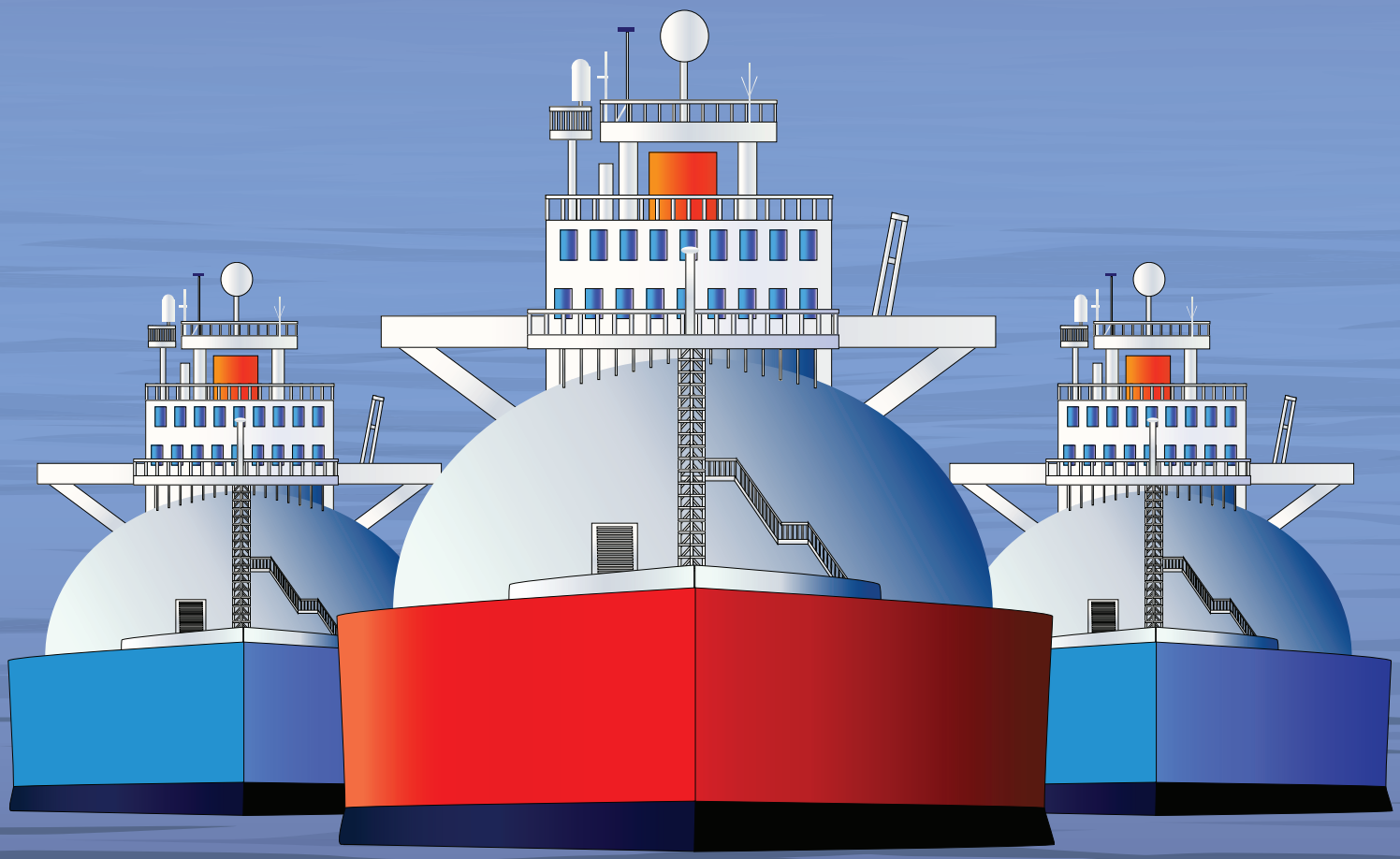
2018

The Middle East LNG Institute

LNG Whitepaper II



How to Establish a Liquid, Flexible and Transparent Middle East LNG Market by 2025?

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Contents

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Establishing a Liquid, Flexible and Transparent Middle East LNG Market by 2025

One need unites all liquified natural gas (LNG) producers' new rulebook: flexibility. As competition intensifies, producers must remain relevant by adapting to different volumes, timings and destinations with minimal fuss and cost. Flexibility of delivery will maximize the value of Middle Eastern LNG exports, the majority (68%) of participants said in a survey by the Middle East LNG Institute last year. One year on and this sentiment has only intensified; momentum for significant change is building.

