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September

The New Energy Security: Building Resilient Energy Systems in an Era of Multiple Risks



CEO Roundtable White Paper

The Al-Attiyah Foundation



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The Al-Attiyah Foundation's third CEO Roundtable of 2026, titled "The New Energy Security: Building Resilient Energy Systems in an Era of Multiple Risks," brought together senior leaders and experts from Qatar and overseas to examine a rapidly changing energy-security landscape.

Held on 9 September, the discussion focused on how governments and companies can build energy systems that remain reliable, affordable and sustainable while withstanding geopolitical conflict, shipping disruptions, cyber threats, climate impacts and increasingly concentrated technology and critical-mineral supply chains.

CEO WHITE PAPER

The late H.E. Abdullah bin Hamad Al-Attiyah created the Foundation to provide a platform for knowledge exchange and support the global community in its pursuit of a sustainable energy future.

The CEO Roundtable provides an opportunity for CEOs, Foundation members and partners to convene and examine pertinent energy and sustainable development topics.



Opening the Roundtable, the Foundation's Chairman, H.E. Dr Saud Al-Attiyah, reflected on succeeding his late father, H.E. Abdullah bin Hamad Al-Attiyah, and thanked the Board of Trustees for the confidence placed in him.

He reaffirmed his commitment to carrying forward the Foundation's legacy and to preserving the CEO Roundtable as a forum for frank, forward-looking dialogue. H.E. Dr Saud noted that energy security can no longer be understood only as reliable and affordable supply: it must also encompass resilience to geopolitical shocks, cyberattacks, extreme weather, disruption of shipping routes and shortages of critical materials. He invited participants to consider how organisations can strengthen resilience without losing sight of affordability and sustainability.

Moderator:

Nawied Jabarkhyl,
Visiting Fellow at the
Al-Attiyah Foundation

Speaker

Michael Williamson,
Section Chief, Energy
Division at the United
Nations Economic and
Social Commission for Asia
and the Pacific

Speaker

Anne-Sophie Corbeau,
Global Research Scholar
at Columbia University's
Center on Global Energy
Policy

Speaker

Jim Krane,
Diana Tamari Sabbagh
Fellow in Middle East
Energy Studies at Rice
University's Baker
Institute for Public Policy

Speaker

Jan-Eric Fährnich,
Global Head of Gas &
LNG Analytics at Rystad
Energy

Jim Krane

Jim Krane spoke on the immediate strategic problem created by disruption to the Strait of Hormuz and the implications for Qatar's liquefied natural gas (LNG) export model. He emphasised that Qatar's cost advantage rests heavily on sunk investment in Ras Laffan and on dependable maritime access. A prolonged or recurring closure of the Strait would therefore impose very high costs on Qatar while remaining a comparatively low-cost means of disruption for an adversary. He framed his proposals as options for discussion rather than prescriptions and stressed that each carried significant political, commercial or sovereignty-related trade-offs.

Mr Krane outlined three options aimed at aligning external interests more closely with the continued flow of Qatari LNG:

