

2023

December

The Year That Was – Reflecting on 2023 and Plotting Climate Action in 2024



CEO Roundtable White Paper

The Al-Attiyah Foundation



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The Al-Attiyah Foundation's fourth CEO Roundtable of the year was held on December 6. The Trilemma for Energy, encompassing Energy Affordability, Energy Sustainability, and Energy Security, formed the basis of the session's analysis of trends witnessed over the past 12 months and predictions for 2024. During the dialogue, experts discussed whether hydrogen would become a significant fuel source in the coming years, the practical and effective approaches that the energy sector could employ to mitigate climate change, the possibility of 'stranded assets' both above and below the ground in fossil-producing countries, and more.

CEO WHITE PAPER

H.E. Abdullah bin Hamad Al-Attiyah created the Foundation as a platform for knowledge exchange and to support the global community in the quest towards a sustainable energy future.

The CEO Roundtable is an opportunity for CEOs, Foundation members and partners to meet in one room and examine pertinent energy and sustainable development topics.



Moderator:



Mr. Axel Threlfall,
Editor at Large at Reuters

Speaker



Professor Paul Stevens,
Economist at Chatham
House

Speaker



Professor Graham Weale,
Professor of Energy
Economics at Ruhr
University Bochum

Speaker



Mr. Alan Gelder,
VP Refining, Chemicals
and Oil Markets
at Wood Mackenzie

Speaker



Mr. Robin Mills,
CEO at Qamar Energy

Speaker



Mr. Chris Gentle,
Senior Advisor,
Partnerships and New
Ventures at the World
Energy Council

His Excellency Abdullah bin Hamad Al-Attiyah extended a warm welcome to the assembled member CEOs, expert speakers, and distinguished guests. In his opening remarks, H.E. acknowledged the eventful nature of 2023, marked by significant developments and transformations within the energy industry and on the global stage. He emphasised that the meeting aimed to reflect upon the pivotal occurrences of the past 12 months while also looking towards the challenges and opportunities that lie ahead in 2024.

SUMMARY OF KEY POINTS RAISED

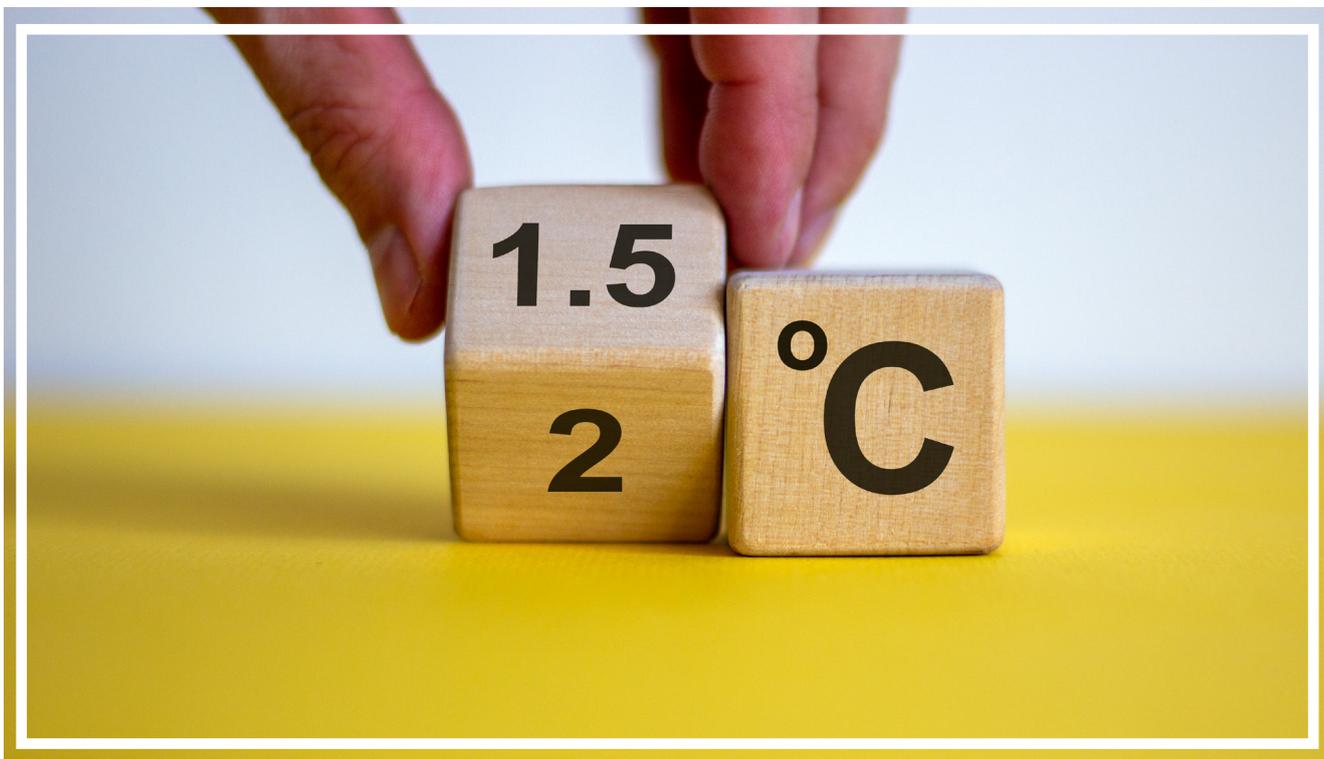
The Roundtable delved into critical discussions, highlighting key points for consideration:

- Addressing methane emissions is imperative.
- The emphasis on climate change has shifted from technical challenges to the importance of political will and the necessity for consistent rules and policies to support long-term financial decisions.
- The role of ammonia in combating climate change is gaining prominence due to its use in fertiliser production and ease of transportation.
- Development of new markets for emerging products requires subsidies to foster growth while ensuring financial viability.