One illustration of the shifting tides is that customers are now pushing for shorter contract lengths to help manage price and volume preferences. The average length of a LNG supply contract was approximately 21 years in 1994 – it fell to six years in 2017. The infamous destination clause (buyers are restricted from reselling LNG outside a designated market) are also increasingly absent from the Middle Eastern exporters' negotiating table, especially for coveted Asian clients. The same applies to the growth of the floating storage and regasification unit (FSRU) market. The $240 – $300 million price tag of a new FSRU typically represents 50-60% of the cost for an onshore terminal and can be delivered in half the time at 27–36 months, estimates the Oxford Institute for Energy Studies (OIES).

40%

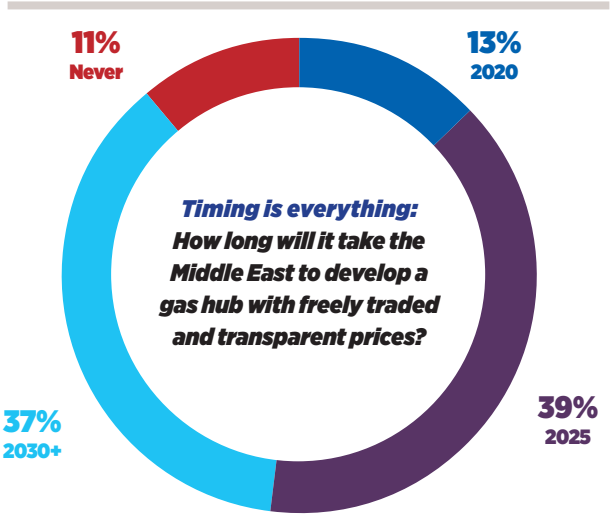
The Middle East holds 40% of the world's natural gas reserves; the majority lies under Qatari and Iranian soil.

Tick Tock

Global energy pricing agency S&P Global Platts expects global demand for LNG bunkering to rise to 28-29 million metric tons by 2030. A supportive political undertone is also encouraging the market's growth. LNG is considered the 'greenest' hydrocarbon and is emerging as an agent of positive change in meeting the low-carbon commitments laid out by the Paris Agreement. The number of LNG consuming countries has more than doubled from 15 in 2005 to 39 in 2017, according to the International Energy Agency (IEA). As the pace of growth accelerates, it is a race against the clock to update the market architecture to leverage the Middle East's competitive edge. More than a third (39%) of survey respondents said the Middle East can develop a gas hub with freely traded and transparent prices by 2025, while others (37%) said 2030 onwards was more viable. Without proactive steps now, neither timeframe will be accurate.

Competitive Future

The Middle East will remain the largest LNG exporter up to 2040, representing 25% of global LNG exports, according to the BP Outlook 2018 report. While this represents significant market share, it is 10% less than the 35% that BP detailed in its 2016 report. Why? In short; the US and Australia. Both are fast emerging as robust competitors to the Middle East's LNG ace: Qatar. The country's crown as the world's biggest LNG exporter is under threat within the decade. By 2022, the IEA estimates that the US will be on course to challenge Qatar and Australia – a large, established and ambitious producer – for global leadership. This is astonishing considering that this year marked the first time the US became a net exporter of natural gas on an annual basis since 1957. As domestic gas demand swells and foreign competition escalates, the Middle East must sharpen its act – both upstream and downstream – to cement its role as a LNG hub by 2025. So, what's next? ■



Source: ME LNG Institute Research; Q2 2017

17%

The Middle East accounts for 17% of global production. Potential abounds for this percentage to rise.

14%

The energy-hungry Middle East represents 14% of global consumption.

15

Shorter term contracts are in vogue; the average length of a LNG supply contract has fallen by 15 years in approximately 23 years.

1.44bn

The UN expects China and India to each be home to 1.44 billion people by 2024, which makes the countries and wider Asia a highly attractive customer base for Middle East LNG producers.

2022

The US could take Qatar's position as the world's biggest LNG exporter in under four years as the global superpower's gas-producing expertise and export infrastructure fast improve.

The Middle East LNG Institute

Established in 2017, the Middle East LNG Institute examines the evolution of LNG in the Middle East and North Africa (MENA) as the region transitions from a net-exporter to a net-importer. The Institute's mission is to facilitate the region's community of LNG stakeholders and share knowledge and best practices. The Institute also provides the insights needed to successfully navigate through what are still uncharted waters for many Middle Eastern energy stakeholders.