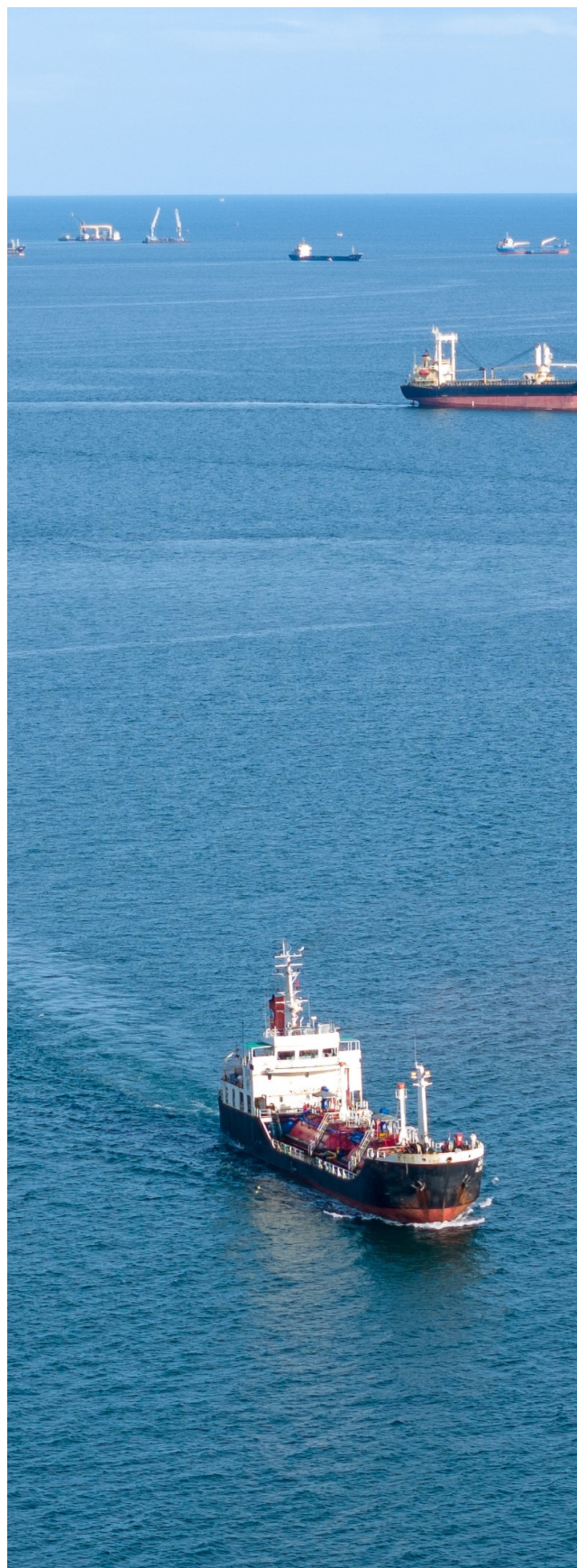
- 1) Develop a deeper commercial alignment with Iran through arrangements linked to the shared North Field/South Pars resource, potentially including bringing Iranian gas to Ras Laffan for liquefaction. Such an arrangement could create mutual incentives to protect facilities and shipping, but would also create long-term physical, contractual and sanctions-related complications.
- 2) Consider a revenue-sharing or unitisation-style arrangement under which Iran would have a direct economic interest in uninterrupted Qatari LNG exports. This could be more flexible than physically integrating assets but could face major political and sanctions-related constraints and the risk of escalating demands over time.
- 3) Increase Chinese economic exposure to the North Field and Ras Laffan, on the premise that greater Chinese commercial interests could strengthen Beijing's incentive to use its influence with Iran to protect energy flows. The deterrent effect would be uncertain, but the option could offer commercial value even if its geopolitical impact were limited.



He also examined longer-term options for reducing dependence on the Strait of Hormuz by creating alternative export pathways or diversifying investments outside Qatar:

- a) Pipeline connections through the Levant and Egypt, potentially linking Qatari gas to Egyptian liquefaction capacity or onward to the Arab Gas Pipeline and European markets.
- b) A pipeline connection to Oman, where additional liquefaction capacity could provide another route to international LNG markets, although transit, commercial and infrastructure arrangements would be complex.
- c) Further investment in gas and LNG assets outside Qatar, building on the logic of portfolio diversification and creating export exposure that is not dependent on Qatari molecules or Gulf shipping routes.

Mr Krane concluded that these alternatives would require substantial investment and would introduce new partners, transit risks and potential losses of control or cost advantage. The central strategic question is therefore not how to eliminate risk, but how much optionality Qatar should build into an export model that has historically benefited from concentration and scale.





Anne-Sophie Corbeau

Anne-Sophie Corbeau broadened the discussion from hydrocarbon supply security to the vulnerabilities created by electrification. She argued that electrification can reduce dependence on imported fossil fuels but may simultaneously deepen dependence on concentrated clean-technology supply chains. China holds leading positions in solar manufacturing, batteries, wind equipment and the refining of several critical minerals. As a result, a more electrified energy system may exchange one form of import dependence for another rather than eliminate strategic exposure altogether.

