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Downstream growth in the Middle East

How can national oil companies deliver on their ambitious growth strategies in a transitioning energy landscape?

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Source

The content of this White Paper was shaped from a roundtable of 25 high-level energy executives in Abu Dhabi in late-2019. Hosted by Wood, moderated by Gulf Intelligence under the Chatham House Rule, the event enabled leaders in national oil companies (NOCs), international energy companies and their partners to openly brainstorm and identify solutions to the critical question: 'How should National Oil Companies in the Middle East deliver on their ambitious downstream growth strategies?' Any further use of this material must cite this document.

Executive Summary

Bringing ambitious blueprints to life requires significant investor support and they need to be confident that operators can effectively manage and optimise CapEx and OpEx. Success is crucial to guarantee ongoing energy security in the Middle East. The tools to achieve this are available or can be cultivated, National Oil Companies must move quickly to integrate them.

There are many bright spots in the Middle East's downstream market, despite intensifying pressure points (page 2: Drivers of uncertainty). The region's abundant resources mean it will remain the world's biggest oil producing region up to 2040, accounting for 36% of global liquids, according to BP Outlook. This geographic good fortune is accentuated by the region's position at the heart of the world's east-west trade routes. To the east, overall energy demand in Southeast Asia has grown by more than 80% since 2000, according to the International Energy Agency (IEA). To the west, more than 500mn people will be added to Africa's urban population by 2040, much higher than the growth seen in China's urban population in the two decades of its economic and energy boom. It appears to be a win-win for the Middle East.

The Middle East's location on the doorstep of two major shipping lanes – the Strait of Hormuz and the Suez Canal – will also help broaden NOCs' global footprint and influence. The Strait, for example, is the world's most important oil transit bottleneck, with its daily flow accounting for 21% of global petroleum liquids consumption, according to the Energy Information Administration (EIA). Plus, NOCs' downstream operators have one of the lowest cost feedstocks worldwide, multiple and extensive port infrastructure and strong government support. This provides a robust foundation for regional expansions and, compelled to improve security of supply security of supply, NOCs are continually upping their capacity upgrade plans (page 4: Growth points). To ensure downstream ambitions are achieved as affordably, efficiently and sustainably as possible a few holes still need plugging.

NOCs take the lead

After decades of international oil companies (IOCs) taking the lead, NOCs are stepping centre stage to spearhead the sizeable downstream projects in the Middle East. NOCs have also made significant headway in recent years to not only align their business models to those of IOCs, but also emerge as worthy competitors. NOCs' most notable changes have been increased vertical integration and the growth of a regional petrochemical market. The fast-growing petrochemicals industry is a good business to

be in. The global market size is projected to reach \$958.8bn by 2025, expanding at a compound annual growth rate of 8.5% between 2019-2025, said Grand View Research. According to the IEA's World Energy Outlook 2019, the main increases in oil product demand in 2018 came from gasoline and diesel. There were also sizeable contributions from ethane, liquefied petroleum gas (LPG) and naphtha as the use of oil as a petrochemical feedstock continues to grow in importance.

Another noteworthy trend is NOCs' expansions into other geographies, which is largely driven by CapEx, market demand and partnerships with other NOCs and IOCs. Such expansions raise the question of whether a NOC will focus on investing at home or abroad. A lucky few have the means to do both. Those keen to invest on home soil are supporting NOCs' role as national champions, boosting the national economy and job market. Those eyeing investments abroad typically do so in major demand centres, such as Asia, helping reaffirm the country's geopolitical and economic alliances.

A greener future

Global momentum to decarbonise energy markets is accelerating, largely spurred by the Paris Agreement, the world's most comprehensive climate-related deal (page 8: Environment: Navigating pressure points). Most recently, for example, in January this year, ADNOC announced plans to lower its greenhouse gas emissions intensity by 25% by 2030 as it aspires to be a low-carbon intensive energy company. All NOC downstream operators are re-examining their crude oil offering through a greener prism, asking how it can be a feedstock for cleaner products and not necessarily just fuel? This evolution will also encompass creating sustainable plastic solutions and lightweight materials for transport, notably shipping, aviation and electric vehicles (EVs).

