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Oil Review Middle East

Oil · Gas · Petrochemicals

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Vision 2030 - the implications for Saudi Arabia's energy sector

- KPC - full steam ahead
- MENA LNG demand on the rise
- The latest developments in compressor technology
- Middle East projects in the low oil price landscape
- Managing power safely in oil and gas
- Defusing the talent time bomb
- Protecting people, processes and critical infrastructure

SPE International

SPE ATCE SINCE 1924

The SPE's Annual Technical Conference & Exhibition (ATCE), comes to Dubai for the first time in September, with the theme "E&P 2.0 - Transforming & Shaping the Future". Khalid Zainalabedin, ATCE programme committee chair, and leading participants, share their thoughts on some of the main themes.

see p34

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Editor's note

THE AUTUMN IS shaping up to be a busy time as far as oil and gas shows in the Middle East are concerned. The SPE's Annual Technical Conference & Exhibition (ATCE) comes to the Middle East for the first time in September, with the theme of "E&P 2.0 - Transforming & Shaping the Future." It will provide a valuable forum to discuss industry challenges and technological developments in the continuing low oil price scenario. Also in September, Bahrain hosts Middle East Petrotech, which will focus on the fast-growing refining and petrochemicals industry and how government, industry and academia can work together to advance the industry. See our event previews (p34 and p44 respectively) for further information. This issue also includes a major feature on compressors (p28), and an interview with KPC (p12) as well as articles on Saudi Arabia's Vision 2030 (p18), recruitment and retention (p42) and achieving capital efficiency in projects (p16).

Contents

Front cover image courtesy of Fluor

➔ Executives' Calendar 2016

AUGUST			
29-1 Sept	**ONS**	STAVENGER	www.ons.no/2016
SEPTEMBER			
6-8	**SPE Intelligent Energy International**	ABERDEEN	www.intelligentenergyevent.com
6-8	**NACE Egypt Corrosion Conference**	CAIRO	www.egyptcorrosion.nace.org
20-27	**8th Annual Process Safety Conference**	ABU DHABI	www.oilandgasprocesssafety.com
20	**Opportunity Arabia Conference**	LONDON	www.the-mea.co.uk/events
26-28	**Middle East Petrotech**	BAHRAIN	www.mepetrotech.com
26-29	**SPE Annual Technical Conference & Exhibition**	DUBAI	www.spe.org.events
OCTOBER			
1-3	**Petroleum Conference - Iran**	TEHRAN	www.petroconfex.com
4-5	**Well Intervention Forum**	ABU DHABI	www.interventionmena.offset
9-13	**World Energy Congress**	ISTANBUL	www.wec2016istanbul.org.tr
17-19	**Saudi Arabia Int'l Oil & Gas Exhibition (SAOGE)**	DAMMAM	www.saoge.org
18-19	**Oil & Money**	LONDON	www.oilandmoney.com
23-24	**2nd Middle East Health & Safety Forum**	DUBAI	www.hse-forum.com
30-31	**Gulf Safety Forum**	DOHA	www.europetro.com/en/gsf2016
NOVEMBER			
7-10	**ADIPEC**	ABU DHABI	www.adipec.com
20-23	**SABIC Technical Meeting**	JUBAIL	www.exhibitionofstm12.com
21-23	**Plastics & Petrochem Arabia**	DAMMAM	www.plaschem-4p-arabia.com
27-29	**GPCA Forum**	DUBAI	www.gpca.org.ae/events
29-1 Dec	**Valve World Expo**	DUSSELDORF	www.valveworldexpo.com
DECEMBER			
5-7	**Kurdistan-Iraq Oil & Gas (KIOG)**	LONDON	www.cwckiog.com

Readers should verify dates and location with sponsoring organisations, as this information is sometimes subject to change.

Dubai Municipality to play key role in Health, Safety & Security Forum

BUILDING ON THE success of the inaugural HSE Forum in September 2015, the 2nd Annual Health, Safety & Security Forum 2016 will bring together HSE and security professionals, policy makers, regulators and solutions providers to share knowledge and experiences on proven methodologies and best practices in the drive for better health and safety performance.

Taking place in Dubai on 23-24 October, this timely event will provide a B2B platform for participants, with stimulating keynote presentations from leading government and industry experts, panel discussions, roundtable sessions and interactive drills and trials.

