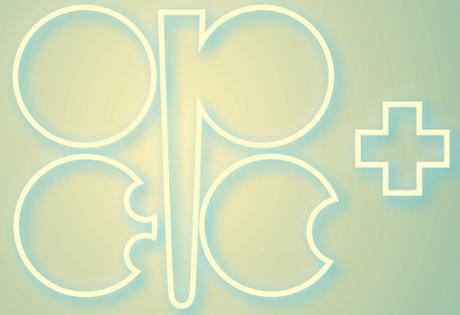


# Energy Outlook

THIRD QUARTER 2019



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OPEC & NON-OPEC CONTINUE THEIR UNIQUE TWO-STEP ON THE DANCEFLOOR...  
BUT WHAT WILL THE DAWN OF A NEW DECADE HOLD?

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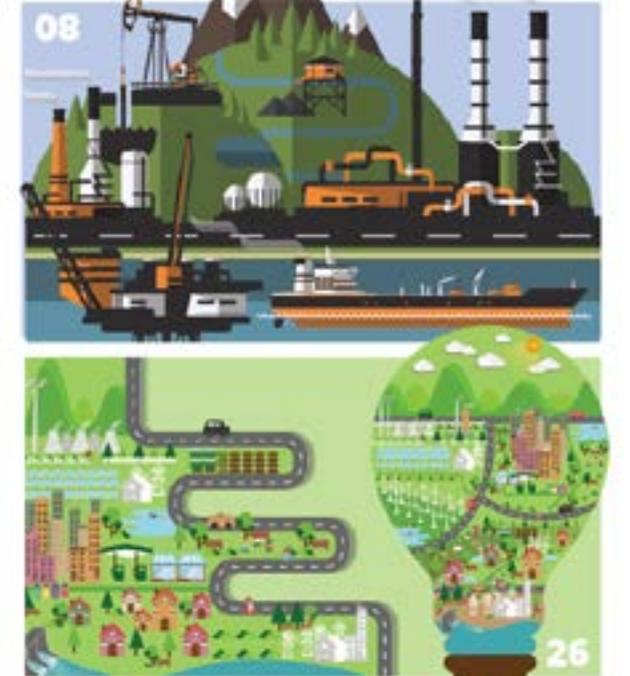


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# The OPEC+ Tango?

*It Warrants Some Summertime Contemplation*

BY SEAN EVERS

Managing Partner, Gulf Intelligence

**I** HAVE ONE FORECAST TO MAKE ABOUT CRUDE OIL that I am pretty sure will prove to be more accurate than the mighty Goldman Sachs was in the first half of the year: oil markets will disrupt your summer holidays!

There is already a lot to think about before you even pack your swimming togs and sunscreen lotion for what you were hoping, and probably needing, to be a few lazy weeks sur la plage reading all the crime novels that have gathered dust on your bedside table since the start of the year.

But I would recommend not to be distracted by all the noise of the tit-for-tat day-to-day headlines that bounce around the hollow news echo chamber when all the editors are away, such as the bluster of new British Prime Minister Boris Johnson trying to prove his mettle in a *give me back my Tanker* shouting match. Or the will-they-won't-they in the US-China trade war interspersed with Trump torpedo tweets, inventories up and down and yaddy-yaddy, same-same shale oil continues to outperform yet again, etc.

When all is said and done, and the sunburn has turned into peeling at the end of August, everything will be pretty much back to where the month started with the Brent crude price banging its head off a \$65/bl ceiling.

What may be worth a few moments of contemplation – perhaps just before you doze off for a well-earned siesta, or as you wait for your other-half to join you on the terrace for a pre-dinner aperitif – is a thought on what could be the long-term consequences of the OPEC and non-OPEC marriage that took place in Vienna in the early days of the third quarter?

This “Charter of Cooperation” agreed on 2 July by some 25 countries, including major oil heavyweights Saudi Arabia and Russia, essentially draws a line in the historic sand. Before this, OPEC was a stand-alone multilateral organization with Riyadh clearly as its dominant leader. And now, Moscow sits at the top table of global oil supply policy with one hand firmly on the steering wheel.

There are no shortage of narratives, conspiracy and otherwise, that one could wander down under a cool summer non-A/C breeze in trying to connect all the dots of where this OPEC+ union could impact oil markets in the months and years to come. Be it good, old boring supply and demand fundamentals, to the more mercurial smoke and mirror shadows of geopolitics...it may present much more fun and plot twists than the best *who done it* novels.

Bon Voyage! ■

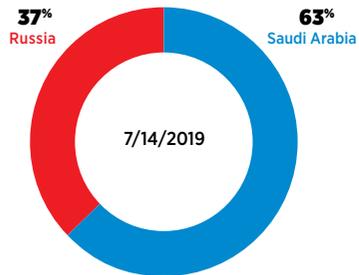


**RESEARCH**

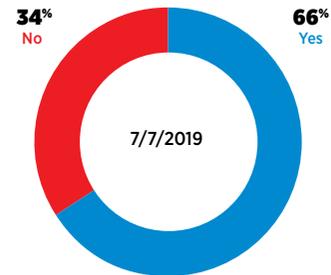
**Black Gold Trends in 2019:**  
*The Top 15 Survey Results from 2019 So Far...*  
**Where will you Place Your Bets?**

**OPEC**

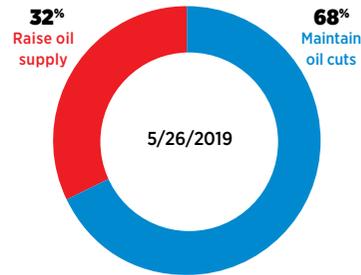
Who has greater influence over OPEC and non-OPEC oil supply policy?



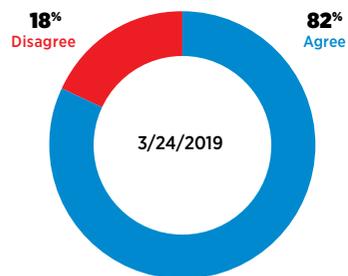
Will the OPEC rollover of current oil output cuts be sufficient to push prices back to \$70/bbl?



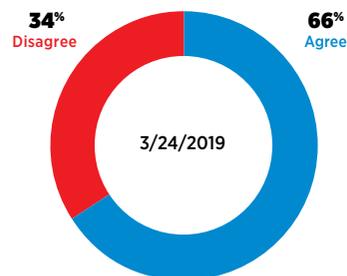
In the face of rising geopolitical tensions in the Middle East, what should OPEC and non-OPEC agree to do when they meet in Vienna in June?



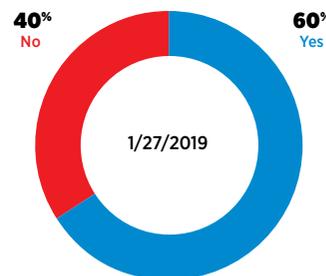
OPEC should postpone its April meeting until June because April is too early to decide on oil supply levels for the second half of 2019.



The OPEC and JMMC bimonthly meeting in Baku in mid March will report 100% compliance with current oil output cuts of 1.2mn b/d.

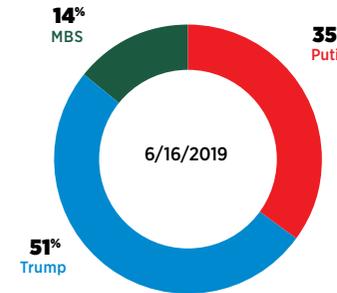


After a 40% fall in oil prices at the end of 2018, should OPEC return to its 2014 strategy of prioritizing market share over chasing higher prices?