Paul Stevens delved into the contrasting forces influencing energy supply and demand, juxtaposing the foundational aspects with the current geopolitical landscape. Analysis of the fundamentals suggests a limited growth in energy demands and, consequently, prices. However, the prevailing geopolitical uncertainties, marked by conflicts in various global regions, prompt buyers to maintain higher stock levels. Notably, amidst declining prices, consumers appear increasingly attuned to the fundamentals rather than geopolitical considerations. This dynamic is illustrated in the "Paper Barrel Markets," showcasing the positions taken by traders – whether long or short. Refer to Appendix A for a detailed presentation by Paul Stevens at the Roundtable.

Graham Weale explored the potential roles of hydrogen in combating climate change, acknowledging its well-known ability to burn without producing carbon dioxide. However, he noted the challenge of identifying a robust business case for "green hydrogen," with demand currently lacking. Despite more negative than positive news in 2023 and a plethora of Final investment decisions (FIDs) for hydrogen yet to materialise, he advocated for government subsidies to stimulate the hydrogen market. Niche opportunities, such as utilising surplus hydropower in Sweden for green electricity and hydrogen production in steelmaking, were highlighted.

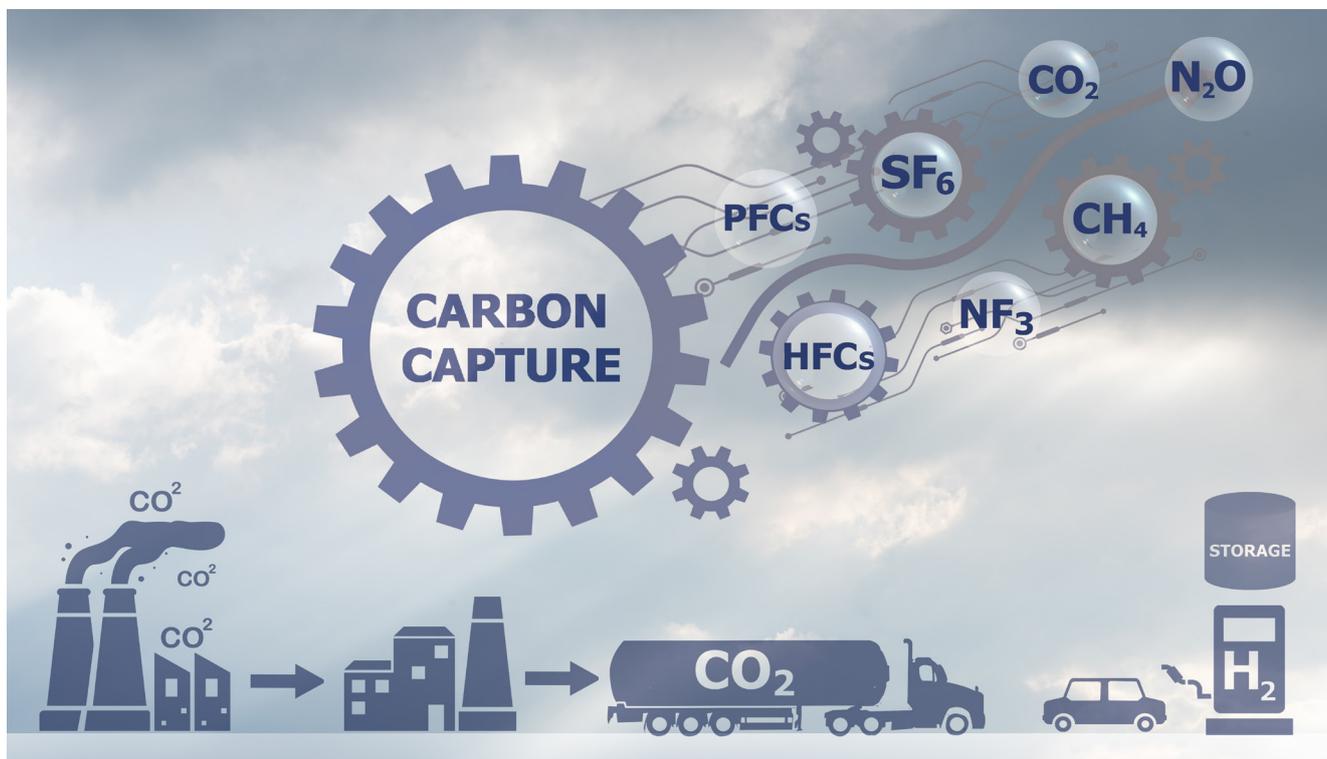


Chris Gentle provided insights into the current stage of the Energy Transition toward non-fossil fuels, emphasising the importance of a "fair transition." This entails support for both less affluent developing countries and more developed ones, while consumers and energy suppliers grapple with the trilemma of sustainability, affordability, and security of supply. Notably, the Inflation Reduction Act of 2022 in the USA, unrelated to inflation, is poised to significantly impact the country's economy by subsidising the transition away from fossil fuels.