Kicking off the agenda, Eng Raed Mohammed Al-Marzouqi, head of Occupational Health & Safety at Dubai Municipality, will give a keynote presentation on the control of unsafe conditions in industries in Dubai. Delegates will hear from Dubai Civil Defence on the new UAE fire safety codes, and from Ahmed El Hadidi, chair IOSH UAE on the importance of leadership in promoting effective health and safety performance. Other topics covered include developing EHS practitioners into effective business executives, the need for smarter protection solutions in real time, construction solutions for fire proofing buildings, the safety culture for oil and gas, and evacuation planning.

A highlight of the event will be a mock court trial, which will offer valuable insights into the working of justice systems after a serious workplace accident, to be followed by a panel session led by IOSH and Dubai Municipality.

Another innovative feature will be a thought-provoking mock evacuation firedrill, in recognition of the importance of preparing employees in case of emergency and calculating incident response time.

Organised by Health, Safety & Security Review Middle East magazine, and endorsed by Dubai Municipality, the Health, Safety & Security Forum 2016 will showcase the latest developments and innovations, and will help to bridge the gap between the increasing demands for health and well-being and the reality of workplace conditions.

For more information see the website at www.hse-forum.com, or email: register@hssreview.me.

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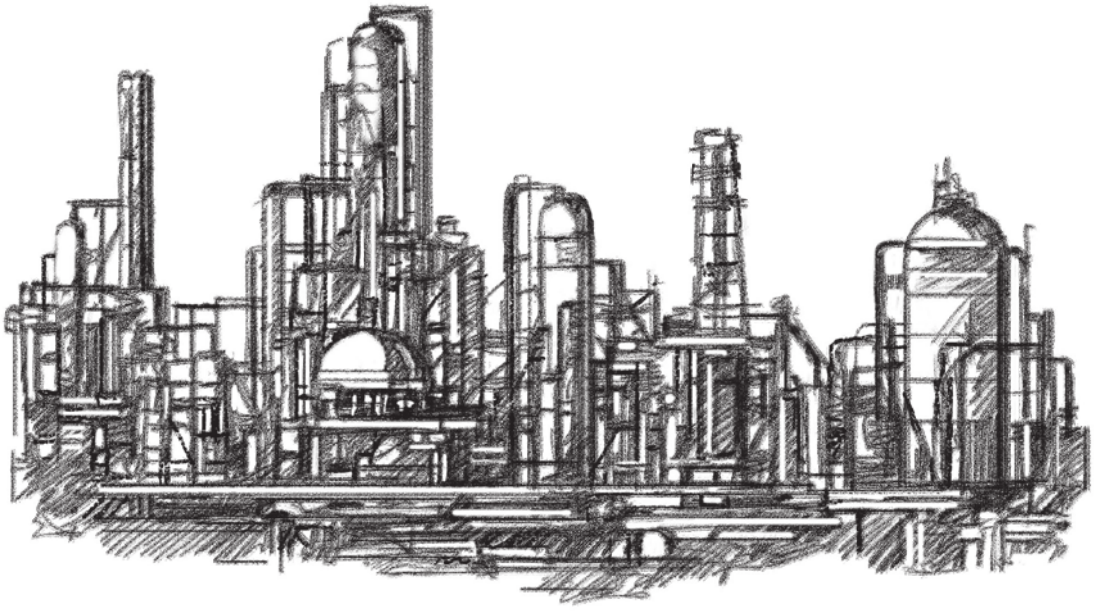

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ATCE Golf Day Dubai

THE SPE ANNUAL Technical Conference & Exhibition (ATCE) 2016 to take place in Dubai from 26-28 September, is looking to be one of the most exciting and globally diverse in history.

The local SPE of the Northern Emirates is hosting their first ever Global Golf Tournament to kick off the ATCE on Sunday 25 September, at the famous Emirates Golf Club, which features several courses in the heart of Dubai and is home to the annual Desert Classic. This event is set to be a great attraction for amateur enthusiasts attending the ATCE. The full service facility will have rental clubs available, for which it is advised to call in advance. The non-golfer coming to socialise can also take advantage of the facility, with full service restaurants and lounges.

Along with its partners at SPE and the ATCE Committee, SPE Northern Emirates provides ample opportunities for anyone who would like to promote their brand, new technology or just socialise during the golf event, offering sponsorship opportunities and price plans. The event will also provide a good opportunity for companies looking to make their mark on the ATCE, whether newcomers to Dubai or those who have been here for a while.