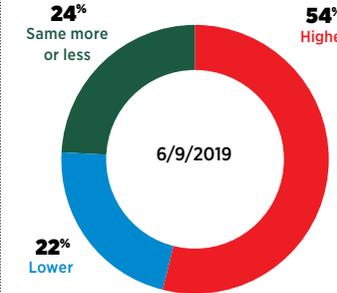


**OIL PRICES**

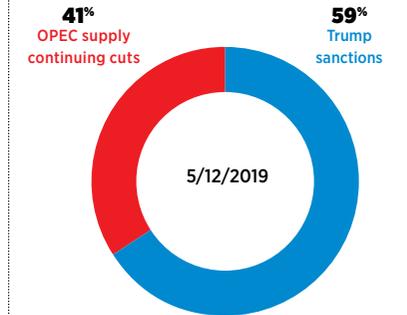
Who will have the biggest influence on the direction of oil prices in the second half of 2019?



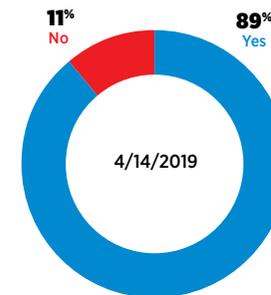
In the first half of 2019, Brent crude averaged \$66.31/bbl. In the second half, it will average:



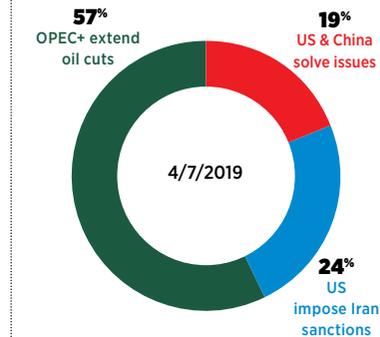
Which will have a bigger impact on oil prices in second half of 2019?



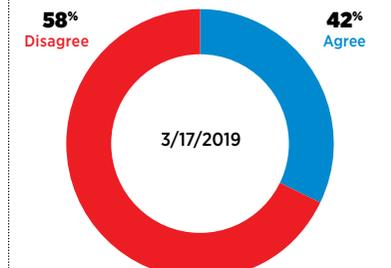
Will oil prices remain above \$70/bbl throughout the second quarter of 2019?



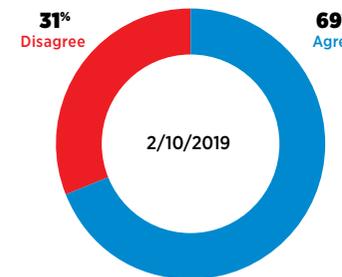
Brent crude oil prices will rise above \$70/bbl in the second quarter of 2019 because:



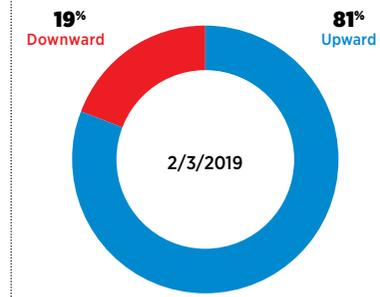
Will a hard Brexit or a soft Brexit make any difference to the trajectory of oil prices in 2019?



US sanctions on Venezuela's oil exports will push Brent crude prices up to \$70/bbl in Q1 of 2019.

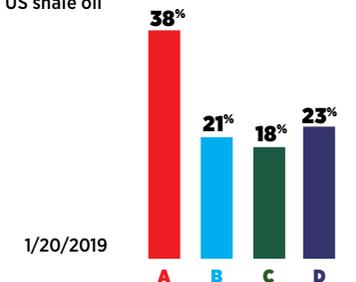


Will international geopolitical intervention in Venezuela put upward or downward pressure on oil prices over the coming months?



Which of the following should we watch for a view on which direction oil prices will move in 2019?

- A. US-China trade war
- B. Enforcement of Iran sanctions
- C. Donald Trump - what has he done now...
- D. US shale oil



# Precious Relief Ahead of IMO 2020



BY CHRIS WOOD

Managing Director, Uniper Energy DMCC (UED)

**A** **WORLD FIRST IS SENDING RIPPLES** of relief through an unnerved global shipping and bunkering market. UED completed the largest ever single shipment of low sulfur fuel oil (LSFO) on the 14 May – while celebrating just its third year of operations. So, why does this earn a spot in the history books?

**154,411 tons**  
The size of the cargo that heralds a critical step in improving price discovery of LSFO – worldwide.

Because it marks the largest such shipment ahead of the biggest change in the shipping industry for more than a century: the International Maritime Organization's (IMO) sulfur limit of 0.5% from 3.5%, from January 1, 2020. The shipment does not just see UED leapfrog to the top of the hierarchy of competitiveness. In the vacuum of guesswork

**“ Why does this earn a spot in the history books? Because it marks the largest such shipment ahead of the biggest change in the shipping industry for more than a century.”**

over how to comply to IMO 2020, it also represents a call of reassurance: ‘supply is there if you want it!’

The 154,411 ton cargo, heading from the world's second largest bunkering hub of the UAE emirate Fujairah to the world's largest bunkering hub of Singapore, heralds a critical step in improving price discovery of LSFO, especially in an IMO 2020 landscape. Fuel costs already represent more than 50% of total operating expenses, and IMO 2020 poses an increase too significant for some carriers to absorb and stay operational, according to IHS Markit and JOC.com. The greater the clarity over the price implications, the better. This is integral to spurring investors' confidence and appetite to support the necessary infrastructure developments in the value chain. Refiners, storage operators, ports, shipping, traders and others are all rapidly reviewing their books to make fuel demand match infrastructure. The same applies to elevating the preference of LSFO as a compliance method against the other options: scrubbers, liquified natural gas (LNG) bunkering.

## GLOBAL REACH

IMO 2020 is a global event that offers a myriad of opportunities for the UAE and wider Gulf – if properly utilized. We are in the process of debottlenecking the units to increase crude flexibility and throughput. This will be a game changer in the lead up to the 1 January, when the importance of quality, sufficient volumes and speedy delivery of LSFO will reverberate worldwide.

As a global marine fuels provider located in Dubai and Fujairah, UED is also leveraging

its golden location at the crux of global trade routes, including China's One Belt, One Road Initiative (OBOR). The modern take on the ancient Silk Road, first trodden more than two millennia ago, links China with 65 countries in Asia, North Africa and Europe. This encompasses 16 nations in the Middle East – 25% of the total. Therein lies an opportunity for UED (and Fujairah) to reinforce a maritime channel of commodities and trade with IMO 2020 compliant fuel. Ignore this opportunity at your peril; Morgan Stanley estimates that a total spend of the OBOR could reach \$1.3 trillion worldwide by 2027.

**“ Amid the uncertainty of IMO 2020, one thing is clear: ramping up LSFO supply is a safe bet.”**

**95%**  
Compliance will likely settle around 90% or 95% in the initial years, 2020 Marine Energy said at a S&P Global Platts conference in July. This is well above some industry estimates last year that pointed to compliance of 70%-80%.

**77%**  
Successful implementation of IMO 2020 will reduce SOx emissions from ships worldwide by more than two thirds between 2020-2025, the IMO said.