Looking ahead to the 2020s, NOCs must dramatically accelerate efforts to hit their downstream ambitions. The answers lie across integration, digitalisation, talent and environment, in a market littered with known unknowns, the holistic application of all four is the best route.

15mn b/d

of new refining capacity will come online between 2018 and 2040, primarily in developing economies in the Middle East and Asia.

3.4mn b/d

of refining capacity growth will be in the Middle East. China takes a narrow lead at 3.5mn b/d.

2010

was the last time this level of growth in global refining capacity was recorded.

55%

climb in the Middle East's energy consumption is anticipated up to 2040.

Sources: IEA, BP Outlook

Growth areas

The downstream industry in the Middle East is entering a new era as a result of oil companies' efforts to meet product demand and monetize upstream resources.

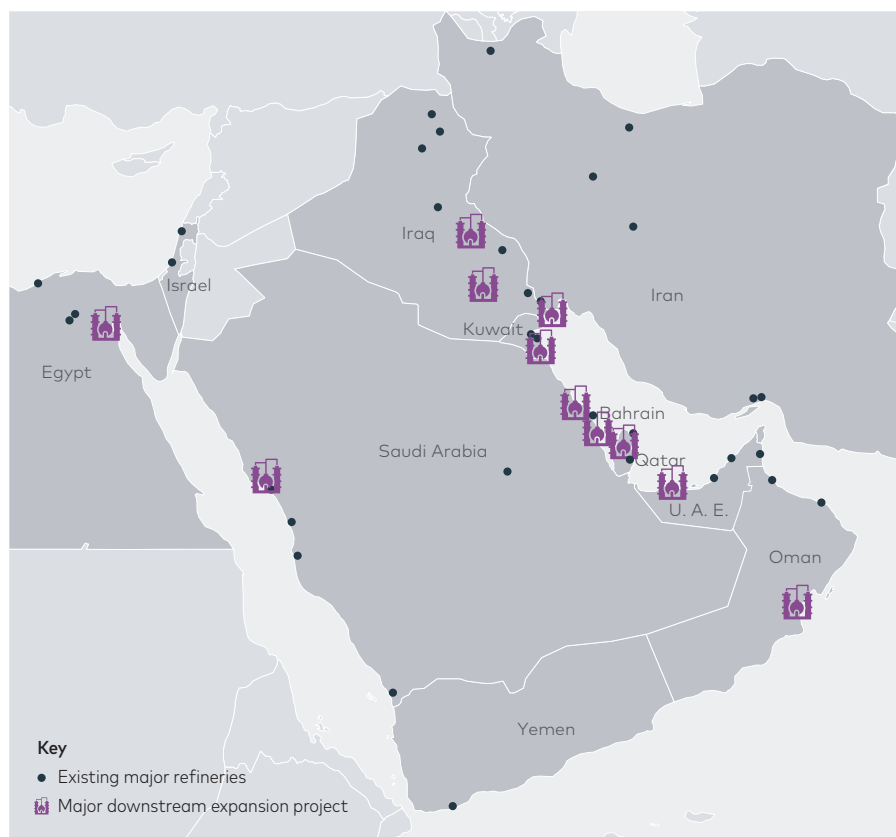
APICORP's MENA Annual Energy Investment Outlook 2019 projects the total investments of over USD 123 billion on petrochemicals for the period 2019 to 2023. In particular, National Oil Companies are expanding refining and petrochemicals processing to take advantage of much-needed downstream capacity enhancements and leverage the entire value chain.

Saudi Arabia has already undergone substantial expansions in the refining and petrochemical sectors. State-owned oil firm Saudi Aramco recently acquired a 70% stake in petrochemicals giant Sabic, making it one of the largest petrochemical companies in the world. Aramco is also targeting global upstream and downstream investments worth \$500bn in the next decade, including new petrochemical projects in China and India. In the UAE, the Abu Dhabi National Oil

Company (ADNOC) has evolved in the last four years into an integrated company and announced a five-year, \$45bn investment in 2018 to become a leading global downstream player.