The SPE Northern Emirates has been hosting annual golf events for the past few years and is also home to the monthly Dubai Oilfield Golfing Society (DOGS). The SPE Northern Emirates, along with its student chapters, hosts many monthly technical and social events, and looks forward to having guests representing so many chapters from around the world in Dubai.

For further information email golf@emeraldeventsme.com.

ADIPEC 2016 to discuss GCC response to oil market changes

The KOC stand at last year's ADIPEC

ADIPEC 2016, WHICH will take place at the Abu Dhabi National Exhibition Centre from 7-10 November, will once again bring industry leaders together to discuss the future of the global oil and gas sector. The GCC's strategic response to future changes in the market will be an important point of discussion at the event.

Badria Ali Abdul Rahman, deputy CEO (North Kuwait) at the Kuwait Oil Company (KOC), recently noted that the market has been challenging for the industry, with global oversupply and a constrained economic outlook in several key markets impacting on prices.

"The petroleum industry in the GCC states carries a significant responsibility for national development, and we need to be as efficient as possible, as innovative as possible, and maximise the utility we derive from our natural resources," said Abdul Raheem, who is responsible for the conventional and heavy oilfields of the North Kuwait asset.

"ADIPEC is an important forum for us to achieve this, both as a discussion of industry issues and best practice, and through displays of new methods and technology."

For further information see the website at www.adipec.com.


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Oil prices drop, global oil demand to wane in 2017, new IEA report reveals

CRUDE OIL PRICES dropped to around US$45 per barrel in August 2016 as 'a global supply overhang weighed' and demand growth weakened. The decrease from a mid-June peak above US$52 per barrel has put the 'glut' back into the headlines even though International Energy Agency's (IEA) latest *Oil Market Report (OMR)* balances show no oversupply during the second half of the year.

According to the report, global oil demand growth is expected to slow from 1.4mn bpd in 2016 to 1.2mn bpd in 2017, as underlying support from low oil prices wanes. The 2017 forecast – though still above-trend – is 100,000 bpd below the projected expectations due to a dimmer macroeconomic outlook. The 2016 outlook is unchanged from last month's report, the *OMR* stated.

On the other hand, the global oil supply rose by nearly 800,000 bpd in July, as both OPEC and non-OPEC production increased.

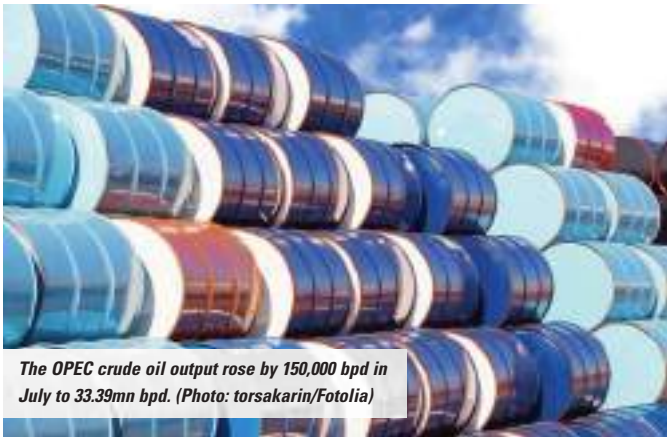
The OPEC crude oil output rose by 150,000 bpd in July to 33.39mn bpd – holding at an eight-year high – as Saudi Arabia produced at the highest ever and Iraq pumped harder. Production from Saudi Arabia reached a record 10.62mn bpd – up 120,000 bpd month-on-month (m-o-m) as Riyadh supplied more crude to domestic power plants to satisfy summer cooling requirements and increased exports to world markets.

In a bid to stay competitive in the region, Saudi Aramco cut the monthly formula price for Arab Light for September loadings to Asia by US$1.3 per barrel.

Shipping data indicate that Saudi Arabia crude exports have held well above seven million bpd so far this year. The latest official data from the Joint Organisations Data Initiative (JODI) show crude oil exports running at 7.53mn bpd from January through May, versus 7.48mn bpd during the same period a year ago.

Kuwait and the UAE pumped at their highest ever and pushed crude supply from the group's 14 members to 680,000 bpd above a year ago.