Albeit important, OBOR is just one part of UED's global reach. Since its first cargo in March 2017, the company now trades with 200 counterparties worldwide. Alliances in the Middle East, Asia, Europe, the US and others will continue to benefit from plans to expand crude and petroleum product facilities with state-of-the-art infrastructure. So far, UED owns and operates two crude processing units in Fujairah, with Uniper Energy's crude units annually producing more than 3m tons of ultra-low-sulfur fuel oil (ULSFO) for the marine market. Having 3m barrels of storage in three of the world's largest bunkering hubs – Fujairah, Europe's port of Amsterdam, Rotterdam, Antwerp (ARA) and Singapore – also spurs the fluidity and ease of global trade, underpinning growth. Amid the uncertainty of IMO 2020, one thing is clear: ramping up LSFO supply is a safe bet. UED's world record is just the first step; momentum must accelerate. The bigger and more frequent LSFO shipments become, the calmer the waters of compliance will be in six months. Tick tock. ■

# Spotlight on Mid-East Petchems Brightens

BY **SHELLEY KERR** *Global Head of Petrochemicals Markets*  
 & **HETAIN MISTRY** *Lead Analyst, Petrochemicals*  
*S&P Global Platts*



**P**ETROCHEMICALS represent the world's fastest-growing source of oil demand. Middle

Eastern petrochemicals producers have enjoyed decades of market leadership but now have to adapt to new competition from the US and the Middle East's own client base in Asia. How can the historic epicenter of fossil fuels sharpen its competitive edge?

For now, the Middle East dominates global polyethylene (PE) exports, controlling around 80% of supply going into Asia and around 60% into Europe. The region is expected to remain the largest global PE supplier in terms of net export trade, with S&P Global Platts Analytics expecting the region's surplus to hold at around 12mn mt in 2019 and move to 16.9mn mt by 2029 – a staggering 40% climb in just a decade. And in the short term, the region's producers are benefitting from the trade issues between the US and China.

## WATCH OUT

Middle East producers need to consider how to counter the rapid growth of US market share buoyed by the abundant availability of low-cost shale gas. Historically, US export prices have commanded a premium over delivered markets in Asia, but the trend has now reversed. Just one year ago, FAS Houston prices for low density polyethylene (LDPE) were close to \$140/ton higher than in Asia, but prices this May were \$70/ton lower, according to prices assessed by S&P Global Platts. The US exponential growth of US liquefied natural gas (LNG) exports serve as a reminder to Middle Eastern petchem producers who may be pausing to catch their breath. Despite only starting LNG exports in 2016, the US will be the third largest exporter worldwide by 2020, behind Qatar and Australia, respectively. Relative

acceleration will likely be echoed in the petchems market as we head into the 2020s.

There's also another pressure point for the Middle East. The largest ever domestic capacity build is underway in China. With Asia as the Middle East's biggest client this could impact the region's appetite for imports. The Zhoushan refinery will come online later this year with 4mn mt/yr paraxylene. Together with 4.5mn mt/yr of Xylenes at China's Dalian refinery and other sizeable product capacity at both facilities, Middle East producers need to adapt.

## THE GOOD NEWS?

Appetite abounds. Petrochemicals are set to account for more than a third of the growth in world oil demand to 2030 and nearly half the growth to 2050, according to the International Energy Agency's (IEA) forecasts. Chemicals feedstock demand for oil as a percent of oil supply is forecast to grow from around 13% in 2019 to close to 20% by 2040, according to S&P Global Platts Analytics. At the same time, due largely to other non-fossil fuel forms of transportation growing, the pull on oil demand for transportation (mostly vehicle) use could potentially decrease from close to 26% in 2019 to 21% by 2040. The rising middle class across the global economy is driving demand for consumer goods and services, with petrochemicals playing an integral role in the manufacture of a near-endless list of products, from food production, consumer goods to industrial purposes.

## KEEP SHARPENING

In this positive but competitive mix, how can the Middle East stay ahead? Governments and industry must keep investing in capacity expansions, leveraging the region's own low-priced feedstocks. Projects

such as Dow Chemical and Saudi Aramco's joint-venture Sadara and the phased expansions of Petro-Rabigh have added PE capacity. There will also be PE capacity attached to SABIC and Saudi Aramco's crude to chemicals complex in Yanbu, which is scheduled to come online in 2026. In Oman, the Liwa Plastics Industries Complex (LPIC) will include an 800,000 mt/yr mixed feedstock ethylene cracker. Plus, Saudi Aramco's Jizan refinery has 420,000 mt/yr capacity for benzene and 1,300,000 mt/yr of paraxylene, while the company's Ras Tanura refinery is expected to come online by the end of 2020 with 285,000 mt/yr of benzene and 1,200,000 mt/yr paraxylene. And then significant volumes of capacity will be coming online by 2025, including Petrochemical Industries Company at Shuaiba in Kuwait and Borouge 4 at Ruwais in the UAE.

## EFFICIENCY? GOLD DUST

Greater efficiency will also intensify the Middle East's tail wind in the global race. The region's demand is expected to climb by 1.7% (CAGR) annually over the next 10 years, with current plant utilization levels in the Gulf averaging 82% for PE. While adequate to help balance global markets, using the digital tools of the 4th Industrial Revolution can help push this utilization percentage higher, especially when market conditions become tighter at the backend of S&P Global Platts Analytics forecasts, when the industry comes out of a cyclical trough. Plus, the region's population size – Saudi Arabia's 34 million versus China's 1.4 billion – means more domestic supply can be siphoned towards the export market. This is especially pertinent as re-emerging sanctions on Iran, a key petchem player, are a thorn in the region's export plans. The Middle East can retain its market leadership position if it leverages over three decades of experience and revs up its speedometer. ■

# GI RESEARCH:

## How to Create a Virtual Community of Enhanced Oil Recovery (EOR) Stakeholders Across the Middle East?

Seventy senior stakeholders in the region's energy industry, academia and government shared their expertise on how best to create a **Middle East Community of EOR Stakeholders (MECES)** at the Gulf EOR Workshop. The six top recommendations detailed in this Whitepaper were captured via interactive discussions and voting sessions that focused on answering two key questions in this critical conversation (See Stream 1 & Stream 2).

### EXECUTIVE SUMMARY

**U**NITY EQUALS PROGRESS AS ENERGY STAKEHOLDERS EMBRACE THEIR MUCH-needed evolution from siloed efforts into collaborative synergies that make greater economic and environmental sense. Achieving this balance ultimately strengthens energy security; a holy grail for all.

Decades of trial and error means every Gulf country benefits from a strong foundation of knowledge, encompassing advanced expertise, technologies and policies. Now, this springboard for further innovation has extra bounce with the advent of the 4<sup>th</sup> Industrial Revolution. How can this unprecedented commercial array of digital tools streamline EOR operations?

A general sense of unity is already present amongst many national oil companies (NOCs), international oil companies (IOCs), academia, technology companies and financial institutions (FI). But a plethora of opportunities must still be leveraged to improve efficiency, cut costs and accelerate funding. As market pressures intensify, how best to knit Gulf countries' hard-won knowledge together to establish a world-leading MECES? ■

## EOR: A snapshot

**\$516.7bn**

The valuation of the global EOR market stood at \$38.1 billion in 2012 and could soar to \$516.7bn by 2023, according to Transparency Market Research. Clearly, potential abounds.