This includes making Ruwais one of the world's largest integrated refinery and petrochemical complexes. The regional NOC heavyweights – Saudi and the UAE – are also expanding internationally. They agreed to jointly invest in the \$44bn Ratnagiri refinery and petrochemical complex in the Western Indian state of Maharashtra, which will have a crude processing capacity of 1.2mn b/d. Among other projects, Oman is investing \$28bn over the next decade in its downstream and petrochemical industry. Also Kuwait is expanding its petrochemical facilities, alongside the new 615,000 b/d Al-Zour refinery, one of the largest in the region.

Existing refineries and announced major refinery and petrochemical projects in the Middle East



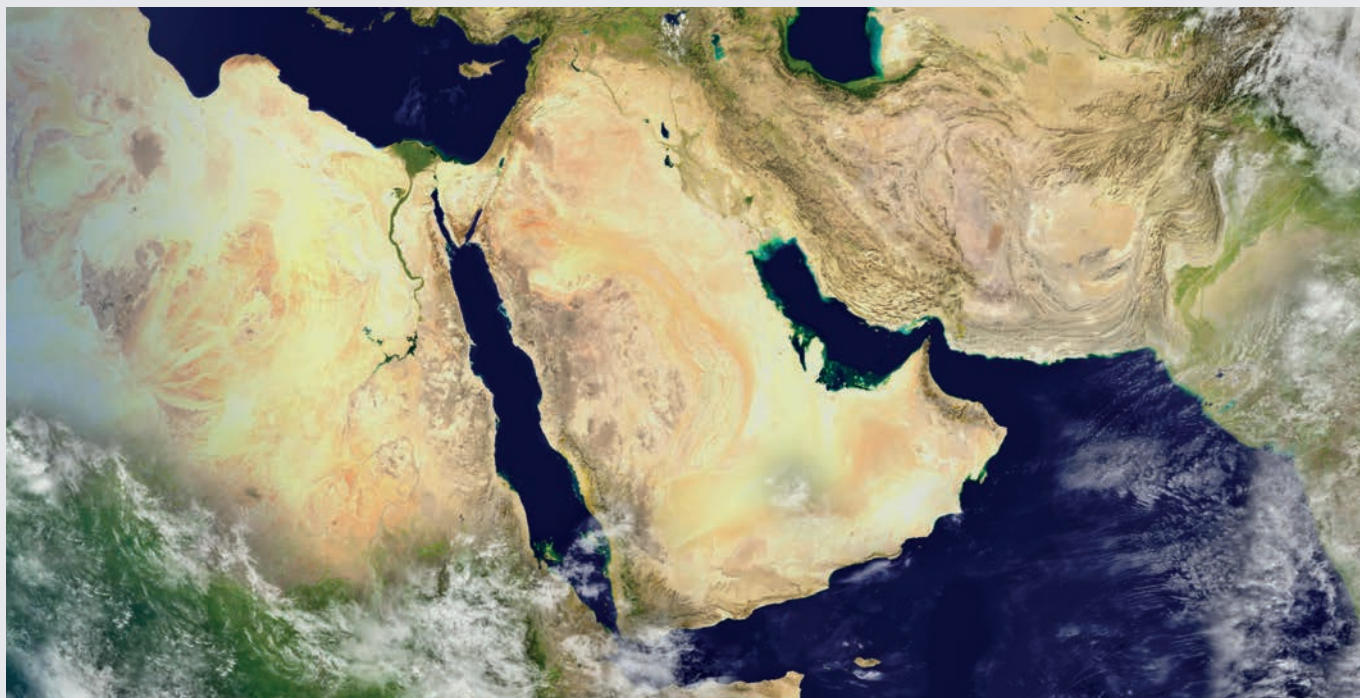
Downstream through the decades

Extrapolating past trends can sometimes help identify future possibilities.

- 1980s**
Rising oil demand drove a surge in downstream infrastructure for those with feedstock and market access.
- 1990s**
Particular growth in the development of clean fuel refineries.
- 2000s**
Advent of fully integrated petrochemical projects, with notable growth between 2004-2010.
- 2020-**
Lower confidence and uncertainty, despite positive market forecasts for the 2020s.