Ms Corbeau also highlighted the digital dimension of this dependence. Modern electricity systems rely increasingly on power electronics, software and connected devices. Concerns over embedded software, remote access and the possibility of compromised equipment mean that supply-chain security can

become a direct operational-security issue. In her view, countries need to assess not only who supplies critical hardware, but also who controls the software and digital architecture on which that hardware depends.

Her second theme was the continuing role of natural gas in electricity security. Europe's experience illustrates that low hydropower output, nuclear outages or periods of weak wind generation can quickly increase the need for flexible gas-fired power. Gas therefore remains an important balancing resource even in systems with growing shares of renewables, complicating assumptions that electrification alone will rapidly remove hydrocarbon dependence.

Ms Corbeau further argued that recent conflicts have exposed the physical vulnerability of large, centralised energy assets.

LNG plants and major power stations can become targets for missiles, drones or cyberattacks. For power systems, more distributed generation, storage and local flexibility can reduce the consequences of losing a single large asset and can support continuity during crises.

Finally, she observed that Europe has moved from heavy dependence on pipeline gas towards greater dependence on LNG. This has increased exposure to global competition for cargoes, price volatility and the growing politicisation of LNG trade. Flexible LNG has improved supply options, but flexibility itself carries a cost and does not remove geopolitical risk.

Michael Williamson

Michael Williamson approached energy security from the perspective of governments and public policy. He proposed a framework built around three core requirements: availability, uninterruptibility and affordability. Sustainability must connect these pillars over the long term, while resilience determines how well a system can absorb shocks and how quickly it can restore full functionality after disruption.

Mr Williamson stressed that energy security is both national and international. Energy underpins economic activity, trade and essential public services, which makes energy decisions inherently political. At the same time, individual countries cannot insulate themselves fully from regional and global disruptions. Cooperation can therefore strengthen energy security as a shared public good, particularly where infrastructure, markets and supply chains cross borders.

He described a risk environment shaped by events that were not adequately anticipated: the COVID-19 pandemic, the Russia-Ukraine

war and the current geopolitical confrontation affecting Gulf energy flows. For many Asia-Pacific economies, the key challenge is that they have limited ability to influence such events but must absorb their consequences. This requires a broader approach to scenario planning and greater attention to low-probability, high-impact shocks.

The closure of the Strait of Hormuz was cited as especially serious for Asia-Pacific economies that depend heavily on Gulf oil, LNG and fertiliser. Developing economies and Pacific Island states often have limited foreign-exchange reserves, storage capacity and fiscal buffers, making them particularly vulnerable to price increases and supply interruptions. Williamson argued for short-, medium- and long-term responses: immediate efficiency measures and distributed solutions such as rooftop solar can help quickly, while broader diversification, electrification and renewable deployment strengthen resilience over time. He cautioned, however, that growing digitalisation also creates new single points of failure and makes cybersecurity a core energy-security concern.





Jan-Eric Fährnich

Jan-Eric Fährnich examined how major geopolitical shocks have historically reshaped energy systems and then distinguished between redundancy and resilience. Previous crises, including the 1970s oil shocks and the 2022 invasion of Ukraine, accelerated investment in alternative technologies and supply arrangements, but the effect of these investments was often felt only after the immediate crisis had passed.

He noted that the present system has far more technological alternatives than in earlier decades. Renewable capacity, electric mobility and clean-energy technologies have expanded rapidly, while China has built very large manufacturing capacity across much of the clean-technology supply chain. This means substitution can occur faster than in the past, although technologies that are not already deployed cannot solve an immediate supply emergency.

In the short-term, Fährnich expected security concerns to entrench fossil fuels in many markets. Countries with domestic coal, oil or gas may rely more heavily on those resources to reduce import exposure. Some governments may also revisit domestic hydrocarbon production that had previously been deprioritised. In this sense, geopolitical disruption can slow elements of the transition in the near-term.