Robin Mills explained the intricate interplay of geopolitics and gas fundamentals under the theme "Hot Climate – Chilly Politics!" He highlighted the surplus of fossil fuel reserves exceeding the carbon budget for 1.5 and 2°C temperature increases, foreseeing inevitable stranded assets. While fossil fuels remain competitive and essential for certain uses, he

anticipated a decline in fossil fuel usage post-2032, with gas diminishing more slowly than oil and coal. Qatar is projected to maintain its status as the lowest-cost producer, particularly when considering Long Run Marginal Costs. Within the Middle East, Renewable Energies are gaining competitiveness but require balance with gas production for low load factor usages.

Alan Gelder reported on the favourable supply/demand balance in 2023, with ample storage levels and a notable shift in destinations for Russian oil and gas. Anticipating a similar scenario in 2024, barring exceptionally cold winters, he highlighted significant changes in refining dynamics in the long term. This shift involves transitioning away from transportation-centric demands toward a focus on petrochemical production.



OPEN FLOOR DISCUSSION

The floor was opened for participants to share comments, questions, and engage in discussions. Key highlights included:

- Observations on incremental progress at COP28 and the need for more clarity on rules and policies.
- Optimism regarding advancements in technology and collaborative efforts among governments, NGOs, academic institutions, and energy producers.
- The call for international rules to facilitate cash flow forecasts for projects.
- Persistent challenges in addressing methane leakage for fossil fuel producers.
- The growing momentum of CCUS (Carbon Capture and Utilisation) projects.

CONCLUSIONS:

In his concluding remarks, H.E. Abdullah bin Hamad Al-Attayah summarised the discussions and expressed gratitude for the valuable contributions. Anticipating further developments at COP28 in Dubai, he acknowledged the potential impact on the industry, promising forthcoming publications from the Foundation. H.E. extended appreciation to member companies for their support and valuable contributions to the dialogue.

WHAT HAPPENED TO OIL MARKETS IN 2023 AND WHAT ARE THE PROSPECTS FOR 2024?

Professor Paul Stevens

Emeritus Professor, University of Dundee, Scotland
Distinguished Fellow, IEEJ, Tokyo
Distinguished Fellow, Al Attiyah Foundation, Qatar
Associate Fellow, Chatham House, London

RECENT PRICE HISTORY 2022-23 THEME:

FUNDAMENTALS Vs GEOPOLITICS

- FUNDAMENTALS = SUPPLY, DEMAND, STOCKS, AND SPARE CAPACITY IN THE “WET BARREL MARKETS”
 - STRONGLY AFFECTED BY ECONOMIC GROWTH, INFLATION, INTEREST RATES, EXCHANGE RATES AND PRODUCER GOVERNMENTS’ FISCAL POSITION
- GEOPOLITICS = WARS AND GOVERNMENT POLICY DECISIONS

**2023 FUNDAMENTALS HAVE PUSHED PRICES DOWN
WHILE GEOPOLITICS HAVE BEEN PUSHING PRICES UP**

Professor Paul Stevens

THE LINKS BETWEEN FUNDAMENTALS AND GEOPOLITICS LIE IN EXPECTATIONS REFLECTED IN THE “PAPER BARREL MARKETS”

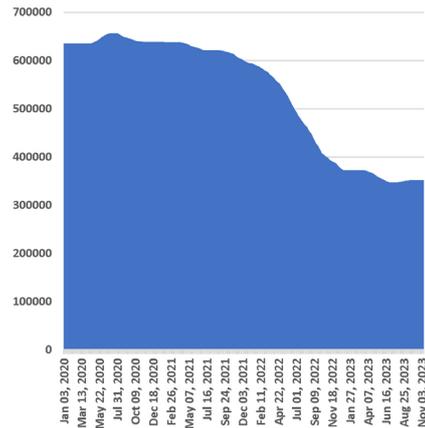
Money managers' net (long-short) positions in Brent and WTO crude oil (number of contracts)



Note: Traders holding long positions generally do so as they expect price gains, while traders holding short positions expect price drops, hence the market has become more bearish in recent weeks