The Institute provides a single, independent and trusted platform for knowledge exchange, data gathering and intelligence sharing. These are crucial tools as the region explores comprehensive solutions to rebalancing one of the starkest juxtapositions in the global energy market. The region is home to more than 40% of global gas reserves, yet the volume of its LNG imports is climbing as domestic demand outpaces pipeline supply. The status quo is being rewritten – new demand, new supply, new hubs – and an ability to flex to these dynamic conditions will create the winners of a market that is nearing the top of the global energy hierarchy.

Workshop: Source of Whitepaper Findings

The Chatham House Rule was invoked at the meeting to encourage openness and the sharing of information: *"When a meeting, or part thereof, is held under the Chatham House Rule, participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed."*

OPEN MIC: Following the Welcome Note and introduction of the Critical Question by the moderator and featured speakers, the Stream Discussions follow an open floor format whereby all participants were encouraged to proactively engage in the free flowing conversation.

COME PREPARED WITH RECOMMENDATIONS: All participants were encouraged to come to the table with "Recommended Strategies" in answer to the Critical Question.

In SESSION A:
Shortlist 5 recommendations

SHORTLIST 5 RECOMMENDATIONS
The 1 hour sessions were broken into 3 parts:
- Commentary from featured speakers
- Open conversation with recommendations put forward
- Voting to identify top 5 recommendations per stream

In SESSION B:
Reduce shortlist from 5 to 3 recommendations

SHORTLIST 3 RECOMMENDATIONS
The 1 hour sessions were broken into 3 parts:
- Commentary from featured speakers
- Author of each of the 5 shortlisted recommendations had 5 minutes to promote and defend their recommendation
- Voting reduced shortlist to 3 recommendations per stream

WORKING LUNCH:
Votes on the shortlist of 3 recommendations in each stream secured ranking in order of importance.

Structure:

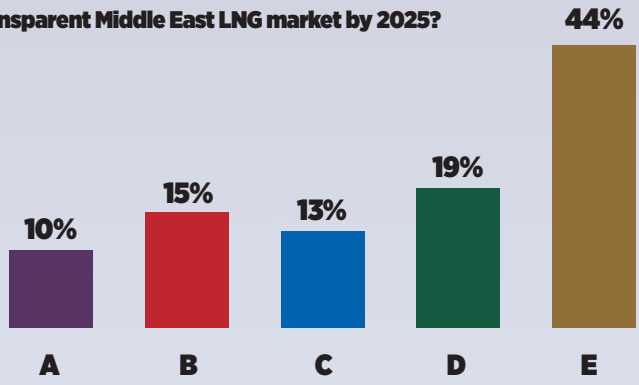
APRIL 16th, 2018	
PLENARY SESSION	
STREAM 1 TOP 5 RECOMMENDATIONS TO CREATE A FLEXIBLE LNG ECOSYSTEM IN THE MIDDLE EAST BY 2025?	**STREAM 2** TOP 5 RECOMMENDATIONS TO OPTIMIZE LNG AND GAS INFRASTRUCTURE IN THE MIDDLE EAST BY 2025?
SESSION A SHORTLIST TOP 5 RECOMMENDATIONS	**SESSION A** SHORTLIST TOP 5 RECOMMENDATIONS
SESSION B TOP 5 RECOMMENDATIONS SHORTLISTED TO 3	**SESSION B** TOP 5 RECOMMENDATIONS SHORTLISTED TO 3
POLL SURVEY ON TOP 3 RECOMMENDATIONS IN EACH STREAM	
FINAL DECLARATION OF RECOMMENDATIONS AND CLOSING COMMENTS	

The Middle East LNG Institute
SURVEY

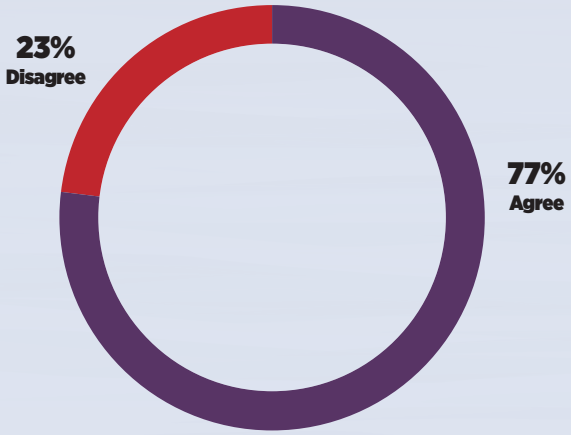
How to Establish a Liquid, Flexible and Transparent Middle East LNG Market by 2025?

What is the most important 'next step' to establish a liquid, flexible and transparent Middle East LNG market by 2025?