Over the longer-term, however, he argued that the economics of batteries, renewable generation and electrification continue to support further deployment. The transition may therefore be delayed or reshaped by conflict rather than reversed. Hydrocarbons will remain important, especially where they provide flexibility and security, but clean technologies are increasingly competitive on economic as well as environmental grounds.

His final distinction was between redundancy and genuine resilience. Simply adding more of the same infrastructure may provide spare capacity but leave the system exposed to the same underlying shock. Resilience requires different pathways, technologies, routes and sources so that one failure does not disable the whole system. Diversification should therefore be judged by whether it reduces common-mode risks, not simply by whether it increases capacity.

MODERATED DISCUSSION

The moderated discussion was held under the Chatham House Rule. Participants explored how the new risk landscape is changing corporate strategy, public policy and the balance between security, affordability and sustainability. The main themes included:

- International law and multilateralism: Participants expressed concern that weakening respect for international rules and institutions increases the risk of conflict spreading into energy and commercial systems. Reliable trade, shipping and investment ultimately depend on a degree of predictability, cooperation and enforcement that cannot be supplied by companies alone.
- The scale and asymmetry of the current shock: The discussion emphasised that the costs of geopolitical confrontation are not evenly distributed. Gulf producers, import-dependent Asian economies and lower-income countries can bear substantial economic consequences even when they are not the principal political actors in a conflict.
- Energy, food and fertiliser linkages: Disruption to Gulf energy flows has consequences beyond oil and LNG. Higher energy and fertiliser costs can feed directly into food prices and development outcomes, particularly in countries with limited fiscal buffers and high import dependence.
- Chokepoints and supply-chain ripple effects: Participants cautioned against viewing the Strait of Hormuz in isolation. Shipping routes, ports, pipelines, cables and other strategic passages can all become pressure points. Effects can also emerge with a time lag in industries dependent on specialised inputs, including petrochemicals, helium and semiconductors.
- A retreat from globalisation: Several interventions linked the current environment to a broader movement towards national priorities, regional spheres of influence and more fragmented trade. While countries may seek greater self-reliance, complete independence in energy, technology or food was widely viewed as unrealistic and potentially costly.
- Corporate investment and long-term resilience: Energy companies continue to make investment decisions over multi-decade horizons. Participants noted that the Gulf remains structurally competitive because of low-cost resources, established infrastructure and growing investment in emissions management. The crisis may also accelerate investment in alternative logistics, pipelines, ports and portfolio diversification.



- The continuing need for cooperation: When government-to-government cooperation is difficult, companies, international institutions and cross-border commercial partnerships can still preserve channels of engagement. Participants also highlighted a potentially stronger role for international energy companies in communicating operational realities to governments.
- Climate change must not fall off the agenda: Immediate geopolitical crises have pushed climate issues down the priority list, yet physical climate risks are already affecting infrastructure and communities. Participants pointed to heat, humidity, water stress and environmental damage in the Gulf as operational concerns that require adaptation as well as mitigation.
- The future role of gas: The discussion suggested that gas will continue to play an important role in power-system flexibility and in replacing more carbon-intensive fuels in some markets. At the same time, repeated supply crises could encourage some importing countries to accelerate renewables, nuclear power or domestic energy options, creating greater uncertainty around long-term LNG demand growth.
- Energy independence versus interdependence: Participants questioned the feasibility of complete energy independence. Electrification may reduce some fossil-fuel imports but increase trade in equipment, minerals and electricity. Stronger regional interconnections, including cross-border power trade, could improve both economics and security if governance and infrastructure risks are managed.