Source: Oxford Analytica Daily Brief 12st November 2023

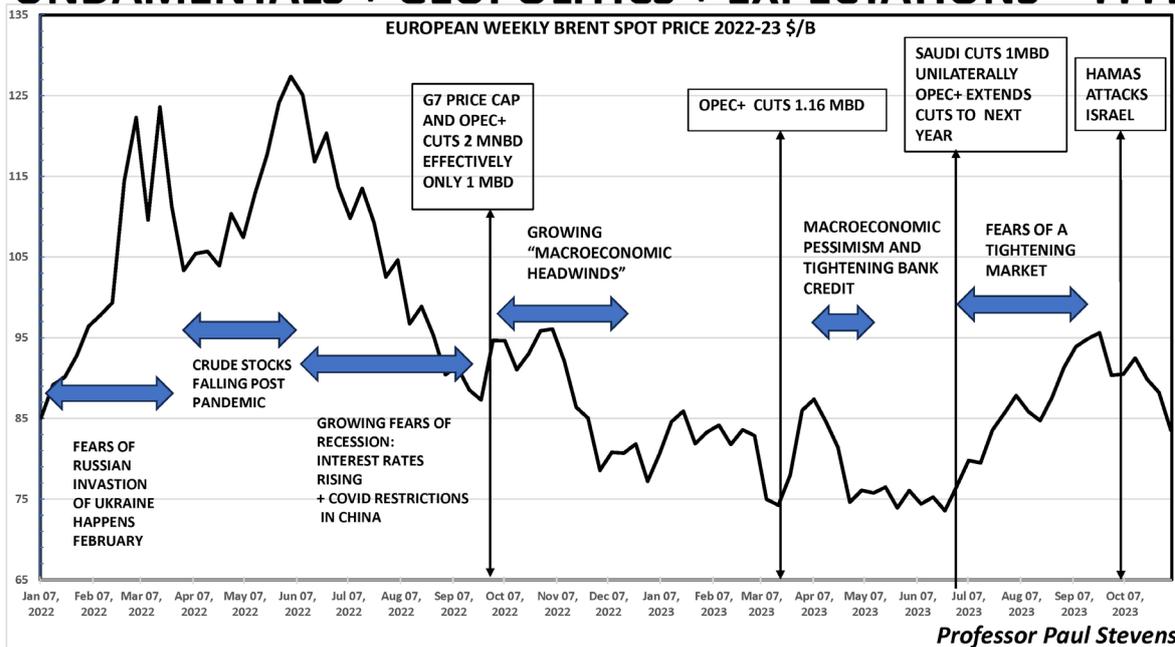
US Strategic Petroleum Reserves 2020-23 '000 b



Source: EIA 22nd November 2023

Professor Paul Stevens

RECENT HISTORY 2022-23: FUNDAMENTALS + GEOPOLITICS + EXPECTATIONS = ??????



Professor Paul Stevens

PROSPECTS FOR 2024: A menu for discussion?

- **FUNDAMENTALS**

- DEMAND? – weak because of recession – key will be the US and China
- SUPPLY? – OPEC+ cuts but widespread cheating leaking supply
- SPARE CAPACITY? – likely to increase aggravating cheating

- **GEOPOLITICS**

- HAMAS AND ISRAEL – Arab producers' response?
- OPEC+ - Struggling to balance the market?
- Russia and Ukraine?

- **EXPECTATIONS**

- Fundamentals will overcome the geopolitics and prices face downward pressure

THANK YOU FOR YOUR ATTENTION

• Professor Paul Stevens

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- Emeritus Professor, University of Dundee, Scotland
- Distinguished Fellow, IEEJ, Toyo
- Distinguished Fellow, Al Attiyah Foundation, Qatar
- Associate Fellow, Chatham House, London

Green Hydrogen and Ammonia Outlook

Al-Attiyah Foundation CEO Roundtable: Reflecting on 2023 and
Shaping Climate Action in 2024 – Doha 6th Dec. 2023

Prof. Graham Weale, Centre for Environmental
Management, Resources and Energy (CURE)
Ruhr University Bochum



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Climate Action in 2024 – Doha 6th Dec. 2023

1

Green hydrogen / ammonia market – a herculean task

- Operators struggling to find business case
- Demand is still missing
 - Needs subsidies or customers willing to pay premium for green products
- 2023: more negative than positive headlines
 - Rollback on production of electrolyzers
 - Rules unclear and bureaucracy obstructive
 - Two blue hydrogen projects cancelled
 - Avalanche of FIDs has not arrived
- 2024: nearly 500 kt H₂ equ./yr onstream