A. Build a LNG storage hub in the region
B. Establish a Middle East LNG benchmark price contract
C. Regional domestic demand to outpace pipeline supply
D. Remove all subsidies that fix natural gas prices at low levels
E. All of the above in no particular order



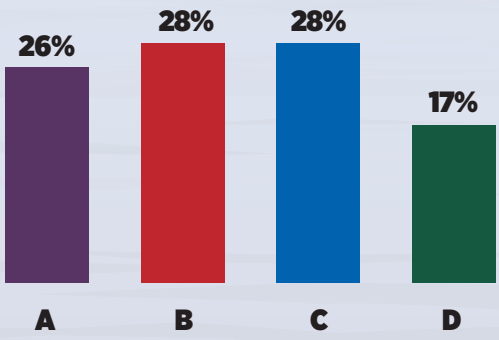
Destination restriction clauses prohibit the buyer in a LNG sale and purchase agreement from redirecting or reselling the LNG in any cargo. Middle East LNG sellers will have to drop destination restriction clauses in future contracts in order to retain market share in Asia.



Between 2016 and 2020, the US is expected to account for half of the 20 billion cubic feet per day of new LNG export capacity worldwide. Should this market revolution compel the Middle East to accelerate its transformation into a more liquid, flexible and transparent LNG market?

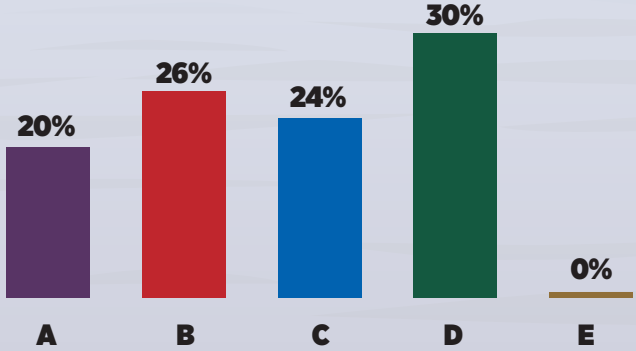
Global LNG demand is predicted to grow from 250 million tons per annum (mtpa) in 2015 to 400 mtpa in 2025 – a 60% increase. How much of this 400 mtpa will be 'homeless' and available to the spot market in 2025?

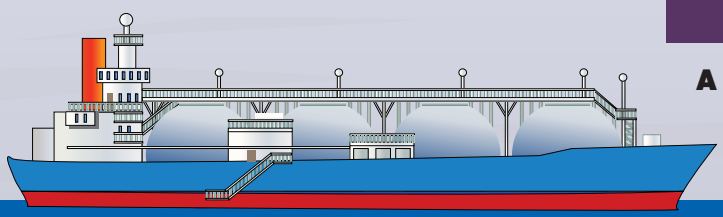
A. 50 mtpa
B. 75 mtpa
C. 100 mtpa
D. 100 mtpa+



The Middle East, traditionally associated with large-scale LNG exports, has become one of the fastest growing demand centers for the commodity. This has mostly been facilitated by a significant increase in the number of FSRUs operating across the region from Egypt to Pakistan. How many more FSRUs will arrive in the region by 2025?

A. 2
B. 4
C. 6
D. 6+
E. None





Source: ME LNG Institute Research; Q2 2018

EXECUTIVE SUMMARY – STREAM 1

Recommendations to Create a Flexible LNG Ecosystem in the Middle East by 2025?

Global LNG trade volumes have doubled since 2005 and Royal Dutch Shell said the market witnessed 293 million metric tons in 2017 – 30% higher than anticipated. As best described by the Financial Times newspaper: 'This once-sleepy corner of the energy industry is rapidly transforming into the next major commodity for swashbuckling trading houses.' So, how can the Middle East ensure it is the preferred region for this golden goose to 'roost' by 2025?

The region has a good head start. It benefits from fortunate geography, lying at the crossroads of Europe, Africa and Asia. This places it – and its port infrastructure – at the heart of the increasingly lucrative energy corridor opening up East of the Suez Canal. Plus, the region has a strong foothold in the market already; it will account for 25% of global LNG exports up to 2040 and is home to the world's biggest LNG exporter, Qatar. National and international companies are also expanding their investment footprint to ramp up domestic production and enhance LNG infrastructure. Abu Dhabi National Oil Company (ADNOC) has earmarked more than $109 billion over the next five years to, in part, boost gas output and Saudi Arabia signed agreements last November worth $4.5 billion; the biggest deal focused on gas production. In Oman, BP and the country's Ministry of Oil and Gas announced first production from the giant Khazzan gas field

1st

Qatar is the world's biggest LNG exporter. In the 1980s, Doha chose to focus on developing its natural gas reserves – the world's third largest – while its Gulf neighbours honed in on black gold (oil) exploration.