The OPEC's 'effective' spare capacity was 1.91mn bpd, with Saudi Arabia accounting for 83 per cent. As low-cost producers in the Middle East boost output, Iran and Iraq have emerged as the world's biggest sources of supply growth. Iran – relieved of sanctions since January – has ramped up by 560,000 bpd so far this year. Iraqi output climbed 80,000 bpd m-o-m after southern oil fields ramped up to boost exports and meet higher domestic demand and has added 500,000 bpd compared to the first seven months of 2015, according to the report.



The OPEC crude oil output rose by 150,000 bpd in July to 33.39mn bpd. (Photo: torsakarin/Fotolia)

Qatari output was seen to be stable at 660,000 bpd. Kuwait intends to follow Saudi Arabia's lead and privatise parts of its oil sector in a bid to ease the strain of lower oil prices. Khalifa Hamada, Kuwait's finance ministry undersecretary, said that a portion of Kuwait Petroleum Corporation (KPC) would be offered to the public.

However, output in Libya slipped by 20,000 bpd to 300,000 bpd in July due to temporary export disruptions at the Marsa el-Hariga terminal. August could see higher flows after a deal was struck between Libya's UN-backed government and the Petroleum Facilities Guard (PFG) to reopen three eastern terminals.

The strategic ports of Ras Lanuf and Es Sider, closed since December 2014, could ship nearly 600,000 bpd between them, but returning to full capacity will take time. Repeated attacks by Islamist militants have damaged infrastructure. Zueitina, the third port due to be reopened, can handle about 150,000 bpd.

New oil deals to generate US$25bn in revenues, says Iran's NIOC

IRAN HAS ANNOUNCED that it expects new oil projects to bring in an investment of about US$25bn within the next two years.

Ali Kardor, managing director of National Iranian Oil Company (NIOC), said that that the new generation of oil contracts is the only solution for the development of Iran's oil industry, according to *Iran Daily*.

Kardor emphasised that Iran's oil projects will be attractive to global investors and a dozen deals have already been signed with foreign companies to study the country's oil reservoirs.

The same deals, he added, will help the NIOC to identify the development targets in which the companies may be interested the most.

Early August, the new format of oil and gas contracts known as Iran Petroleum Contract (IPC) was approved in a Cabinet meeting chaired by Iran President Hassan Rouhani.

Now, the Parliament needs to give the go ahead to the new contract – revised in response to criticism that the terms gave too much away to foreign firms – before the Oil Ministry and NIOC can formalise the IPC. NIOC hopes to launch the IPC, an improved version of the former buy-back model that offers more flexible terms, within the next six months.

Based on the IPC, foreign companies will team up with Iranian partners for production of oil and gas from a list of targets that will be announced within the next months. (Photo: George Spade/ Fotolia)

Iran had introduced the IPC in November 2015 to replace buy-back agreements. It is expected to offer more flexible terms on oil price fluctuations and investment risks to make the sector more financially attractive.