**75%**

Robust EOR methods can literally pay their way. Oil extracted via primary recovery accounts for 5% to 15% of the total reservoir while secondary recovery can extract about 20% to 60% of the total oil present in the reservoir, according to Future Market Insights. But installing EOR technology means 35% to 75% of oil can be extracted.

**34%**

Can better EOR methods help BP Outlook's forecast ring true? The energy major expects the Middle East to still be the largest oil producer by 2040, accounting for over 34% of global liquids production.

**2025**

Gulf countries' EOR goals are becoming increasingly ambitious and well-supported. Oman has long been a leader, both regionally and globally, in this area. For example, state-owned Petroleum Development Oman (PDO) aims for 25% of its oil production to be supported by EOR by 2025.

**15%**

The UAE has already made huge strides in improving EOR methods. Between 10-15% of state-owned ADNOC's oil is currently recovered with EOR technologies, primarily via miscible gas injection.

**40%**

Despite sitting atop approximately 40% of the world's natural gas reserves (the majority in Iran, Qatar), parts of the Middle East face chronic gas shortages. R&D to increase the efficiency of gas in EOR processes will help trim the region's rising bill for LNG imports.

**7.9%**

In 2014, the Middle East imported 5.9bn cubic metres of gas as LNG – just under 2% of the global total LNG imports, according to Platts Analytics' Eclipse Energy. By end-2016, LNG imports had moved to 28.6bn cubic metres a year – 7.9% of the global total. The IEA also expects the region's demand for natural gas to double from current levels by 2040.

**25%**

In Kuwait, the natural gas needed to produce the steam for Ratqa's planned thermal EOR operations is equal to a quarter of the country's current gas production, according to GlassPoint. The incentives to reduce reliance on gas for EOR operations is clear.

## WORKSHOP – STREAM 2

### What are the Top 3 Priorities that the Middle East Community of EOR Stakeholders (MECES) Should Strive to Focus on?

**T**he current EOR lens is very broad; multiple R&D ideas to explore, applications to test and geographies to adapt to. But the majority of efforts happen in siloes with lessons learned in one project failing to migrate to another, even if both lie within the same border.

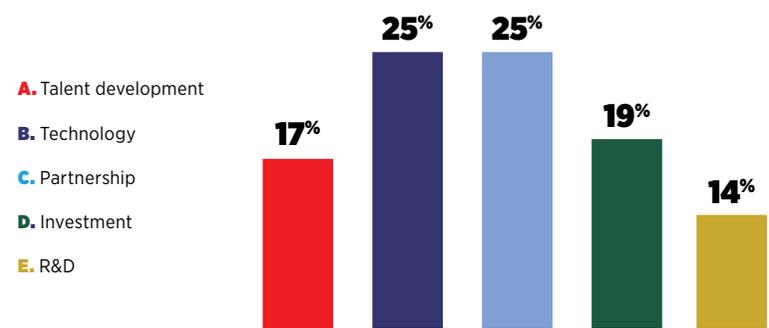
Organizing these factors into a cohesive system, such as under the umbrella of the MECES, will

mean stakeholders do not waste time and money reinventing the wheel. Equally, the MECES cannot be a jack of all trades, at least not to start with. Attempting to cover all bases risks spreading resources too thin and alienating potential members.

Therefore, a clear focus with quantifiable goals is paramount to build the credibility of the MECES, encouraging membership and ultimately, strengthening the

overall ecosystem of knowledge and progress. EOR stakeholders all have a common goal; to affordably bolster oil production to meet domestic needs and sharpen the region's global competitive edge while hitting lower-carbon targets. Pinning down three key goals that have the widest applicability for members to collectively work towards in the MECES is a good starting point. What priorities top the list?

Which of the following is the most critical area to advance in order to make EOR operations more economically viable across the Gulf? This includes achieving recovery targets of 70% in the UAE, which is twice the world average.



#### Points to consider

The exploration and implementation of new EOR technologies in such a wide space – geographically, politically, economically – is very complex and costs could soar. How could MECES partners merge strategies to ensure shared success? What would be the risks for MECES members, if any? What are the strengths of each Gulf country in this process and how can they be leveraged? How important is unity? What are the main hurdles? How beneficial and realistic would it be to have joint EOR projects – collaborating from the laboratory to the field – in order to accelerate the knowledge sharing and application process? ■

**“With so much diversity and so many ideas, how best to identify a common voice with a streamlined focus?”**



## STREAM 2 Top Three Recommendations

### 1. Integrate an asset model of reservoir management across the whole value chain, which can also highlight examples of best practice

The noise of conflicting agendas can make it hard to hear the full worth of stakeholders' insights, adding unnecessary time and costs to already challenging projects. Identifying a common asset model of reservoir management under the umbrella of the MECES would provide a much-needed beacon of clarity; essentially a language everyone can look to and understand. Less opacity would support more sophisticated levels of reservoir characterization, reservoir management, reservoir modelling

**“The MECES cannot be a jack of all trades. Equally, it cannot alienate members and new ideas. Where does the balance lie?”**

and reservoir monitoring. Stronger integration between sub-surface and surface R&D and operations can also help improve the continuity, efficiency and ultimately the safety of operations. These improvements all help strengthen budget management; gold dust

to hedge against unpredictability i.e. oil prices, geopolitics, natural events. Highlighting best practices and success stories in an industry that often has its flaws, rather than qualities, in the headlines is essential to driving positive momentum.



### 2. Ensure R&D, service providers and E&P companies jointly coordinate on MECES projects

Any joint operations must earmark time to ensure all parties are singing from the same hymn sheet before the band starts playing i.e. clarify quantifiable goals and methods before parties start funnelling resources into a joint project. Collaborations need clarity. Opacity in joint projects bleeds into delayed timetables and increased costs; neither is attractive to members of the MECES, nor investors. One route suggested by workshop participants included focusing on the least complex technology that can have the widest applicability in the



region, therefore promoting holistic techno-economic development. Others said blue-sky thinking has equal value, but appreciated the high risk associated with such R&D means that it must complement, not dominate, the agenda. Workshop participants pointed to several key areas for collaboration, including

how cut the costs associated with CO<sub>2</sub> capture while hitting environmental targets and how to enhance expertise in the wider EOR ecosystem. For the latter, EOR and digital expertise must be 'programmed' within human resources; it is not automatically known. That does not mean the MECES should become a training facility but it can be an 'intellectual home' of a cross-pollination of ideas. As long as the findings thread back into the MECES' ecosystem, the time taken on talent enhancement is a win-win.

### 3. Create an architecture for a basic standard of data definition

In alignment with Moore's Law, computer power has doubled every year since the 1970s and more data has been generated in the last two years than in all of previous recorded history. What does this mean? Proper data management (PDM) is vital across the energy industry, including in the MECES. Poor data handling risks leaving the EOR ecosystem as a lame duck as the wider energy industry actively enhances its digital acumen. The MECES must keep pace with the 4th Industrial Revolution to be viewed as a relevant and valuable marketplace of knowledge and ideas. NOCs and other Gulf energy companies have made bold moves in recent years to remove bricks from the walls safeguarding their data – much of which has more value in a collaborative environment. But these are just the first steps; more national and cross-border cohesion is required. Smart data

generation, harvesting and analysis in a central data bank could be a cornerstone of enabling affordable and lower-carbon scalability. Members contributing data to such a bank could pick and choose what information to share. But all contributors must ensure that they define and manage their data

in a 'common language' that is compatible with the broader data bank in the MECES. The benefits of creating and leveraging a central data bank are far reaching, from accelerating innovative R&D and commercialization to exploring application in new geographies in the Middle East. But remember: simplicity is crucial as complicated data storage systems will confuse a market already grappling with a myriad of uncertainties.