“The Middle East has made a good start. But creating a LNG ecosystem will require more boxes to be ticked – and quickly.”

in September 2017, with future expansion to 1.5 billion cubic feet a day of gas on track. Bahrain is undertaking pre-development work on its tight gas reserves this year and to the west, Eni produced first gas from Egypt’s supergiant Zohr field in December 2017. Potential abounds as Zohr is the largest gas discovery ever made in Egypt and in the Mediterranean Sea.

While commendable, such efforts still only tick part of the criteria to create a flexible, liquid and transparent LNG ecosystem. There is a lot more work to do. Ecosystems must encompass independent buyers and sellers, accessible infrastructure, transparent access to prices and liquidity and services, such as banking and legal. Creating a trading architecture also requires participants to master increasingly nuanced market conditions. One is a growing preference for smaller and shorter-term contracts. This marks a step away from the sizeable long-term contracts that have long been the market’s bread and butter. Rethinking how the market prices LNG is also on the table.

Carving out a clear and robust framework now will help plug the region’s growing gas deficit. To meet rising demand, Saudi Arabia-based Apicorp estimates that power capacity in MENA must expand by an average of 6.4% each year between 2018 and 2022. S&P Global Platts said in 2014 that the region imported 5.9 billion cubic meters (4.3 million tons) of gas as LNG, just under 2% of total global LNG imports. By the end of 2016, this figure had risen to 28.6 billion cubic meters (20.9 million tons) – 7.9% of the global total.

A structured ecosystem will also help the region meet a new source of demand from 2020: LNG bunkering. It is is considered an environmentally safer option to scrubbers to meet the International Maritime Organization’s (IMO) ruling to implement a 0.5% sulphur cap on marine fuel, down from today’s 3.5%, from 1 January, 2020. Amid the many unknowns left to clarify, one point is appreciated by all: the Middle East must act quickly before competitors tempt the golden goose away. ■

X2

Global LNG trade volumes have doubled since 2005.

0.5%

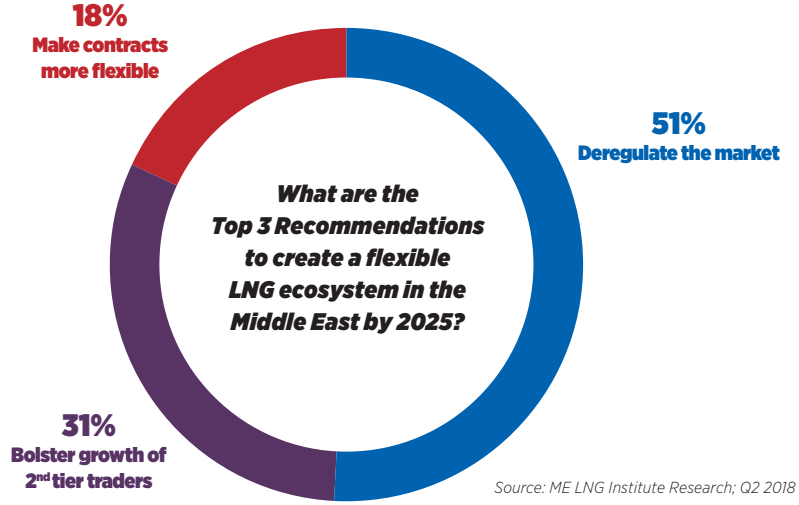
The rise in LNG demand to meet the IMO’s 2020 sulphur limit on bunker fuel of 0.5% - just an unnerving two years’ away for many – must be factored into an ecosystem.

6.4%

The Middle East’s domestic gas supply cannot plug its looming power deficit alone, so this source of demand for LNG must be priced into the design of a regional ecosystem. Power capacity in MENA will need to expand by an average of 6.4% each year between 2018 and 2022.

$109bn

The amount Abu Dhabi has allocated to, in part, boost domestic gas production, meet domestic demand and expand LNG market share. All points have quickly climbed the region’s political agenda.