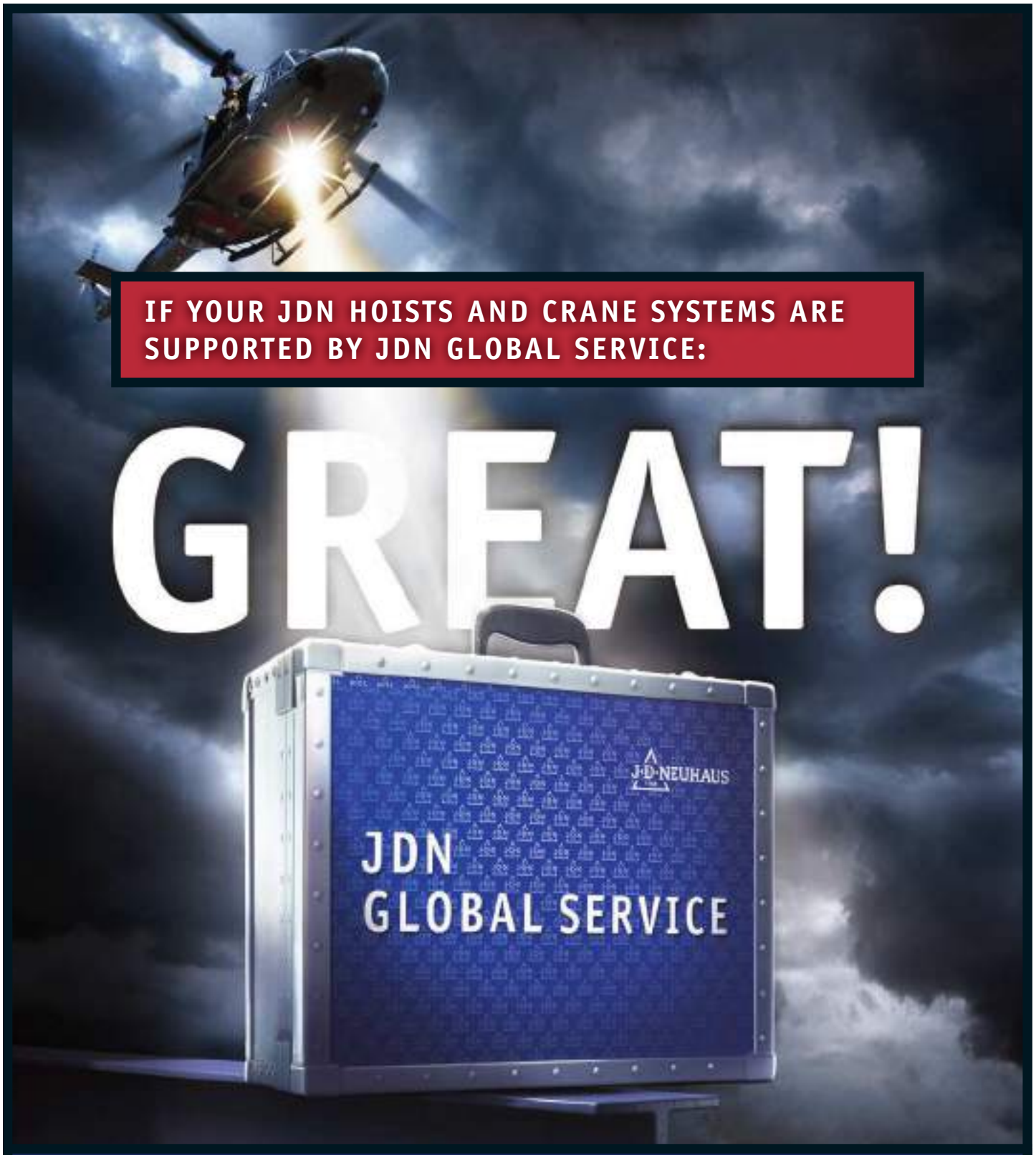
The IPC Regulation provides that each contractor must form a joint venture between one or more IOCs and an Iranian entity. According to the regulation, the purpose of this joint venture is to facilitate technology transfer.

According to Kardor, the NIOC has identified about 34 companies that can team up with Iranian companies over the exploration and development of Iran's upcoming projects.

Kardor further stressed that Iran has prioritised at least 12 reservoirs to be developed through the new format of contracts in the first phase of project awards that will be carried out within the next few months. The projects will have different stages of exploration, development and production and the contractors will be paid with a share of the output, he added.

In June, Iran's petroleum minister Bijan Zangeneh said that the first deals through the new format of contracts will be awarded by October.

Zangeneh further emphasised that Iran expects the upcoming awards to help increase its crude production by 600,000 to 700,000 bpd over the next five years.



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‘Saudi Arabia’s August oil output may hit a new high, to overtake Russia’

SAUDI ARABIA IS likely to boost its crude oil supplies in August to a new record level, overtaking Russia, the world’s top oil producer, as it gets ready for tough talks next month for a global output freeze pact.

In June this year, Saudi Arabia pumped 10.55mn bpd, and lifted production to 10.67mn bpd in July, the highest in its history.

Now the sources expect the OPEC heavyweight to raise its crude supplies to another record this month as demand inside and outside the Kingdom look healthy.

One source from outside OPEC said that output could rise further to as high as 10.8mn bpd to 10.9mn bpd.

Reuters report has stated that industry sources say the Kingdom, already the world’s largest oil exporter, started to raise production from June, after holding it steady for the first half of the year, to meet rising seasonal domestic demand as well as higher export requirements.

The Kingdom started to raise production from June, after holding it steady for the first half of the year, to meet rising seasonal domestic demand as well as higher export requirements. (Photo: Sashkin/Fotolia)

Higher production could give it more leverage during talks in September when both OPEC and non-OPEC producers are expected to revive a freeze deal to support oil prices, the sources added.

Saudi Arabia appears to want higher prices, but agreeing a level to freeze supplies will be the main obstacle to a deal.

Some analysts, however, said using hard negotiating tactics could backfire on Riyadh.