#### Other Recommendations From Stream 2

**COMMIT TO:**

- ✓ Cutting the cost of EOR implementation
- ✓ Managing the voluntary versus paid discussions and give collaborations credibility
- ✓ Defining the trends of underlying building blocks for EOR
- ✓ Focusing on talent development and critical thinking, as well as linking the world's top universities to improve efficiency practices
- ✓ Collaborative incentives, such as crowd funding
- ✓ Continuity and fit-for-purpose EOR to enable sustainable progress
- ✓ Improving efficiency, collaboration and integration between surface and sub-surface efforts
- ✓ Coordinated data solutions ■

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**Saudi Arabia 4.0**  
لإسلام الأحمد بسوا الله



Saudi Arabia pioneered its way to the top of the global energy league table throughout the 20<sup>th</sup> century, reaffirming its pole position ever since. The question marks that lie ahead abound; many successful energy entities are understandably left scratching their heads over the how to merge fossil fuels and renewables affordably and efficiently. But as highlighted in this Special Report, Saudi Arabia has already taken innovative strides towards a larger yet environmentally sustainable energy market. As we near the 2020s, the kingdom's pace will only accelerate, carving out an entirely new roadmap that can act as a beacon to other countries still finding their way.

**Watch this space.**

## EXECUTIVE SUMMARY

**E**nergy security enables civilizations to thrive, to push intellectual and geographical boundaries. The need for an unshakeable foundation of supply – of fossil fuels and increasingly, renewables – binds us all. Therein lies the deep-rooted relevance of the how the 4th Industrial Revolution (4IR) is unfolding in one of the world's most successful and influential energy economies: the Kingdom of Saudi Arabia.

Data science. Mobile supercomputing. Intelligent robots. Industrial Internet Of Things (IIoT). Predictive Analytics. Self-driving cars. Electrification. All these are possible because of the 4IR; a digital overhaul that is reshaping the global energy market and how we work within it. Have no doubt: the transformation will be unlike anything humankind has experienced. For nearly half a century, since the 1970s and in alignment with Moore's law, computer power has doubled every year. This means more data has been generated over the past two years than in all previous recorded history. At this staggering rate of positive disruption, one fact is clear: slow movers will be left behind.

Energy markets must be agile, creative and collaborative. Cornerstones of society in Saudi Arabia and beyond – government, industry, academia and the public – must work together to

**“Our country is witnessing a giant transformation, which requires doubling the size and diversity of the national economy, including the mining sector, to meet the increasing global and domestic demand for energy through the development and diversification of the energy mix. This includes traditional hydrocarbon sources, as well as renewable energy sources and nuclear energy.”**

**H.E. Khalid Al Falih**  
Minister of Energy, Industry & Mineral Resources, Kingdom of Saudi Arabia

leverage this digital gold dust. If managed correctly, it will make the value chain much safer and more efficient, affordable and environmentally-friendly than ever – all invaluable features amid escalating market pressures. For one, BP Outlook expects energy consumption in the Middle East alone will rise by 55% by 2040. Adapting and thriving amid this overhaul will not happen automatically. Hard but rewarding graft lies ahead.

**GAME CHANGERS**

This is especially pertinent as the 4IR coincides with the greatest paradigm shift in the energy markets for more than a century: the energy transition towards a lower-carbon world. As per the ambitious and much-needed Paris Agreement, Saudi Arabia and other governments in the Middle East have bolstered their environmental agendas to promote renewables, energy efficiency and green financing, among many other efforts. This is an inspirational period for youngsters in the Middle East and North Africa (MENA), many of whom are seeking job opportunities and modern career paths. The same applies to more experienced staff as this uncharted territory enables them to flex their wisdom and knowledge, garnered over decades.

**Definition: 4<sup>th</sup> Industrial Revolution**

It is a new chapter in human development, enabled by extraordinary technology advances that commensurate with those of the first, second and third industrial revolutions. These advances are merging the physical, digital and biological worlds in ways that create both huge promise and potential peril. The speed, breadth and depth of this revolution is forcing us to rethink how countries develop, how organizations create value and even what it means to be human.

World Economic Forum (WEF)

## TOP 10 RECOMMENDATIONS

These Top 10 Recommendations were harvested from the brainstorming sessions held with 350 stakeholders during the Gulf Intelligence Saudi Arabia Energy Forum: *The Next Best Steps for Saudi Energy Sector to Leverage the 4<sup>th</sup> Industrial Revolution?*

**1. One Size Does Not Fit All**

Digital tools should be leveraged and positioned specifically to suit business needs; this results in tangible added value and a sharpened competitive edge. Companies should acquire a full understanding of the 4IR to decide on their speed and depth of adoption.

**2. Achieve 100% Real-Time Visibility**

This requires the installation of digital support systems under the umbrella of the 4IR to bolster immediate connectivity and clarity on all parts of the value chain. This leads to increased safety, revenues, environmental efficiency and reputational value. Transparency pays – literally.

**3. Market Forces Dictate Implementation**

Adoption of the 4IR is best done via commercial pressures, leaving public policy to focus on incentives that encourage the growth of new industries and small and medium-sized enterprises (SMEs). Following this dual structure creates sustainable market growth, including coveted higher value jobs.

**4. Invest in Cybersecurity**

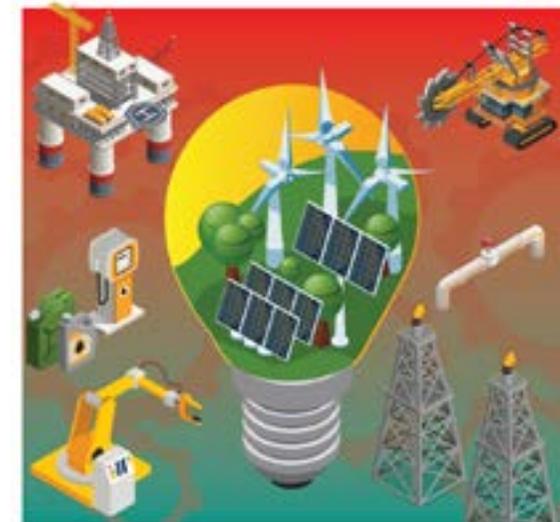
Digital protection cannot be overlooked; companies must always be one step ahead of cyberhackers. Companies must carefully consider how much enhanced external connectivity is absolutely required and try and limit unnecessary exposure.

**5. Standardization Matters: Spur Application**

The greater the uptake of the 4IR, the greater the need for standardized systems and criteria. This ensures all entities along the value chain are on the same page and most importantly, it safeguards operational and public safety.

**6. Implement Smart Meter Data At Power Utilities**

Maximizing efficiencies and managing consumption and production requires a consistent and accurate feed of information. Therein lies the value of smart meter data and a digitalized and decentralized electricity sector, which more accurately marries demand with supply and also increases customer choice.

**7. Talent Development: Ignore at Your Peril**

The successful application of a digital toolbox requires continual education. This encompasses coordination between academia, government and industry on educating, training and developing a multidisciplinary, curious and digitally fluent workforce. There is no finish line to our ability to learn and adapt.

**8. Increase Advisory Centers and Digital Platforms**

Such establishments and platforms can showcase, advise on and lease the application of latest technologies available in the kingdom. This is especially valuable for SMEs, which typically operate on tight budgets.