Sources: International Energy Agency (IEA); Energy Information Administration (EIA)

Drivers of uncertainty



Energy transition

Global momentum for a lower carbon world is gaining speed and fossil fuel industries are trying to find their footing. Forecasts for strong oil demand in the near-term (2020-2040) should reassure downstream investors. Oil will remain paramount to energy in the foreseeable future, as renewables cannot satisfy all energy demand. Still, downstream operators must be flexible for they face two challenges in the energy transition. One is responding to shifting product demands and the other is supporting the decarbonisation of assets and the wider energy market. Operators must proactively respond to global trends such as the electrification of the vehicle fleet and the rise of sustainable aviation fuels (SAFs).

Economic outlook

The GDP in the Middle East and North Africa (MENA) is expected to grow at a subdued rate of 0.6% in 2019, rising to 2.6% in 2020 and 2.9% in 2021, according to the World Bank. Downside risks are predictable: intensified economic headwinds, the economic impact of COVID-19, and = rising geopolitical tensions. Top-tier borrowers can still secure attractively priced debt financings but improving the outlook will especially help capture new investors' interest.

Oil market

NOCs have adapted well to the 'new normal' of oil prices in the \$60s/bl range since the value plummeted in 2014. The proactivity of OPEC+ – OPEC members and non-OPEC members – to adjust production cuts in accordance to support the price provides a welcomed perception of stability (for now).

Geopolitics

Geopolitical sentiment is especially weak, from the discord between Saudi Arabia and the UAE with Qatar since 2017 to the long-running and escalating US Iran dispute. For the latter, concerns that Tehran may attempt to close the Strait of Hormuz in protest remain. The passing of Oman's Sultan Qaboos in January – a master mediator for five decades – has fuelled regional angst. On a global scale, the US-China trade war (and the recent spread of the coronavirus) also threatens the volume of Middle Eastern exports to China.

Digital adoption

The potential benefits of digital adoption are well advertised, but there are also risks, notably the threat of cyber attacks and the shift in working practices required to embrace new ways of operating. This must be addressed in the near-term to accelerate digital adoption in the early 2020s.

Integration:

The power of efficiency

Total integration extracts maximum value along NOCs' downstream chain by bolstering efficiency and output while streamlining costs and the environmental impacts.

It is opportune timing to accelerate integration. For one, the region's NOCs currently benefit from particularly strong leadership. Bold and innovative approaches are critical to achieving the region's growth ambitions; integration is a complex challenge.

Oman has recently made major steps in this direction. The government's planned integration of state-owned oil company OOC, refiner Orpic and seven other domestic energy firms is underway. OQ is the newly established entity to integrate the companies' operations in order to streamline and then ramp up the sultanate's downstream operations, including petrochemicals. This strengthens Oman's foundation as it aspires to expand its downstream operations, including petrochemical projects. This move also sends a clear message of aspiration and confidence at a time when many companies and investors need reassurance. But more is needed.

Build clients' confidence

Financial and political instabilities mean clients and investors are viewing proposals and projects through a more tentative lens. Recent overruns on capital investments have not helped. Easing their concerns must be one of downstream operators' priorities in 2020. This can include showcasing successful projects, highlighting growing digital awareness (page 4: Digital: Gamechanger?) and encouraging collaborations. Time is of the essence. Building the \$10-\$15bn assets can take 5-6 years (7-8 years when including the project definition and basic engineering design phases), roundtable participants said. Every year of waiting, as energy demand rises, translates into weakening energy security in the mid to late-2020s. Plus, building assets enhances In Country Value (ICV), which strongly supports the goal of self-sufficiency in the region's national visions.

"Partnerships that do not add value are not true partnerships."

Abu Dhabi Downstream Roundtable,
November 2019



Increase partnerships

Collaborative spirit between NOCs is burgeoning, improving access to finance, technology and new geographies. For example, Saudi Aramco and Total agreed a 50:50 joint venture in 2019 to invest \$1bn over the next six years to develop a network of retail fuel service stations in the kingdom. ADNOC, Eni and OMV formed a trading venture, called ADNOC Global Trading, at the Abu Dhabi Global Market last year. Looking ahead, ever-decreasing risk will be key to ensure more partnerships bloom in 2020.