“It would therefore be a very hard sell for Saudi Arabia to have other countries join a collective action plan, while it is the main source of supply increase ” outside of Iran post sanctions,” according to Olivier Jakob at Petromatrix.

Last week, Saudi Arabia energy minister Khalid al-Falih sought to clarify why the Kingdom hiked its production in July in an oversupplied market. In a statement, Falih explained the rise was due to rising seasonal domestic demand and customers asking for more oil worldwide.

Oil prices dropped to US$27 per barrel in January from as high as US$115 in mid-2014, hitting the budgets of oil exporters worldwide, including Saudi Arabia, and resulting in a record fiscal deficit for Riyadh.

A previous attempt to freeze output at January levels to support prices collapsed last April after Saudi Arabia said it wanted all producers, including Iran, to join the initiative. But since the appointment of Falih in April, Saudi Arabia has taken a softer tone towards Iran at OPEC.

OPEC sources say the group will probably revive talks on freezing output when it meets non-OPEC nations next month in Algeria as Riyadh appears to want higher prices.

New natural gas processing plant opens in Iraq

IRAQ STARTED OPERATING a new natural gas processing plant for oilfields in its south eastern region to use flared gas for generating electricity, the Oil Ministry said in a statement.

The plant located in Misan province, on the border with Iran, will process gas associated with crude pumped at the Fakka and Bazargan fields. All Misan fields, to be brought on stream in the future, will be connected to the plant.

OPEC’s second largest oil producer, Iraq flares about 70 per cent of its gas output, according to Basrah Gas Company, which was set up in partnership with Shell and Mitsubishi.

Basrah Gas Company, this year, also started exporting cargoes of gas condensates and LPG processed from fields in the Basra.

According to Bloomberg, Iran will start exporting gas to Iraq in September 2016.

Shipments will start at seven million cu/m a day to supply a power plant in Baghdad, Hamid Reza Araghi, director of the National Iranian Gas Company, said. A second route to Basra will be opened in 2017, with shipments eventually reaching 70mn cu/m a day.

Iraq currently produces around 880mn cu/m of natural gas per year, according to reports.

Libya begins repair work at largest oil port

LIBYA HAS STARTED maintenance work at Es Sider port, nation’s largest oil export terminal, as part of plans to increase output from North Africa’s biggest holder of crude reserves.

Exports should resume by September once official orders are received to reopen the port, Galal Mohamed, head of operations at Waha Oil Company, said.

Es Sider, operated by Waha Oil Company, has been closed since December 2014 when armed groups attacked the port.

The state National Oil Corporation has engineers and other workers at the port to evaluate damages and decide when to resume exports, NOC’s Ibrahim al-Awami added.

“We haven’t received official orders to reopen the port and resume exports, but there were intensive meetings with National Oil Corporation officals recently,” Mohamed noted.

Six of the port’s 19 storage tanks are damaged from fighting over the last two years, he revealed.

Libya is seeking to boost crude production after rival leaders agreed in July to unify the state NOC under a single management. The bulk of the country’s oil infrastructure is either damaged or straddles disputed territory as armed factions fought for control of producing fields. The nation pumped 300,000 bpd of oil in July, compared with as much as 1.78mn a day in 2008, three years before a revolt led to the overthrow of the regime of Muammar Gaddafi, according to data compiled by *Bloomberg*.

Waha Oil Company will be able to produce 75,000 bpd in the first six months after resuming operations. Waha fields stopped producing in 2014 after the Es Sider oil port operations were halted. Es Sider has an export capacity of 340,000 bpd.

Libya’s unity government announced on 28 July an agreement to pay salaries to Petroleum Facilities Guard members in exchange for reopening the ports of Es Sider, Ras Lanuf and Zueitina.

The NOC said that the resumption of exports from the ports and the release of budget money to the company would help boost production by more than 900,000 barrels a day by the end of the year. “NOC is working to overcome difficulties and technical problems in the entire oil fields,” it said in a statement on its website.

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Moving ahead to boost production

Ghadeer Al-Qadfaan, manager marketing planning at Kuwait Petroleum Corporation (KPC), discusses the NOC's plans and operations.

What are the key projects KPC is planning and progressing?
Kuwait Oil Company (KOC), a subsidiary of KPC, is handling the exploration and production of crude oil and gas within Kuwait, and has initiated huge projects to augment light oil (Light Oil blending facility, and three Jurassic Oil processing facilities) and heavy oil production capability (Lower Fars blending facility), in addition to four new gathering centres, in order to increase Kuwait's crude oil and gas production towards the aspired production target of 3.5mn bpd by 2021.