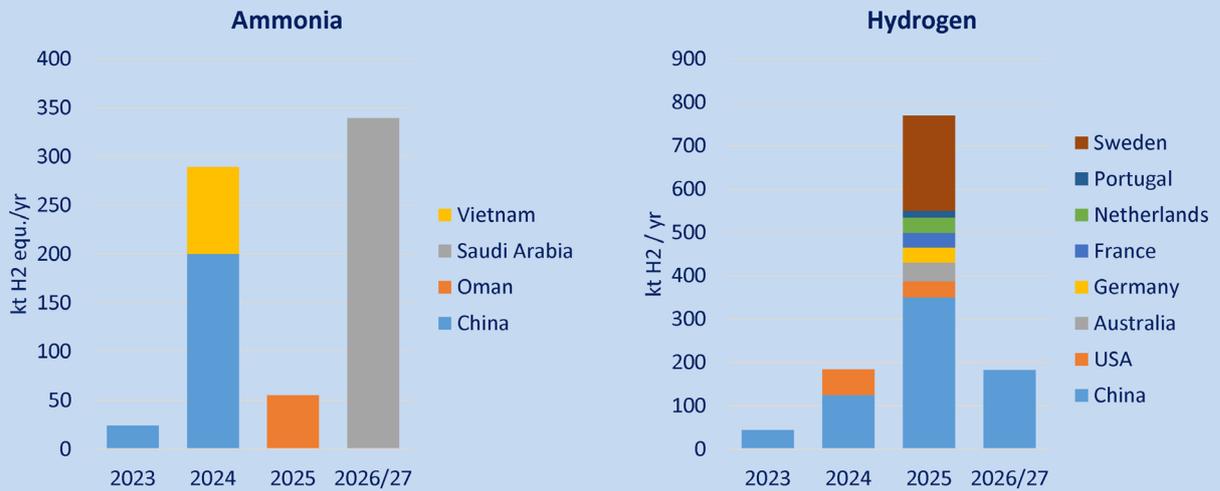


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2

Ammonia and hydrogen plants under construction / with FID



Source: IEA Hydrogen Database (Oct. 2023) and author's analysis

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3

Ammonia and hydrogen projects worldwide – under construction / FID



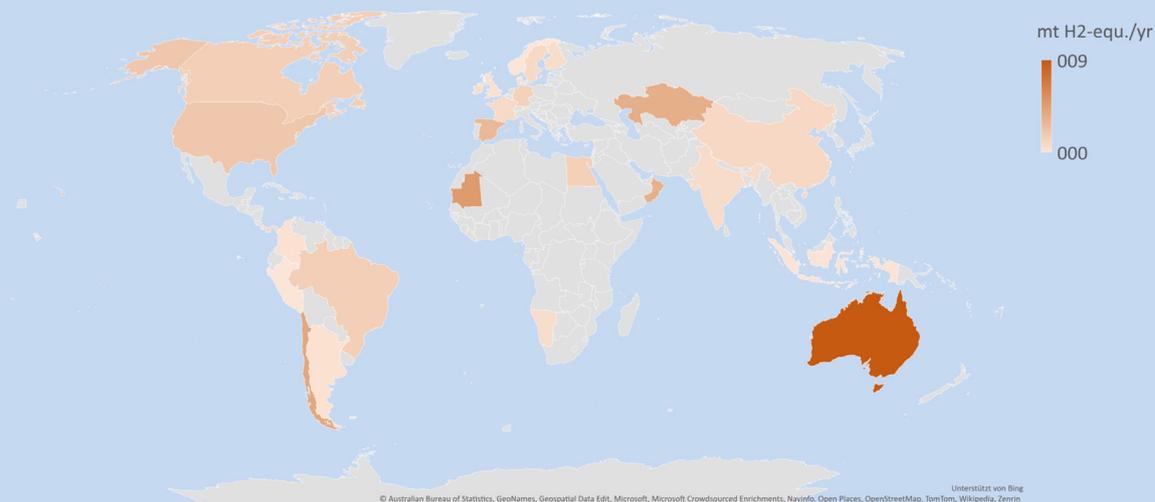
Source: IEA Hydrogen Database (Oct. 2023) and author's analysis

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4

Ammonia and hydrogen projects worldwide – feasibility studies



Source: IEA Hydrogen Database (Oct. 2023) and author's analysis

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5

Cumulative electrolyser build and average project size – not enough to make progress along “learning curve”



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6

Significance of fuel, colour and transport

- Significance of fuel – coming only in homeopathic quantities
 - All global projects underway / FID will account for nearly 2 mt H2-equ./yr by 2027 (5.7 mtoe)
 - 0.04% total primary energy and 0.17 % of natural gas
 - Half of the projects with feasibility studies would result in 22 mt H2-equ./yr (63 mtoe)
 - 0.5% of total primary energy and 1.9 % of natural gas
- Colour
 - More interest in green hydrogen, but blue could be a pump-primer
 - In some regions of the world renewable power will be very abundant and cheap
- Transport
 - Up to ca. 4000 km by pipeline, otherwise shipping in form of ammonia

Breaking the deadlock – what is required?



More
money?



Different
rules?



New
players?

Conclusions

- The biggest challenge since the start of the industrial revolution?
- Like renewables relies heavily on subsidies, but value chain is much more complex
- Not enough electrolysers planned to make progress along the learning curve
- Enormous co-ordination and contracting challenges
- Will only make progress if countries will subsidise heavily

Thank you for your attention!

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Middle East & Global Gas: Hot Climate, Chilly Politics