Source: ME LNG Institute Research; Q2 2018

STREAM 1
Top Three Recommendations

1. Deregulate the Market

The first step to creating a more liquid, flexible and transparent LNG market? Deregulation. A liberalized market would increase the number of market players, spur competition and accelerate the adoption of pricing benchmarks – all key features of an evolving and world-class gas and LNG ecosystem. It would also whet investors' appetite and grease the wheels of financial decision-making. In the early 1980s, European gas markets comprised of negotiations with a complex formula of oil-based products that were quoted on the Rotterdam Exchange. It was a relatively opaque environment. Fast forward to 2018 and there are several hub prices quoted in Europe, with flexibility for point of landing and point of delivery, for example. This fungible marketplace provides competitive pricing for end users and offers a working example of how Middle Eastern policy makers can create a transparent pricing hub with a variety of contractual arrangements via liberalization. While deregulation is not historically in the Gulf's DNA, there are clear signs that policy makers' ears are open and ready to listen. Unprecedented policy changes in recent years – notably reduced subsidies – and National Visions that promote greater competition are major signs that a shift is underway. The UAE is a good starting point for market deregulation. The country's different sources of gas supply – the Dolphin pipeline, LNG imports and FSRUs – have fostered a multi-choice and competitive environment for consumers. As momentum for liberalization mounts, stakeholders must remember that steady rather than speedy change equals greater sustainability. The market may not be fully deregulated by 2025, but resetting the compass today will inevitably put the Middle East on the right path.

2. Bolster Growth of 2nd Tier Traders

Several boxes will be ticked by lowering the 'entry to market' barrier for 2nd tier traders. Firstly, more market players breed liquidity, thus increasing the adoption of new regulations and pricing benchmarks. In addition, 2nd tier traders are well suited to shifting market dynamics; they can cater to buyers' growing preference for small-scale contracts, for example. All these factors are vital to nurture a LNG ecosystem. But a few hurdles must be scaled first. Human capital – primarily trading expertise – must be enhanced to enable 2nd tier trading companies to accurately analyze the dynamics in what many workshop participants warn can be a risky commodity market. Historical wounds also need to heal. Some cargo deliveries defaulted when Japan's Fukushima Daiichi nuclear disaster in 2011 triggered a surge in LNG demand. Sour sentiment lingered for years. But the large size of the LNG market today means the stress on the marketplace in the event of a spike in demand would be less acute. Stakeholders must have faith that 2nd tier traders now have a stronger footing and make it easier for such companies to enter the market.

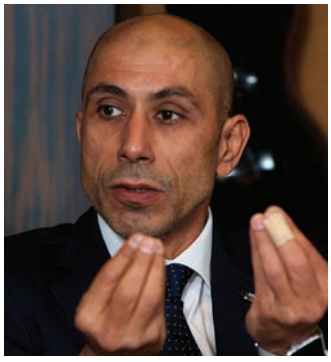
3. Make Contracts More Flexible

A power shift at the negotiating table is gaining traction. Lower LNG prices and intensifying competition among exporters for market share – especially for coveted Asian contracts – has given importers more clout since 2016. And what do they want? A bigger 'menu' of options. This includes diversifying the traditional contracts that stretch up to three decades with more spot and shorter-term contracts, which are increasingly popular. Removing destination clauses is also at the top of importers' wish list. The clauses restrict the resale of LNG cargoes and critics argue they inhibit competition. Having more contractual choices will buoy liquidity and make the adoption of pricing benchmarks more viable, therefore supporting the evolution of a LNG ecosystem. While responding to importers' new criteria, Middle Eastern LNG exporters stress that keeping some long-term commitments is paramount to hedge against the big-ticket infrastructure projects that help exporters guarantee supply. Exporters' ability to flex is undoubtedly improving, but one size does not fit all. For example, exporters investing in downstream assets have a greater need for long-term commitments than those that have existing infrastructure and are more focused on optimizing the short-term commodity price. But they all share the challenge of schedule management, which will inevitably become more complex with more contractual options on the table. Producers' management skills must run parallel to rising demand for shorter-term contracts and the reselling of LNG cargoes to ensure uninterrupted supply. ■

STREAM 1

Other Recommendations

- ✓ **Create a Middle East LNG marker**
- ✓ **Leverage midstream capabilities, including storage**
- ✓ **GCC to remain an importer and exporter of LNG**
- ✓ **Foster cross-border cooperation**
- ✓ **Lift subsidies**



EXECUTIVE SUMMARY – STREAM 2

Recommendations to Optimize LNG and Gas Infrastructure in the Middle East by 2025?

There is an elephant in Middle Eastern energy boardrooms – a looming gas deficit that needs plugging. One consequence is power shortages; public showers on steaming Iraqi streets and blackouts in other Middle Eastern countries are commonplace, for example. It is perhaps unsurprising then that the growth rate of LNG imports into the Middle East over the last three years reached a staggering 380%, according to S&P Global Platts' data.