To hedge risk, and as integration along the value chain increases, NOCs must bolster their cooperation with IOCs. Knowledge and data exchange mean NOCs can adopt tried-and-tested templates. Working with consultants and technology providers can also help pinpoint synergies more quickly. Greater cooperation

can also accelerate the growth of small-scale refineries, potentially reducing construction time to just 14 months. The relative flexibility of such projects can help strengthen security of supply when larger complexes have planned and unexpected down times: a steel safety net, per se. Sometimes, NOCs will have to work harder to reassure and incentivise reluctant IOCs. Some IOCs fear jeopardising their competitiveness or increasing their vulnerability to cyber threats through data sharing. Equally, IOCs must not underestimate NOCs' ever-growing value and influence.



"Without collaboration, we stagnate, and innovation and growth weaken. Strategic partnerships are integral to the success of NOCs."

Abu Dhabi Downstream Roundtable,
November 2019

Digital: Gamechanger?



The words 'digitalisation' and 'gamechanger' are increasingly synonymous. But only if downstream operators can embrace step changes and capture value from the advantage of regional upstream and downstream digital integration.

One key, overarching message in the growth of digitalisation is the need for information management. This encompasses making the most of digital tools and workflows and understanding how data will be used throughout design, build and operation processes. Having this clarity at the outset ensures that NOCs maximise their economic potential along the value chain. The greatest risk to digital plans is thinking this integration will happen automatically. When used correctly, digital tools can be instrumental in accelerating integration in a NOC or with NOCs' partners. Theoretically, as operations could be under one digital umbrella, Middle Eastern NOCs can unite upstream production and downstream processes with relative ease. This is good news, for investors and clients want a complete digital operational downstream journey. Embracing the tools of the digital revolution is a must, with Artificial intelligence (AI), Industrial Internet of Things (IIoT), predictive analytics, data science, robotics and automation emerging as preferences. Digital twins are also increasingly popular as they significantly reduce the

risk of down time, increase CapEx and project execution. Implementing the right mix of these technologies and processes with deep asset knowledge will optimise performance and protect asset security. This will prepare today's assets for the future.

Catching up

There is some way to go, for adoption has been slow. This may be because the development of these new technologies with oil and gas application has collided with several major market changes (notably the global energy transition), and NOCs' capacity for change is running thin. It may also be the operational complexities involved, such as learning how to seamlessly merge new digital tools with existing technologies. NOCs must also spend time and money on curating the right talent pool to support this technological and digital transition (page 10: Talent: New style of thinking). Oil and gas has also not traditionally been an early adopter of new technologies given the risk challenges.



Image: Courtesy of ADNOC

NOCs must act fast, for the pressure to digitally evolve will only intensify in the 2020s. As more NOCs and companies improve their digital competencies, those lagging will find themselves increasingly irrelevant. The longer the wait, the greater the financial and reputational damage in the 2020s. While embracing the digital journey, NOCs must be acutely aware of the risks, notably cyberattacks. Cybercrime damages alone will cost the world \$6trn per year by 2021, up from \$3trn in 2015, according to Cybersecurity Ventures.

NOCs must standardise

NOCs with poor data management risk drowning in a tsunami of numbers, curbing growth and attractiveness to potential partners. This challenge touches nearly every entity in the global energy market, state-owned or not. Worldwide data creation will grow to a mind-blowing 163 zettabytes (ZB) by 2025, according to Seagate

and the International Data Corporation (IDC) – ten times the amount of data produced in 2017. Instances where two NOCs/IOCs define the same piece of equipment differently must stop. It just breeds confusion. Standardising the value chain – from data collection, codes for operational parts to employees' digital training – saves time and money. It also enables companies to integrate digital tools into the existing framework or joint venture, such as predictive analytics. The same goes for ensuring that today's technologies and practices are, in some way, compatible with those in the late-2020s and beyond. One roundtable participant said he cannot access 300+ historical files from 2005 because the technology is now obsolete, losing valuable knowledge. Standardisation also enables downstream operators to smoothly incorporate crossover digital and technological knowledge from other industries, such as airlines and medicine. Simplicity will encourage and strengthen cooperation.