Qamar Energy / Robin Mills Presentation for the ABHAIF
CEO round-table

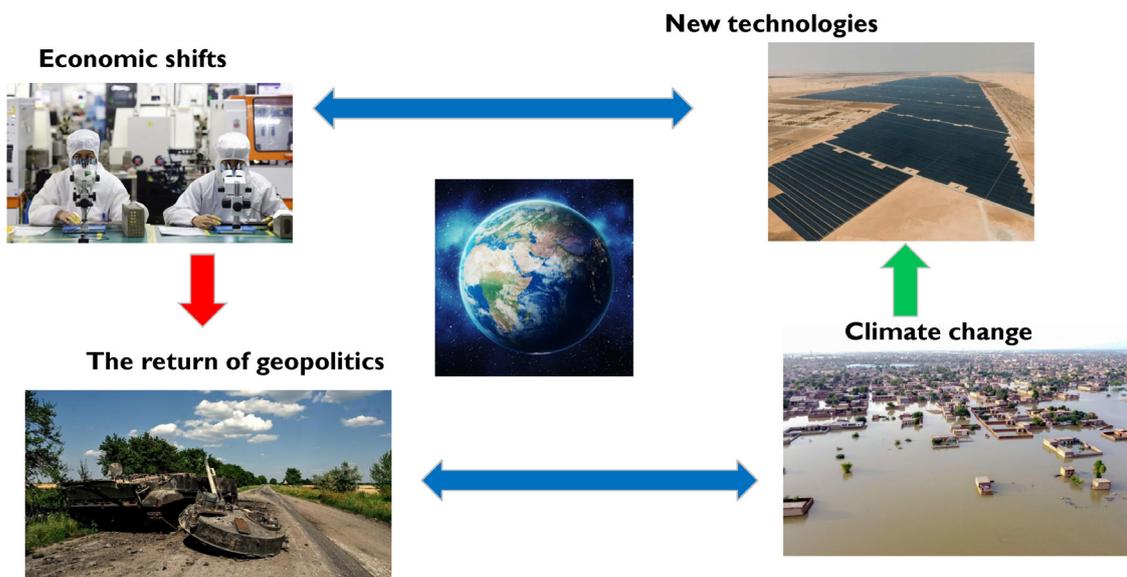
December 2023

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Key themes in global energy



Sources: Qamar Energy research

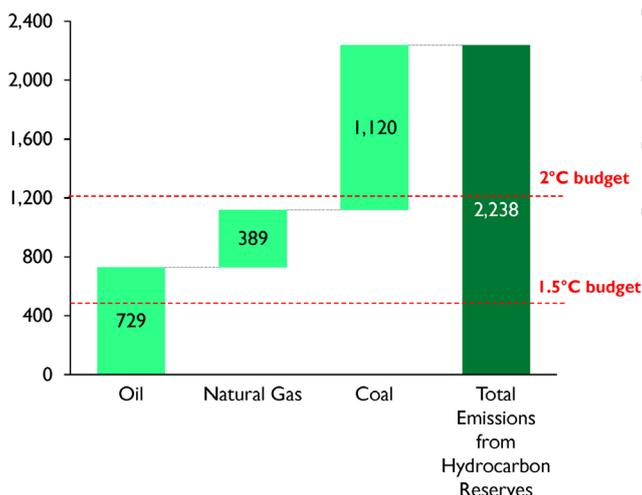
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The scale of the climate challenge: ~2,200 Gt CO₂ of global hydrocarbon reserves and only 460-1,200 Gt of carbon budget

Emissions from Known Fossil Fuel Reserves

Units: gigatonne (Gt)



- Known reserves of fossil fuels vastly exceed the carbon budget for 1.5-2°C of warming
- Warming depends on cumulative emissions – not on when / if we reach “net-zero” carbon
- Additional resources can be added through exploration and improved / enhanced recovery
- Hydrocarbons remain competitive and essential in many end-uses
- Options to use fossil fuels while staying within the 1.5 / 2°C budget include:
 - cutting non-CO₂ emissions (methane & others)
 - prioritising lower-emitting resources, projects, and operations
 - deploying carbon capture & storage in end-use
 - non-emitting uses (e.g. long-lived petrochemicals)
 - bio-sequestration and Bioenergy with CCS (BECCS)
 - direct air capture of CO₂

Sources: BP Statistical Review of World Energy and Qamar Energy's Internal Research and Analysis

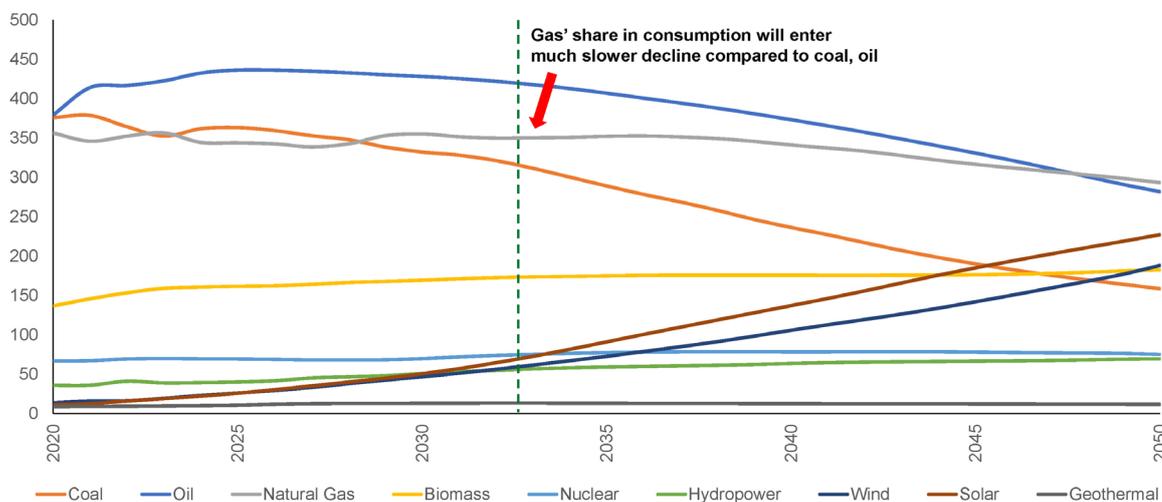
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Primary Medium-Term Energy Consumption will be Dominated by Oil & Gas, but Declining