- Renewables and gas as complementary resources: One idea discussed was the use of solar generation supported by flexible gas to provide firm regional power, potentially allowing the GCC to export reliable electricity as well as energy molecules. Long-distance interconnection could become increasingly important as technology improves.
- Critical minerals and clean-technology concentration: Participants recognised China's dominant position in several clean-energy supply chains, while also noting that some risks differ from fossil-fuel dependence because equipment is generally less exposed to continuous supply interruption once installed. Strategic refining, stockpiling and trusted supply-chain nodes in the GCC were identified as possible areas for future consideration.
- Artificial intelligence and digital resilience: AI can improve forecasting, predictive maintenance, optimisation and crisis response, but the discussion stressed the need to consider both the use of AI for resilience and the resilience of AI-enabled systems themselves. Digital dependence, data, cybersecurity and computing infrastructure therefore need to be incorporated into energy-security planning.
- Economic diversification in Qatar: The crisis reinforced the strategic value of diversification, but participants also stressed Qatar's enduring advantages in energy: globally competitive resources, established infrastructure, expertise and location. Diversification should build on

these strengths while developing adjacent capabilities in technology, services, finance, infrastructure and knowledge-intensive sectors.

- Adaptation and operational excellence: Participants argued that climate adaptation and high standards of operational resilience could themselves become areas of expertise and value creation for Qatar and the wider GCC, especially as extreme heat, water stress and other physical risks increasingly affect energy operations.
- Resilience as an investment discipline: A recurring theme was that crises can create opportunities to identify vulnerabilities that had previously been tolerated. Stress testing, optionality, diversification and carefully targeted redundancy can reduce the economic cost of future shocks when integrated into long-term investment decisions.





To conclude the session, the moderator asked the guest speakers to identify the priorities that should remain front and centre as governments and companies respond to the current crisis. The following takeaways emerged:

- Build alliances and preserve cooperation: Qatar and other energy producers should avoid relying on a single relationship or pathway. Different partnerships can serve different strategic purposes, and cooperation remains one of the strongest tools for managing uncertainty.
- Plan for compound and unexpected shocks: Geopolitical disruption can coincide with climate hazards, cyber threats or other chokepoint failures. Resilience planning should therefore stress-test systems against multiple simultaneous disruptions rather than assume that risks will occur one at a time.
- Create optionality rather than simply more capacity: Alternative routes, diversified markets, distributed assets, strategic inventories and flexible technologies can be more valuable than duplicating infrastructure that is exposed to the same underlying risk.
- Reinforce regional and international cooperation: The discussion repeatedly returned to the weakening of multilateralism and international law. Energy security is difficult to achieve in isolation, and stronger regional arrangements, commercial relationships and institutions are needed to reduce shared vulnerabilities.

- Keep climate and sustainability integrated with security: The immediate crisis does not remove long-term climate risks. Adaptation, mitigation, efficiency and clean-energy investment should be designed to reinforce energy security rather than treated as separate or competing agendas.
- Use technology to strengthen resilience, while managing new dependencies: AI, electric mobility, distributed energy and digital tools can create new buffers and efficiencies, but they also introduce cybersecurity, infrastructure and supply-chain risks that must be anticipated from the outset.





In closing, H.E. Dr Saud Al-Attiyah thanked the speakers, members and participants, including the speakers who joined virtually from the United States and France. He said that, as his first CEO Roundtable as Chairman, he had found the discussion valuable and had been encouraged by the range of practical options and perspectives presented.

H.E. Dr Saud observed that crises can create opportunities by forcing governments and companies to reconsider vulnerabilities and accelerate options that may previously have received less attention. At the same time, he cautioned against accepting disruption to the Strait of Hormuz as a normal feature of the energy system. He also echoed concerns raised during the discussion about the weakening of international cooperation and the need for stronger mechanisms to reduce conflict and restore predictability.

He further noted that the crisis had underscored the continuing importance of conventional fossil fuels within the global energy system, even as the transition proceeds. He concluded by thanking the moderator and participants and expressing his hope that the Foundation would continue the conversation through future CEO Roundtables and other activities.