The upward demand trajectory – from both domestic production and LNG imports – will only continue. Demand for power capacity is expected to climb by an average of 6.4% each year between 2018 and 2022 in MENA; the region's population and industrial growth show little sign of slowing down. The UN estimates that the UAE's population alone will swell by 17% to 11.05 million people (versus 70,000 in 1950) by 2030. More than half of electricity generation in the Middle East is gas-fueled, while industry in the region is also slanted toward gas utilization. The IEA estimates that the power sector will lead the region's growth in gas consumption into 2040. Plus, abiding by the IMO's 2020 ruling adds another batch of demand (volume yet to be determined), as do aspirations to widen the region's influence in the LNG export market.

Consider the Middle East's current challenge against the fact that it sits atop 40% of the world's natural gas reserves; Iran and Qatar alone are home to the world's second and third largest

380%

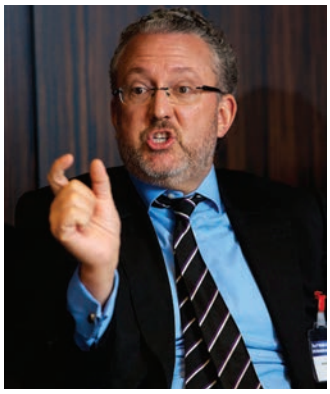
The growth rate of LNG imports into the Middle East over the last three years was a staggering 380%.

1st

The Dolphin pipeline was the first cross-border gas pipeline in the Gulf. Starting in Qatar, the pipeline supplies the UAE and Oman with 2 billion cubic feet a day of gas.

17%

Population growth across the Middle East is a significant driver of gas and LNG demand. The UAE's population alone is expected to rise by 17% to 11.05 million by 2030.



“Why is a region so rich in natural reserves short of gas and LNG? A myriad of reasons: challenging fields, high development costs, a preference for oil production and a lack of cross-border collaboration, to name the primary drivers. So, how best to ramp up momentum in the 21st century?”

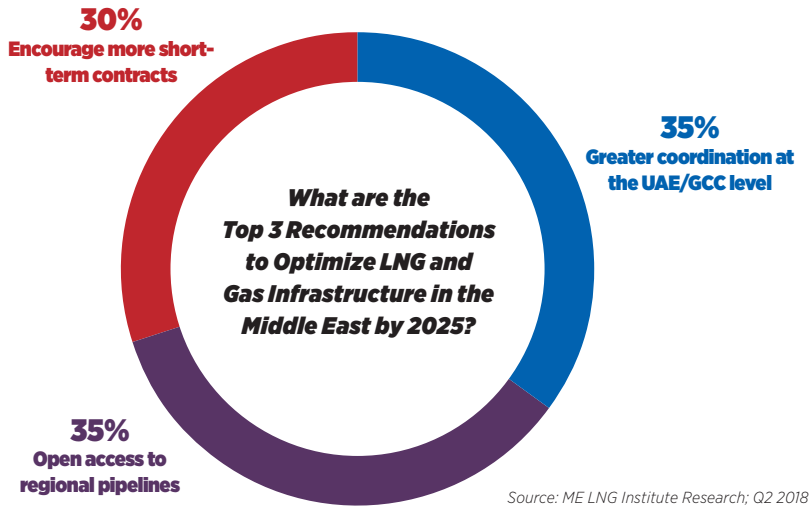
reserves, respectively. So, why is a region so rich in natural reserves short of gas? A myriad of reasons: challenging fields, high development costs, a preference for oil production and a lack of cross-border collaboration, to name the primary drivers. The Dolphin Pipeline from Qatar to the UAE and Oman was the Gulf’s first significant cross-border gas pipeline project and its last – so far. The pipeline opened in 2007 and now carries 2 billion cubic feet a day of gas. It illustrates how collaboration breeds success, but it is also a niggling reminder that so much potential remains untapped.

With demand profiles so starkly out of tune with domestic supply – and a desire to minimize reliance on LNG imports – the Middle East is examining its puzzled gas management strategy with rejuvenated eyes. Flexibility and forethought will be key as fortunes can change quickly, as highlighted by Egypt’s experience. The country moved from exporting 16.2 billion cubic meters of the 61.3 billion cubic meters it produced in 2010, to consuming almost all of the 48.8 billion cubic meters it produced domestically in 2014. Egypt’s gas narrative is likely to shift again as the development of the Zohr field gives the country’s ambitions to bolster production another stamp of credibility.

As the Middle East rethinks its gas strategies, plans to strengthen security of supply via infrastructure is at the top of the agenda. Energy stakeholders agree that a united physical infrastructure network that encompasses all, rather than a few, is crucial to mature import-export hubs and distribution systems. The consensus extends to FSRUs and data transparency playing a key role. But with 2025 less than a decade away, what are the next steps required to ensure security of supply before the elephant starts to trumpet? ■

2025

MENA and the Asia Pacific will drive gas demand over the medium term, growing 40% by 2025 compared with 2015 levels, according to Apicorp. The region will account for 60% of global demand growth over the same period.