**9. Bolster Cross Border Collaboration**

Energy markets are becoming increasingly interconnected and Saudi Arabia lies around the heart of these supply-demand flows. Deeper collaboration across the Gulf and wider Middle East would be a win for the region as it seeks to improve energy security while reducing reliance on international imports.

**10. Inspire a Culture of Innovation**

Smarts and creativity are required in equal measure to be a digital leader, especially in the energy transition. An ability to innovate – the commercialization of novel ideas – requires a supportive ecosystem. This encompasses promoting critical thinking in education to improving financial channels for SMEs and entrepreneurs. Today's students and employees must evolve into tomorrow's energy champions. ■

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INTERVIEW

# H.E. Khalid Al Falih

Minister of Energy, Industry & Mineral Resources  
Kingdom of Saudi Arabia

Moderator: Manuss Cranny, Anchor, Bloomberg TV

*Manuss Cranny (MC): Your Excellency, is the Saudi Aramco deal to buy PIF's stake in SABIC one of the seminal moments of transformation for Saudi Arabia?*

**Khalid Al Falih:** The kingdom is going through a phenomenal transformation. You see it in social activities, in economic activities, amongst the youth, amongst business enterprises. You see it present in the reforms and every government agency. And you see it in the sound strategies that have always been on paper but that have previously found difficulty in getting implemented. Vision 2030 is now making it possible to implement these and one of those has been the dream to create the world's largest oil and energy petrochemical companies. As a former CEO of Saudi Aramco, we had a vision within the company to create an integrated energy petrochemical giant that would add value to the hydrocarbon value chain. SABIC is the way to do this because there is a lot of overlap geographically and in terms of the molecule flow from upstream to midstream to downstream, as well as complementarity between the two portfolios. It would have been unthinkable a few years ago because SABIC has always been seen as a national champion with a standard of their own. But with the vision of breaking barriers and paradigms, it is now turning into a reality. This acquisition will realize synergies and integration opportunities not just for Saudi Aramco, but more importantly for SABIC and its minority shareholders. So, it is value creation all round and we hope to close the SABIC deal in the coming six months.

*MC: Will the funds that flow from this deal reenergize the ambitions of the kingdom to deliver on Vision 2030?*

**Khalid Al Falih:** The vision of the PIF is very bold and goes way beyond the \$69 billion that Saudi Aramco will provide through the SABIC deal. The vision is both domestic and global. It's about the mega projects that will turbo charge many of the pillars of our future economy. This will need capital also from other assets that are non-strategic, that the PIF may own that they choose to exit.

*MC: What kind of assets?*

**Khalid Al Falih:** It's premature to specify, but my point is that the PIF is going to be an active and not a passive investor. The objective is to create value for the kingdom, first and foremost, through in-country investments and also by looking globally and strategically to acquire emerging companies and industries, creating value for them. At the same time, leveraging those acquisitions and investments for the benefit of the kingdom's strategy.

*MC: Was the recent Saudi Aramco bond roadshow a curtain raiser to perhaps coming back to the bond market again?*

**Khalid Al Falih:** I think Saudi Aramco will establish a permanent presence in the capital markets that will have both debt and capital. It is the world's largest company and is obviously going to have all the tools at its disposal to access capital markets. Paying for the SABIC

#1

Saudi Aramco is the world's largest company.

\$69bn

The volume of finance that Saudi Aramco will supply as part of its purchase of PIF's stake in SABIC.

x2

There are two dimensions to the kingdom's gas plans. Firstly, to increase domestic production, including shale gas reserves, and to leverage gas as the preferred feedstock for the rapidly growing petrochemicals market. Secondly, to sharpen the kingdom's competitive edge in the global gas markets.

deal was not the primary or only reason for accessing the bond market; the company needs to lever up and have some debt and instruments on our balance sheet.

**MC:** *In terms of the kingdom's economic transformation, what are the ambitions for gas?*

**Khalid Al Falih:** There are two dimensions to gas. One is domestic where gas is the feedstock of choice for our petrochemicals. It's low cost to crack and it's plentiful and it's reliable and we need to increase that. There is also a second wave of gas development that has emerged over the last few years by Aramco, which is to develop our own unconventional resources, mostly shale gas, in eastern Saudi Arabia, but also other formations in the north that have been used to fuel phosphate mining and manufacturing development. Gas is also the fuel of choice for power generation, so dry gas or natural gas will be used to displace 600,000 – 800,000 barrels of liquids that are going mostly to power, but some to water desalination. Both sectors will be reformed, and their efficiency improved dramatically, by changes in the fleet and power generation by switching a lot of our water desalination to reverse osmosis technologies. The second dimension for gas is global. We realize that oil will continue to grow, but gas will grow faster.

**MC:** *Does that mean that you'll have to buy assets globally?*

**Khalid Al Falih:** Anything in excess of our domestic needs in power, water and petrochemicals, will be exported. We do see an opportunity to be a significant gas exporter.

## Up, Up and Up

We see strong demand in the emerging economies of Asia. The US' economic GDP growth can drop by a percent or two, but the underlying drivers for oil demand will continue. The demographics are there, the urbanization is there, people are moving from rural to big cities and acquiring modern modes of transport and lifestyles. That's not going to be dented significantly by GDP growth on a sustainable basis. I think where demand could flatten and weaken a bit is in the Organization for Economic Co-operation and Development (OECD) countries, where manufacturing and trucking and industrial activity are the main drivers. And there are a lot of incentives that are being put by governments to reduce demand (through taxation). But there's a limit to that too and it is not a line that is going to remain linear indefinitely. Even in the US, which is a highly industrialized economy, demand will continue to grow.

**Khalid Al Falih**

## IN FOCUS: OPEC+

**MC:** *Will the group extend output cuts beyond June this year?*

**Khalid Al Falih:** Our objective to bring inventories back to a reasonable level remains unchanged. We have seen how sensitive oil markets are to inventories and how when production is increased in the second half of the year for the usual reasons, how quickly markets react. We want to avoid that scenario materializing again. Given the kingdom's financial position and our scale, our volumes can probably withstand some of these shocks more than others. We have seen companies having to change investment plans and some of the poorer countries hurt, so we want to stabilize markets. We are getting to a stage where inventories are starting to stabilize and come down, but they're still significantly above what I would consider a normal level.

**MC:** *Is 1.2m barrels still your baseline to balance the market?*

**Khalid Al Falih:** The 1.2m barrels was based on certain other countries keeping their October 2018 production level. So, we have to watch them. We need to see what happens with Venezuela and with the sanctions, which the US waived in November. All these factors will impact the fundamentals. Ultimately, the 1.2m barrels was a balancing based on assumptions of demand and supply and US production. The closer we are to June, the more informed our decision will be on the next steps.

**MC:** *Is Russia on board in general about a possible extension?*

**Khalid Al Falih:** The dynamics in Russia are different from any other country. It also has different geopolitical considerations than most other producers, so it has to weigh all of those factors. But I believe strongly that the OPEC + agreement has been good for Russia from multiple angles. As a key producer, it holds a lot of

resources, not just oil but gas as well. The value of gas in the international markets is impacted by the oil outlook and oil prices.