Qatari Options for Regaining Hormuz Access



Jim Krane

Diana Tamari Sabbagh Fellow for Middle East Energy Studies, Rice University's Baker Institute

Al Attiyah Foundation meeting, Sept. 9, 2026

The tasks at hand

- 1) Revive Qatari LNG exports, and
- 2) Make them resilient to Iranian actions

Preferred solution: Incentivize **Iran** to allow Qatar to use the Strait of Hormuz:

- Directly: Align economic interests. Either
 - a) JDA with Iran; or
 - b) Revenue sharing.
- Indirectly: Help from **China**

Alternate options (non-Hormuz):

- Invest in Hormuz **bypass pipelines and alternate liquefaction** of Qatari gas outside Qatar
- Invest in liquefaction and export of **non-Qatari gas** outside of Qatar



Toll Route: Larak Island and Iran shipping channel (purple). Omani waters in yellow.
<https://maritime-executive.com/article/the-irgc-s-positions-on-larak-overlook-the-tehran-tollbooth-route>

The problem

- Qatar's LNG cost advantage is based on sunk investments in immobile infrastructure
- Qatari exports of other commodities are daisy-chained to LNG: helium, condensates, petrochemicals, fertilizer.
- Attacking/blocking Qatar is low-cost for Iran, but costs Qatar ~\$4bn/month in lost revenues
- Conflict could metastasize into long-term hybrid warfare focused on Hormuz



Option 1: Joint Development Agreement

Bring South Pars gas to Ras Laffan for liquefaction

- Could be part of the NFS, NFE expansion
- (Dedicated trains?)
- Iran incentivized to protect Ras Laffan and ensure Hormuz passage

Downsides:

- Long-term ties between Qatar and Iran; difficult to unwind if circumstances change
- Iran could still block non-Iranian cargoes or attack non-Iranian trains
- IOC partners would avoid roles as technology providers (sanctions)
- USG *probably* opposes. But USG buy-in is possible

Advantages:

- Iranian dependence: Qatar gains control over Iranian resources and revenue flows
- Iranian deterrence power via the strait is reduced (disadvantage if it enables further US-Israeli attacks)



Option 2: Revenue sharing

Revenue sharing agreement with Iran

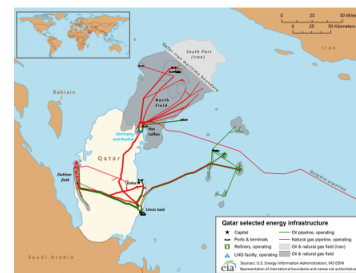
- Qatar shares a small percentage of LNG export revenue with Iran in exchange for escort through the strait
- Payments could be rationalized on unitization agreement that allows QE to market gas from a shared field

Downsides

- Iran can escalate payment demands
- USG opposition

Advantages

- Interests align: Iran maximizes revenue when Qatar maximizes exports
- Can be halted when circumstances change
- Reduces incentives for Iranian targeting of any part of Ras Laffan, or blockage of any cargo
- QatarEnergy handles relationship with Iran without IOC involvement (reduced sanctions exposure)



Option 3: Indirect deterrence via China

Increase Chinese investment stake in Ras Laffan to indirectly deter Iran

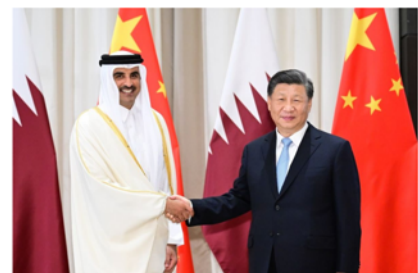
- China is key Iran ally, one of few countries with leverage
- Sinopec and CNPC hold equity stakes (single digit %) in NFE and NFS, and 27y offtake
- Enhance equity to 30% range
 - China responds more urgently to Iran threats
 - Offtake settlement in RMB
 - QE invest in China regas, storage, petchem JVs, etc.

Downsides:

- Iran ignored past Chinese demands for Hormuz free passage
- Iran hardliners prioritize deterrence over Chinese economic interests
- China has no Gulf military presence to bolster clout

Advantages:

- Low risk. Profitable regardless of whether deterrence succeeds
- USG no objections (?)