Talent:

New style of thinking

NOCs need a multifaceted workforce. It must reflect the global norms – aspirational, innovative and intelligent people who want to work in industries and organisations with purpose and impact – as well as supporting local value generation and nationalisation.

NOCs must also factor in the stark difference in the generational melting pot (millennials versus baby boomers) and learn how to combine and recruit both skillsets, ensuring neither is alienated. The same applies to the rise of small and medium-sized enterprises (SMEs) and entrepreneurs in the Middle East; a trend wholly supported by governments. Plus, the digital revolution has now added another layer of complexity (see below). NOCs can also increase hires from other industries, such as aviation, medicine and IT. Unburned by legacy knowledge, such talent can be creative trouble shooters once they have learned the fundamentals of the oil and gas markets (NOCs must factor in this training time).

The overarching goal for all these endeavours must be efficiency. Streamlining recruitment processes, training programmes and upskilling internally with upmost efficiency is critical to unlock additional economic value (and strengthen reputational value). For example, Petroleum Development Oman (PDO) began its Lean journey in 2009 in response to operational complexity

and rising costs. So far, more than 500 managers have been trained in Lean leadership behaviours, generating \$1.4bn in additional value – a sum no NOC can ignore

Investing in local value generation pays

Downstream operators support countries' plans, some detailed in national visions, to continually enhance local economic value generation along the value chain. Efforts are clearly paying dividends. For example, ADNOC launched its ICV programme in 2018 to encourage private-sector partnerships, accelerate socio-economic development, improve knowledge-transfer and generate jobs for UAE nationals. Since then, more than 3,000 suppliers have been certified by the programme, driving more than AED44bn (\$11.8bn) back into the UAE's economy as of February this year. It has also enabled more than 1,500 private-sector jobs for Emiratis since 2018.

Middle Eastern NOCs are also increasingly keen on having commitments to local economic contribution

"Poor connectivity in the digital talent chain will slow operational progress."

Abu Dhabi Downstream Roundtable, November 2019



Attracting the workforce of the future

Read ADNOC's report into how careers in oil and gas are perceived by STEM students and young professionals.



development as a non-negotiable part of joint venture agreements and partnerships; a move that is embraced by private entities. For example, last November, Schlumberger signed a memorandum of understanding with ADNOC to support the major's ICV programme, including recruiting and investing in the training of up to 1,000 UAE nationals.

Digital fluency

Digital awareness is critical for the NOC workforce. Talent with digital fluency is in short supply worldwide. This is especially true for the fossil fuel industry, which must compete with businesses that have a cleaner image (this matters to millennial hires, who appreciate their employers' green credentials). To succeed NOCs must upskill their workforce with digital training programmes (including science, technology, engineering and mathematic [STEM] skills) and curate a more positive public image. Failing to act could see downstream operators missing out on a lucrative

opportunity. For example, according to a PwC forecast the benefits of applying AI in the Middle East could accrue \$320bn by 2030. In relative terms, the UAE is expected to see the largest impact with \$90bn in 2030 – 13.6% of GDP. Saudi Arabia takes second place with a \$135.2bn impact (12.4% of GDP).

Know your business

In the 1980s, shift controllers at a refinery would need to know the details of all major infrastructure off the top of their head. Today, that same information is gathered with the click of a computer mouse. And so, a nervousness that computers, not humans, are operational linchpins is building. Countering this means NOCs' workforce must understand operations from the ground up. The lines between 'us and them' are merging, but they cannot blur. The risk could be very real. For example, a computer algorithm convinced 33% of the human judges that it was a 13-year-old human boy during a thirty-minute typed conversation online in 2014.



Environment:

Navigate pressure points

"I'm not producing oil in Angola and living in Paris. I'm producing in Abu Dhabi and I live in Abu Dhabi. This deepens my social responsibility to achieve our corporate aspirations while preserving the environment."