**MC:** *You've been producing 9.82m barrels, which is a four-year low. Many people are applauding you and saying you have done the big job. Are you prepared to cut further to achieve market balance?*

**Khalid Al Falih:** If you look at 2017-2018, by the time it was all said and done, the kingdom was almost exactly on the dot with the voluntary production level that we agreed to back in December 2016. During that two-year period, we were able to stabilize the market's response with market dynamics that changed unexpectedly. But at the end of the day, we were on track and we met our obligations. The kingdom is the world's largest exporter and the country that has, by far, the largest spare capacity. With our policy and the relationship that we have with the industry within the kingdom, we're able to swing production faster than ever, so we're driven by our



policy objectives of stabilizing markets. Sometimes we do more than others, but it goes both ways.

**MC:** *Would you be prepared to do more if you needed to?*

**Khalid Al Falih:** The market is on its way towards balance. We've obviously done a lot more than others, but I've been assured that they're catching up with their obligations. I was in Iraq a few days ago and the Minister reassured us that Iraq will do more and would be on track. Russia has reached its

objectives on its commitment and the UAE and Kuwait have too. The majority of countries have met their obligations and the implementation is moving in the right direction.

**MC:** *Are you comfortable with the recent speed of recovery in the oil price?*

**Khalid Al Falih:** Our policy has never been, nor will it be, driven by price objectives and we always need to look at what the appropriate baseline is to measure from. We can feel it when the market is healthy. We can feel it when investors

are comfortable. You saw in early April that for the first time in almost two months, the number of rigs in the US rose. Many would consider this bearish, but I would consider it as one of the vital signs that the market is coming back to health.

**MC:** *What is the most under-priced risk for the market in your mind? What's the next shoe to drop?*

**Khalid Al Falih:** Geopolitical risk. There are times when the market overprices this and times when it under prices it. It's unfortunate that many countries – from Venezuela to Algeria and Libya, Syria and Yemen, all of which have oil – are in civil and security distress. That could squeeze supply in the mid to long term if things don't improve. But given the fact that we have a glut today, the market seems blind to that risk. The saving grace is that the spare capacity that the kingdom has means we can always reduce the level of cuts like we did last year.

**MC:** *How soon can you achieve that?*

**Khalid Al Falih:** I would say by 2025 is realistic. We're already in discussions with our brothers in the GCC about interconnection through pipelines, all the way from Oman to Kuwait and Iraq.

**MC:** *Have you committed a capex number to that?*

**Khalid Al Falih:** Not yet, but we've dedicated the teams from our side and our colleagues from the GCC have indicated that they're ready to start undertaking the technical studies. I think what will happen after that is the commercial framework through which gas is traded through pipelines in the region and this will

be a significant move forward that the kingdom will enable because we are the country that interconnects most of the GCC countries and Iraq as well. The next phase beyond this is LNG trade. We know that growing and sizable economies around the world, from China to India and other countries in Asia, will need to displace a lot of their existing coal generation facilities to meet their climate change targets. But we also know that there are billions of people who don't have access to clean energy and with population growth set to increase by another 2 billion, the demand for this is set to increase. Clean energy is going to be a combination of gas and renewables and the kingdom is ready to play a leading role in these emerging economies.

**MC:** *What has changed that Saudi Arabia now wants to make the commitment to be a gas exporter in a few years? Has there been a significant shift in terms of policy?*

**Khalid Al Falih:** The resource base has changed for us. We have always looked at conventionals as the limit of resource availability and we've always thought of ourselves as resource constrained. With the unconventional gas resources going deep into the shale formations in the kingdom, we are not only able to access natural gas, but wet rich gas that is going to power our growth for the petrochemical industries as well as give us these resources. We are also able to produce some associated gas at higher levels now. ■

*\*Edited transcript*

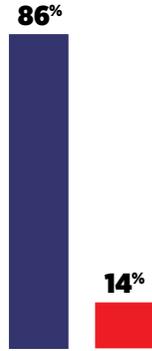


# INDUSTRIAL REVOLUTION 4.0

## Golden Opportunities for Positive Disruption?

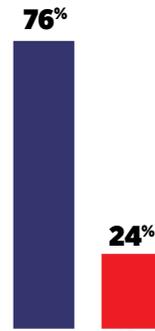
The more Saudi Arabia's industrial companies adopt the 4IR toolbox - such as big data science, predictive analytics, artificial intelligence, robotics, automation, blockchain and 3D visualization - *the faster the kingdom will achieve the goals of Vision 2030.*

- A. Agree
- B. Disagree



Speed is the defining factor for success in this 4.0 digital transformation. Lagging behind is simply not an option.

- A. Agree
- B. Disagree



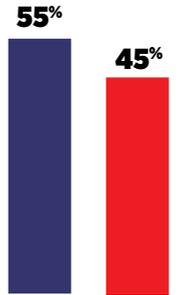
Is Saudi industry doing enough to be ahead of the digital transformation curve?

- A. Yes
- B. No



Apple CEO Tim Cook told his shareholders in January that the company had been completely blindsided by "the magnitude of the economic deceleration" in China in 2018. *Hands up, if unlike the Apple CEO, you knew China was experiencing slowest growth since 1990?*

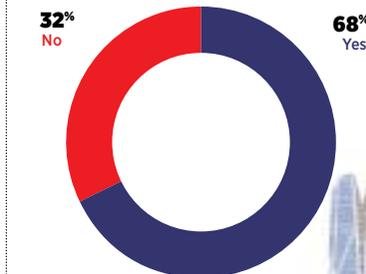
- A. My company/institution knew it was coming and so we are prepared
- B. My company/institution is not prepared for a significant China slowdown in 2019



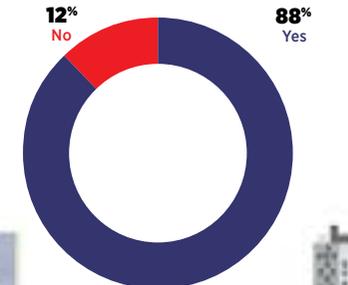
Downstream industries in Saudi Arabia and across the Middle East are not moving fast enough to take advantage of the new 4IR tools available.



NIDLP have established Capacity Development Centers specialized in 4IR technologies to enable leading industrial players to use modern technologies that will assist them to increase competitiveness and productivity. *Do you think it would be useful to go one step further and introduce a rating system to measure and rank companies and institutions on their success in adopting 4IR tools?*



Downstream industries in sectors, such as power, mining, refining and petchems, all have the potential to harvest massive amounts of new data points. Should companies look to monetize this to develop new business opportunities?





# CIRCULAR ECONOMY

## *Why Should Energy Markets Care?*

BY MAZIN ALBAHKALI  
*President & CEO, GE Power Services, Saudi Arabia & Bahrain*

**\$138 billion** in savings is one driver of energy stakeholders' appetite for a 'circular economy'. The multi-billion benefit of this economic model equates to nearly 1% of the GCC's cumulative GDP between 2020 and 2030, as detailed by the World Government Summit and Strategy&'s Ideation Center. Another big incentive is Gulf countries' commitment to the Paris Agreement, the world's most comprehensive climate-related agreement.

But these are just two factors in a regional effort that resembles an octopus. There are many 'legs' – from economic growth, government will and public buy-in – that must all move in harmony to achieve progress (*see: What is a Circular Economy?*). This is a very tall order and good stewardship – a healthy mix of both private and public – of finite resources is critical amid an ever energy-hungry world.