Alternative export routes and liquefaction for Qatari gas

Across KSA to Tabā/Aqaba

Target Egyptian liquefaction (12.7 mtpa) or domestic market (\$6-7 mmbtu)

Also: Arab Gas Pipeline (extension to Turkey/EU?)

Pipeline to Oman LNG at Sur

Oman LNG 11.4 mtpa, increasing to 15.2 in 2029

- o Dolphin to Oman exists (expansion needed?)
- o UAE interference (extend Dolphin on favorable terms)

Other possibilities:

- o Pipe to Red Sea KSA (need liquefaction)
- o Pipe to Iran network, to Turkey, EU?

Downsides

Pipelines mostly don't exist and would have to be financed and built

Qatar loses sovereignty, cost advantage; gains unwanted partners, new risks



Non-Qatari gas options



Invest in liquefaction and export of non-Qatari gas

Current:

- Golden Pass, Texas 9 mtpa expanding 18 mtpa soon

Potential:

- QE has stakes in offshore exploration blocks in Namibia, Cyprus, Egypt, Suriname, Brazil, and Guyana
- Discoveries in **Cyprus and Namibia** could eventually warrant liquefaction
- Further investments

Downsides:

- Not as profitable
- No Qatari gas involved
- No Qatari sovereignty



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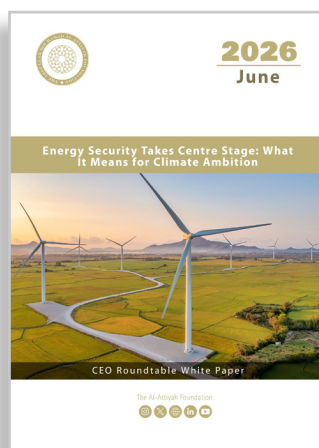
Jim Krane

Email: jkrane@rice.edu

Office: +1 713 348 3567

LinkedIn/Twitter: @jimkrane

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June – 2026

Energy Security Takes Centre Stage: What It Means for Climate Ambition

At the Al-Attiyah Foundation's second CEO Roundtable of 2026, distinguished leaders from the energy industry, drawn from within Qatar and overseas, convened to discuss and reflect on a possible change in emphasis in the energy scene.



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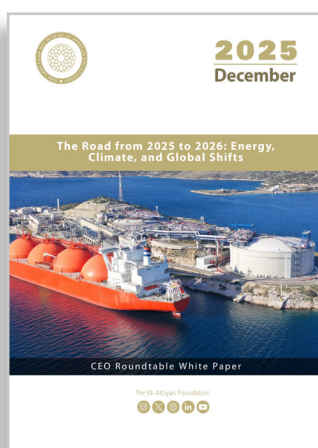
February– 2026

Global Energy Dynamics: Forces Shaping the Industry

The Al-Attiyah Foundation's first CEO Roundtable of 2026 convened distinguished leaders from the energy industry, drawn from within Qatar and overseas. The Roundtable reflected on the factors (political, economic, and others) that will significantly shape the landscape of the energy industry in 2026 and beyond.



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December– 2025

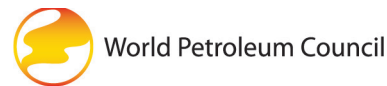
The Road from 2025 to 2026: Energy, Climate, and Global Shifts

The Road from 2025 to 2026: Energy, Climate, and Global Shifts provided a candid and forward-looking forum to discuss the accelerating pace of the energy transition, the pressures facing global supply and demand systems, and the strategic dilemmas confronting governments and companies during a period of heightened uncertainty.



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Our partners collaborate with the Al-Attiyah Foundation on various projects and research within the themes of energy and sustainable development.





The Al-Attiyah Foundation

Tel: +(974) 4042 8000,
Fax: +(974) 4042 8099
www.abhafoundation.org

Barzan Tower, 4th Floor, West Bay.
PO Box 1916 Doha, Qatar
Alattiyahfndn

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