Abu Dhabi Downstream Roundtable, November 2019



Environmental awareness is now non-negotiable for all downstream operators against the backdrop of the Paris Agreement and the energy transition.

A positive and unstoppable momentum is building quickly. One roundtable participant from a NOC said the company monitored its CO₂ emission levels from operations three times every hour (500+ times a week). Still, 55% of CEOs of all industries in the Middle East do not think their organisation has assessed the potential transition risks to a 'greener' economy, according to PwC's CEO Survey 2019.

Areas to explore

Clearly there is much more work to be done. Areas of particular interest for NOCs can include the emerging hydrogen and carbon capture, storage and utilisation (CCS) markets. The Al Reyadah project in Abu Dhabi is the world's first commercial CCUS facility for the steel industry, sequestering up to 800,000 tonnes of CO₂ a year. Examining how this template can be applied to downstream operations should be an environmental priority in 2020. Digital transformation can play a key part here as well with estimated benefits worth \$430bn

from lowering emissions and \$30bn in reduced water usage, forecast the World Economic Forum (WEF) and Accenture. Consider the value of the latter, for example, against the World Bank's report that water scarcity will cost the Middle East and North Africa up to 14% of GDP by 2050.

International Maritime Organisation (IMO) 2020

IMO 2020 was the biggest shift in the global shipping markets – and a major upheaval for downstream oil operators – since engines replaced sails in the early 1900s. The seamlessness of the implementation since 1 January, 2020 translates into a significant confidence boost in the Middle East's downstream sector, from refineries to ports. IMO 2020 refers to the ruling to reduce the sulphur limit on bunker fuel from 3.5% to 0.5%, decreasing demand for high sulphur fuel oil (HSFO) in preference for low sulphur fuel oil (LSFO). The handover applied to 50,000+ merchant vessels



Renewables are increasingly being integrated into downstream operations worldwide. In Russia, Gazprom Neft is embarking on a project to build solar-power electricity plants at its refining facilities, with a 1MW solar installation. This will act as a pilot site for implementing other energy-saving renewable-energy technologies. Shell has installed one of the largest solar parks in the Netherlands at their Moerdijk Chemical Plant and reconfigured the facility to use solar generation to power operations at the plant. In India, BASF, ADNOC and Borealis have signed a Memorandum of Understanding (MoU) to engage in a joint feasibility study to evaluate a collaboration to establish a \$4bn chemical complex. If realized, this would be the world's first CO₂-neutral petrochemical site to be fully powered by renewable energy. And in New Zealand, REFINING NZ is building New Zealand's largest solar farm to power its refinery at Marsden Point.


Image: Courtesy of Shell

worldwide and the Middle East needed to be particularly organised. The region was under a spotlight as it is home to the world's second largest bunkering hub, the UAE emirate of Fujairah, and at the crux of global east-west crossroads. This opportunity to showcase the region's operational flexibility helps solidify its reputation as a reliable and attractive downstream operator – essential to build investors' confidence when ramping up ambitions.

Step changes to watch

In the 2030s, the downstream industry will look back on IMO 2020 as an early testing ground for environmental edits to the crude oil palette. Next up for NOCs is the growth of the electric vehicle (EV) market and sustainable alternative fuels (SAF) in aviation. For EVs, the global stock passed 5mn in 2018, an increase of 63% from the previous year (from a very low base), the IEA said. It could reach 23mn in 2030. While small compared to today's 1.2bn+ non-electric vehicles worldwide, growth

by 2040 could translate into a reduction of 4mn b/d in oil demand. In aviation, the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) will be mandatory for all airlines from 2027. CORSIA aims to address any annual increase in total CO₂ emissions from international civil aviation above 2020 levels and contribute to the industry's commitment to carbon neutral growth from 2020, which translates into rising demand for SAFs. With the world's first SAF flight in 2008, the IEA estimates that biofuels may reach 10% of aviation fuel demand by 2030. This is a leap considering the majority of refineries are not set up for SAF production. As a global hub that is home to several of the world's busiest airlines and airports, Middle Eastern NOCs' proactivity could see the region playing a leading role worldwide. But they must hurry.



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