Primary Energy Consumption by Source in a Peak Demand Scenario

Units: Btoe



Sources: Qamar Energy's Internal Research and Analysis

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The Middle East is central to the global energy response – and not just in oil and gas



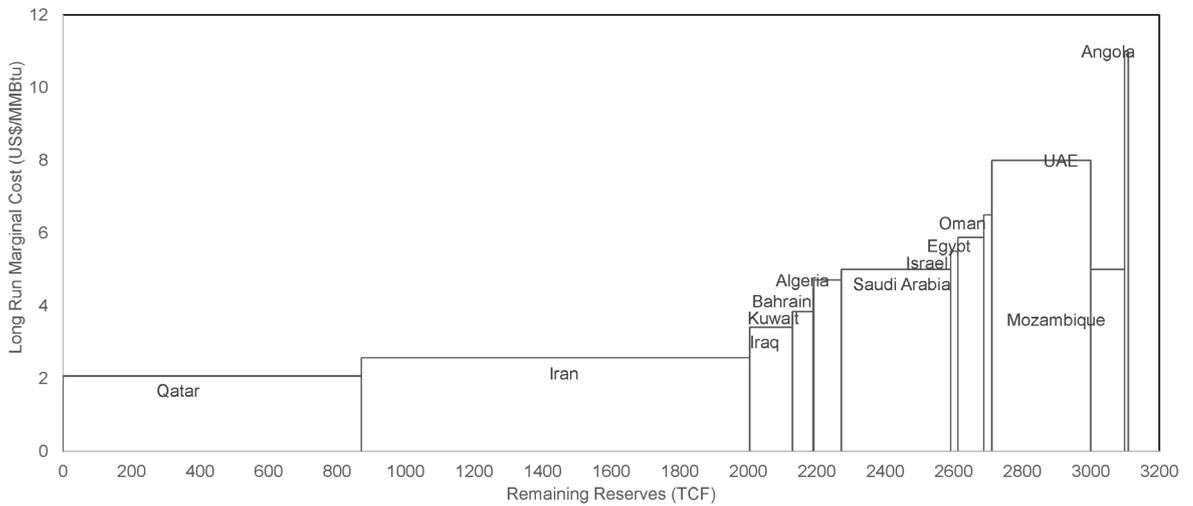
Sources: Qamar Energy research

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Underpinning Planned Capacity Expansions, New Capital Projects coming from the Region

Natural Gas LRMC Cost Curve in the Middle East & Africa
Units: US\$/MMBtu, BCM/y



Sources: Qamar Energy's Internal Research and Analysis

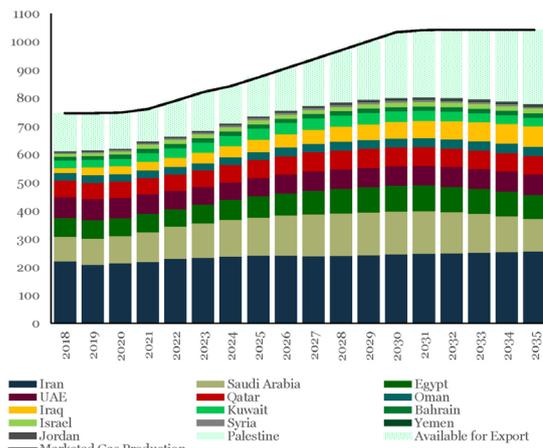
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Strong Forecasted Demand in Gas in the Region will support Uptake of Green Technologies, Renewables

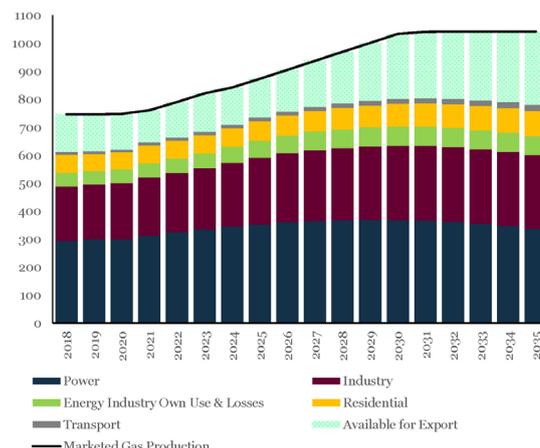
Demand for Natural Gas by Country

Units: BCM/y



MENA Gas Demand by Sector

Units: BCM/y



- **UAE** underlying natural gas demand growth limited by nuclear, solar, efficiency. However, growth from industry, blue hydrogen and ammonia will be strong.

Sources: Qamar Energy Research

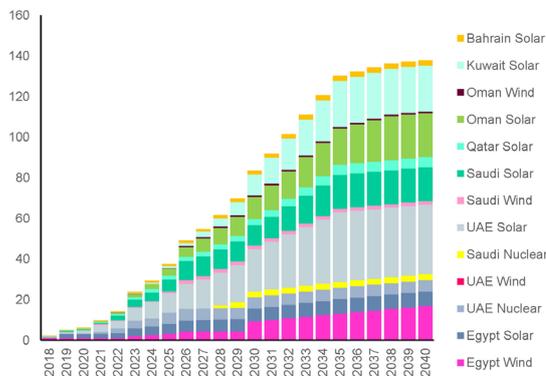
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Superbly Low LCOEs for Renewables and Growing Capacity more Targeted to Transition

