, but its transformation. Oil, gas, and hydrogen differ in their physical properties. In their embedding within power and space, however, they are more similar than early narratives suggested.

For the MENA region, this presents a historic window of opportunity. Lasting advantage will depend on whether hydrogen is treated not only as an export commodity, but as a tool for industrialisation. This requires moving beyond the role of a production hub. Localisation of technology, industrial processing, the development of regional demand, the intelligent use of Chinese and European competition, and diversification of export markets will determine whether MENA becomes a shaping force in the new energy order or remains an upstream supplier.

For Europe, the conclusion is no less clear. Maintaining a position in the emerging hydrogen system requires more than setting targets and defining regulatory standards. Europe must decide whether it wishes to remain a rule-setting end market or become an active co-creator of the industrial and infrastructural foundation. This implies credible demand instruments, realistic and stable

regulation, domestic manufacturing capacity, strategic infrastructure investment, and an honest acknowledgement that hydrogen policy has long been a matter of foreign, security, and industrial policy.

At its core, the issue is not technological, but systemic. The question is not whether hydrogen will emerge, it already has. The question is who controls the system in which hydrogen is produced, certified, transported, processed, and secured. Control over routes affects prices, technology shapes dependencies, demand drives investment, and stability defines influence beyond energy.

The new energy order is not a distant prospect. It is already taking shape – in Duqm and Fujairah, in Ain Sokhna and Jorf Lasfar, in the SoutH2 Corridor and IMEC, in Chinese electrolysis plants, in European auction mechanisms, and in the crisis management around the Strait of Hormuz and the Red Sea. Hydrogen is not simply part of decarbonisation. It is part of a broader reordering of space, industry, and power. Those who see it only as a green molecule underestimate its political significance. Those who understand it as a system recognise that it is reshaping both energy markets and global power dynamics.

Related publication

A shorter version of this analysis is available here: ***Where the future smells of salt, steel and risk***

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