What is the status of the new oil refinery and Clean Fuel project?
The new refinery project (Al-Zour Refinery) consists of three mini-refineries, which will commission in July, September and November 2019. As for the Clean Fuel Project (CFP), it is expected to commission by October 2018. (The Clean Fuel project involves the upgrading and integration of the Mina Al Ahmadi and Mina Abdulla refineres, increasing combined capacity from 736,000 bpd to 800,000 bpd).

To what extent has the low oil price affected KPC's development plans, and have you adopted any particular measures to address this?
Despite the prevailing low oil prices and the challenging market environment, KPC has and will go onward with the planned projects as mentioned above to enhance its upstream and downstream capabilities, and to ensure it meets its clients' needs in the optimum manner. Hence KPC always aims to maintain its presence in the market, and will expand in the near future to offer improved product slates to the market.

Nevertheless, KPC has taken serious measures to control its expenditure, in line with most of the NOCs and IOCs, to absorb the negative effect of the current market situation, while maintaining KPC standards and the welfare of its employees.

The marketing departmentn of KPC; Ghadeer Al-Qadfaan is standing far left

> "KPC has taken serious measures to control its expenditure, in line with most of the NOCs and IOCs"

How are you looking to encourage further international collaboration in Kuwait's oil and gas sector?
KPC and its subsidiaries always try to engage international expertise and specialised entities across oil sector studies/projects, in order to ensure the adoption of the latest technologies across our operations.

Furthermore, the majority of oil sector mega projects have been developed with the participation of elite international companies who are selected through a comprehensive selection process.

How is KPC attracting and developing the next generation of oil and gas leaders?
One of KPC's most important values is that our employees are our most valuable assets, hence KPC capitalises on and invests in its employees by enrolling them in training courses internally or abroad in distinguished international training firms.

Also, KPC management has always promoted a competitive working environment and encouraged on the job training across KPC and offers attachment programmes with major oil companies, as well as engaging future leaders in the decision-making process.

How is KPC encouraging more involvement of women in Kuwait's oil and gas industry?
KPC has always invested in talented employees, irrespective of their gender. KPC and its subsidiaries give all talented employees the chance to compete and to reach the highest grades and ranks. There are many distinguished examples such as Hosnia Hashem (V-P Operations at KUFPEC), and Sara Akbar (former manager in KOC and KUFPEC), along with many others.

I believe that KPC has succeeded in creating a healthy work environment that nourishes talent and facilitates competition with gender equality. ■

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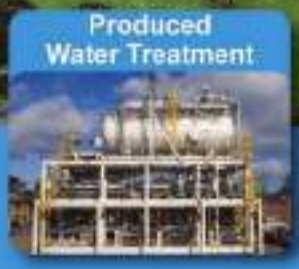

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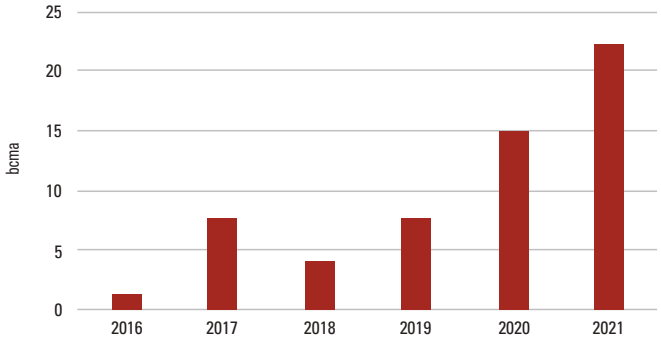
MENA demand for LNG set to grow

The MENA region is leading global LNG demand growth in 2016 – a trend that is set to continue as domestic gas output falls short of surging regional demand for power and industry, according to a recent report from APICORP Energy Research.

THE LATEST APICORP Energy Research report states that MENA will invest around US$10.3bn in LNG-importing facilities over the medium term to cater for growing demand, and will increasingly charter floating storage and regasification units (FSRUs) as a temporary and lower-cost solution.