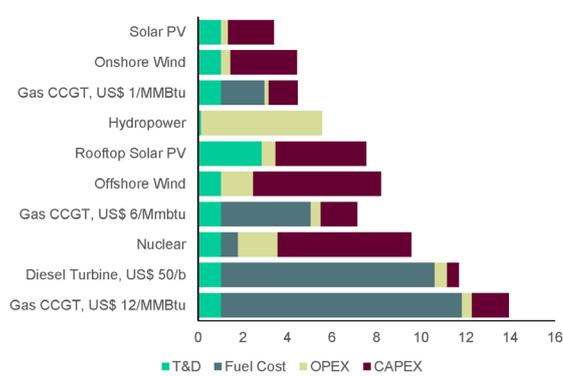
Installed and Planned Clean Energy Capacity in the Middle East

Units: GW



Breakdown of Levelised Cost of Electricity

Units: US\$/ kWh



- Left chart excludes H₂-dedicated RE capacity, i.e., RE power for H₂ production – shows only RE capacity for power
- Renewable energy is increasingly low-cost but still needs to be balanced by natural gas generation (particularly at lower load factors)
- Low-cost RE energy generation can enable competitive green H₂ production – right chart shows LCOEs inclusive of T&D costs, which can make them higher than project bid prices + costs shown for 2023, when prices have increased slightly

Sources: Qamar Energy's Internal Research and Analysis

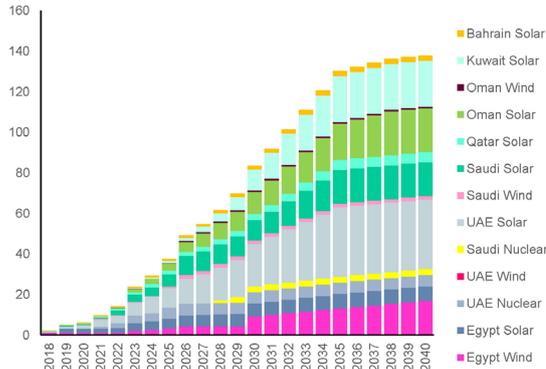
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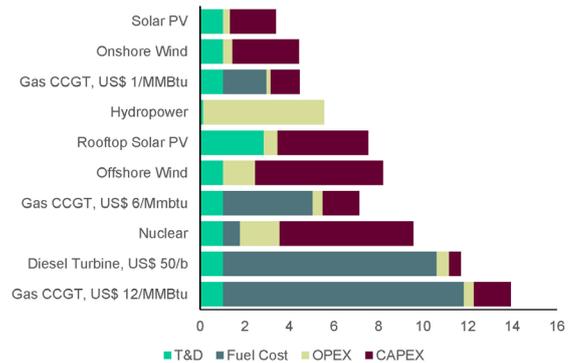
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Sources: Qamar Energy's Internal Research and Analysis

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Contacts and Disclaimer

Robin Mills

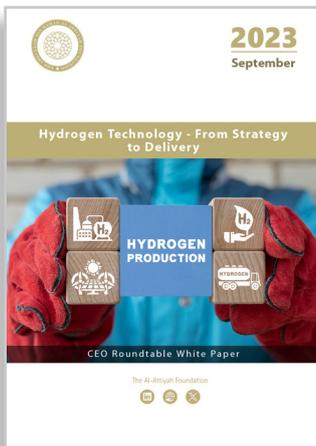
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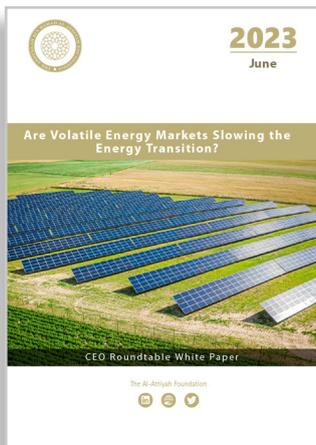


September – 2023
Hydrogen Technology – From Strategy to Delivery

Hydrogen is the most abundant element in the universe and also burns without producing carbon dioxide. Due to these properties, many experts have claimed that it is the "wonder fuel" and could play a major role in the race to net-zero emission by mid-century.



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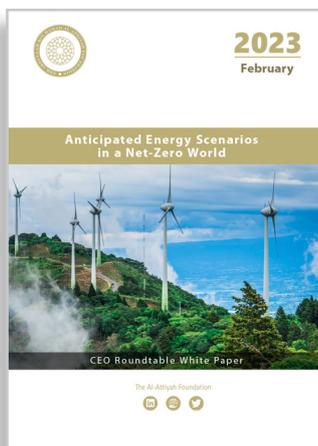


June – 2023
Are Volatile Energy Markets Slowing the Energy Transition?

Various institutions within governments, academia, research institutions and the private sector are addressing the need for mitigating actions to either abate or counteract the effects of climate change. However, it is often observed that the prices of fossil fuels are volatile.



(QR CODE)



February – 2023
Anticipated Energy Scenarios in a Net-Zero World

Institutions within academia, research organisations, the private sector, and the energy industry have developed energy scenarios. While these organisations have different methodologies and varying assumptions, most of their scenarios are not optimistic about the world meeting targets set by the Paris Agreement.



(QR CODE)

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

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