The kingdom is playing an active role as per the aims of Saudi Vision 2030. Saudi Aramco is supporting a research program on the Sustainability of Bio-based Materials in a circular economy at the Aachen-Maastricht Institute for Biobased Materials (AMIBM) in The Netherlands and the kingdom's petrochemical giant SABIC has signed a memorandum of understanding (MoU) with chemical recycling experts to supply recycled plastics waste for production facilities in Europe. Through this, the company has developed plans for a commercial refining plant for recycled low-quality, mixed plastics waste in The Netherlands. And as part of its sustainability initiative, Ma'aden commits to facilitating responsible and innovative product design, use, re-use, recycling and

disposal of products. The company has embedded circular economy principles into its operations and has developed measurable key performance indicators (KPIs) to monitor progress.

**The growth** of a circular economy is a fine line to tread. Existing energy capacity – from production, storage, downstream, transport and so on – must lower its carbon footprint rather than pulling back on operations. Cutting capacity now would be perilous; BP Outlook expects the Middle East alone to have a 55% rise in energy consumption by 2040 and Saudi Arabia's population to climb by 37% to 45 million by 2050. Such pressure points do not point to reducing capacity but increasing it – just much more intelligently. ■



materials from energy production plants, utilization of the energy industry and other industries' excess energy. Another popular method to spur a circular economy is improving existing technologies, like efficiency for internal combustion engines (ICE), carbon capture and storage (CCS) for hydrocarbons in the power sector and renewables in enhanced oil recovery (EOR). Plus, capturing the billions of cubic meters of natural gas flared at oil production sites worldwide to use onsite, or reuse in operations, would be a major leap towards a circular energy economy. This would be especially meaningful in Saudi Arabia and the wider Gulf, the global epicenter of hydrocarbon production. Progress will also give the energy markets some much-needed career kudos for the more environmentally aware millennial generation; good news amid a global talent shortage.

## What is a Circular Economy?

A circular economy means changing processes and mindsets to enable companies and countries to do more with less. It seeks to replace today's linear 'take-make-dispose' approach to resources and aims for materials, including energy, to be re-used and recycled through the value chain. The result? It gives companies and countries more gold stars for what is an increasingly strict environmental check list, it creates a sustainable job and manufacturing market and has the potential to narrow the global wealth divide in the long-term. Also, on the long list of benefits are cost effectiveness and optimization of supply chains.

The purpose of the circular economy is to protect the environment while maintaining a market driven economy. There are two main channels to achieving this. One is letting the market dynamic work through incentive mechanisms, as seen with subsidy reforms and the rise of renewables. The other is regulatory changes, such as reducing high public and industrial consumption of energy to products, like household utilities.

Under this umbrella, there are a range of application options: waste-to-energy, fuel conversion, recycling

### 1st

In one of the most comprehensive oil field carbon intensity (CI) studies ever published, a global team led by Stanford University has calculated the CI of 8,966 of the world's active oil fields across 90 countries. This represents 98% of the world's 2015 global crude oil and condensate production. How did Saudi Arabia fare? Very well; the kingdom ranks the lowest in CI of any major producer to extract, process, and transport its crude oil to the refinery gate.

### #2

Saudi Arabia ranked second overall in the aforementioned CI study; Denmark, which produces near 150,000 b/d, took first global position.

### 62%

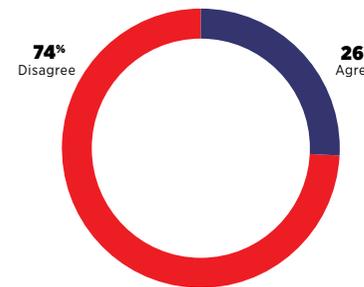
The Circularity Gap Report 2019 calculates that 62% of GHG emissions (excluding those from land use and forestry) are released during the extraction, processing and manufacturing of goods to serve society's needs. Just 38% are emitted in the delivery and use of products and services. Stakeholders now have a clear focus where to direct their efforts.



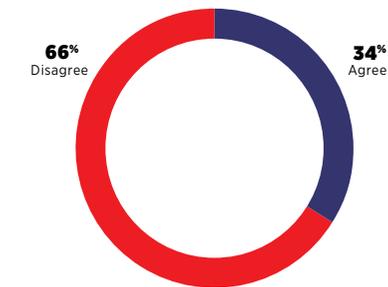
## INDUSTRY RESULTS

# Ramping Up Green Credentials: What's Next?

The COP24 conference in Poland in late 2018 successfully put together a climate change package. This will be the year when the big energy transition invigorates on-the-ground action that changes industry and economies.

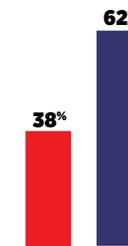


Global CO<sub>2</sub> emissions rose in Asia and Europe in 2017; regions with strong support for the Paris Agreement. Yet, they declined in the US, which suggests it doesn't really matter that US President Trump withdrew the country from the agreement.



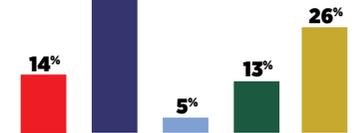
China is at the forefront of the global transformation into a lower carbon energy world. Beijing has spent \$60 billion on subsidizing its electric car industry over the last decade and it is deploying a similar commitment to hydrogen fuel cell vehicles. With such financial momentum, is it possible to get left behind in the great energy transition and miss out on its economic rewards, now estimated at \$1 trillion per year?

- A. Yes, first movers set the agenda and own the most valuable intellectual property (IP)
- B. No, we all win when countries invest in lower carbon solutions

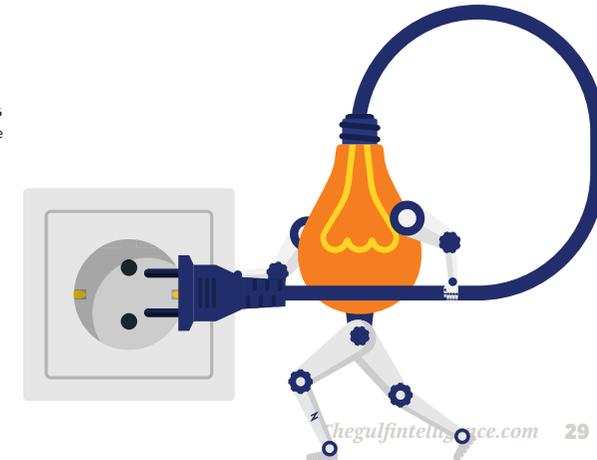
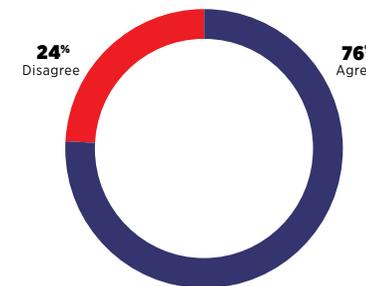


Which of the following is the most appropriate indicator to measure a country's progress in implementing an energy transition strategy?

- A. Removing subsidies on fossil fuels
- B. Amount invested in renewable energy projects
- C. Competence of local supply chain to deliver
- D. Public buy-in to transition commitment
- E. Industry buy-in to transition commitment



The World Economic Forum (WEF) said the global energy transition is not moving fast enough. The WEF declared that the ball was back in policymakers' court to accelerate the shift to the clean energy solutions of the future.



Too much wind?  
Too much sun?  
No problem.

We know how to capture surplus wind and solar power for later use: by transforming this green energy into gas and injecting it into the existing gas pipeline system. So we can use it to generate power and heat wherever and whenever they're needed. We make renewables flexible.



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