Source: ME LNG Institute Research; Q2 2018







STREAM 2
Top Three Recommendations

1. Greater Co-ordination at the UAE/GCC Level

Today, buyers and sellers cannot freely trade and move gas and LNG around the Arabian Peninsula; the land mass may as well constitute islands for the level of connectivity in play. This narrative must be reversed. A united gas infrastructure is essential to meet rising demand and deepen the region's position as an energy superpower. Disjointed policies mean Middle Eastern countries – and the region as a whole – must play catch up to meet shifting demand profiles. For example, the region's LNG imports rose by 380% in the last three years: this is indicative of a knee-jerk reaction, rather than collaborative and strategic forethought. Open lines of communication at home and abroad will help the Middle East keep ahead of the curve and avoid inefficiencies in supply management. Working together means domestic demand can be affordably satisfied, influence in export markets can grow and a local trading ecosystem can be nurtured. The same collaborative ethos can be applied to bolstering the transparency of data and knowledge across the region's entire value chain, especially as multiple hubs are anticipated. Such a significant undertaking would be valuable as the competitive edge of other gas and LNG players – notably the US and Australia – sharpens. Improving transparency within and across borders would also noticeably enhance the accuracy of forecasting; another crucial move to creating a liquid LNG market. Learning how to collectively adapt to changing market dynamics now will pay dividends later, as there will inevitably be more regulatory changes on the way. As illustrated by IMO 2020, the world's increasingly strict environmental rulebook will be a primary driver of change.

2. Open Access to Regional Pipelines

It is paradoxical that the Middle East's pipeline infrastructure is often underutilized when gas infrastructure is urgently needed to meet demand, ramp up domestic production and increase exports. For example, a 48-inch pipeline with capacity for 1 billion cubic feet of gas in Al Hamriyah in the UAE's emirate of Sharjah typically utilizes less than one tenth of said capacity. Such underuse is echoed across the region. Instances where the availability of infrastructure is strangled by poor management, manipulation, monopolization or political snags must be eradicated. Operators' hands must not be tied by red tape and unfair commercial alliances. Demand for gas and LNG is too high and infrastructure is currently too scarce for such barriers to limit the effectiveness of existing networks or allow blueprints for new projects to gather dust. Physical infrastructure is just one part of the story. Regulation is also paramount as it helps define the shared rulebook for cross-border and international projects and forms a much-needed step in liberalizing the market. A dichotomy of political agendas means some investors tread tentatively around big-ticket investments in pipeline infrastructure. Attacks on pipelines in several Middle Eastern countries has not buoyed sentiment: Bahrain, Yemen and Saudi Arabia are among the countries affected in recent years. Successfully opening access to regional pipelines through collaborative and transparent efforts would reverse some of the negative PR and galvanize investors' interest.

3. Shape Infrastructure to Support Short-Term Contracts

The market's offering must match the pace of change in demand profiles. The main triggers include swelling populations, changing policies, such as subsidy cuts and compliance to the Paris Agreement, and less predictable weather patterns. Amid such change, optimizing infrastructure is integral to enabling the market to offer a more flexible 'menu' of options i.e. spot and short-term contracts.

While still valuable, long-term contracts do not account for more immediate variations to the demand profile; a nuclear power plant coming online, an increase in domestic production or more FSRUs, for example. Gas and LNG producers must evolve the flexibility and transparency of their infrastructure frameworks to meet clients' desires for different specifications and schedules. With the right infrastructure in place, producers have a better chance of affordably leveraging spot and short-term contracts as a buffer against the unexpected. Investing more in infrastructure today also minimizes the amount of operational hiccups tomorrow, which is integral to bolstering liquidity and nurturing the growth of a LNG ecosystem. It also facilities the growth of 'homeless' LNG, which is current supply without fixed customers. Homeless LNG offers much-needed flexibility in a market with a growing preference for the 'here and now.' ■

STREAM 2

Other Recommendations

- ✓ **Build LNG and gas storage facilities**
- ✓ **Establish an independent regulatory body**
- ✓ **Liberalize the market and improve transparency**
- ✓ **Create integrated approaches within Industry to eliminate unnecessary buffering**
- ✓ **Increase pipeline access with Iran, home to the world's second largest natural gas reserves**
- ✓ **Single entity to manage LNG Imports (similar to JERA, the world's largest buyer of LNG)**

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