Despite its dominant role in terms of hydrocarbons reserves, the MENA region will become the world's second-largest gas-importing region after South Korea and Japan, believes the International Energy Agency (IEA). Consumption of natural gas in the Middle East, the agency forecasts, will rise from 480bn cu/m in 2015 to 738bn cu/m in 2040. Yet despite its strong gas reserves base, production has largely failed to keep pace with historical demand growth and is unlikely to do so in the coming years. Furthermore, regional pipeline import options are limited. The MENA region is facing a looming domestic supply crunch for natural gas, which will mostly be met by LNG imports.

MENA planned regasification additions 2016-21 (bcma)

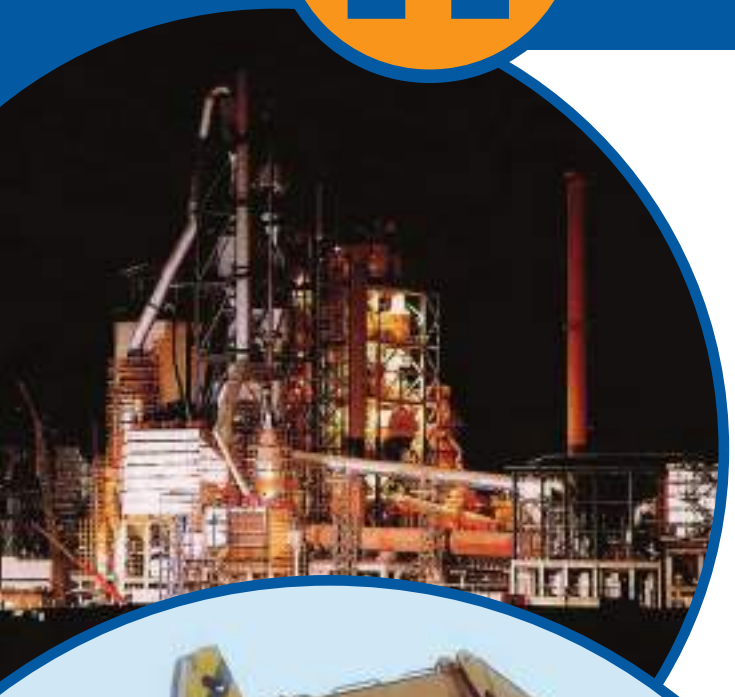


Source: APICORP Research

Imports by consumer countries in the region in 2015 amounted to just 10.5bn cu/m of LNG, of which 40 per cent was sourced from Qatar. But by the end of 2017, MENA countries will account for 6.5 per cent of global LNG demand – a sharp rise from around one per cent in 2013. Egypt and Jordan received their first LNG shipments in 2015; Kuwait, the GCC's first LNG importer, and Bahrain are looking to construct permanent import terminals; and Abu Dhabi has opted to import LNG via a FSRU. Regional LNG importers are seeking to tie up term supply deals, making the most of structural oversupply to lock in favourable pricing and flexibility, at a time when budgets are under pressure. It will all make the MENA region a growing demand-side force in the global LNG sector.

While low LNG prices present opportunities, there are also challenges, the report says, such as the cost of finance. In the case of Egypt, for example, LNG suppliers are wary of agreeing long-term contracts given the state's poor payment history. Capital constraints and uncertainties in the LNG market mean that many are opting for FSRUs as a temporary measure, taking advance of low prices before considering more expensive long-term options. But longer term, confronting the gas challenge requires a pragmatic approach to domestic prices for gas (and power), allowing them to rise sufficiently to incentivise the development of the region's own substantial gas resources. ■

RELIABILITY IN OIL WELL CEMENTS



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Middle East projects in the low oil price landscape

Richard Meserole, Fluor's vice president of international construction, shares his thoughts on how the current landscape also provides opportunities to achieve cost savings and capital efficiencies for clients.

Only projects with a lower capital spend and high rate of return are moving forward. (Photo: Fluor)

THE LOW OIL price environment has resulted in challenging times for doing business across the entire Middle East. Our clients are focused on per-unit costs, such as dollars per barrel, and are therefore cautious about deploying capital through new projects. Therefore, only projects with a lower capital spend and high rate of return are moving forward. But this is also an opportunity to be innovative and identify ways to make oil and gas projects more cost efficient.

That's something that Fluor has been working on for several years now. Aware of the fact that EPC contractors had to be more competitive, we changed our execution model to provide clients with more cost and schedule certainty, and this new approach has had great resonance with our clients in the Middle East.

> "By engaging strategic global sourcing expertise early on in a project, significant procurement savings can be delivered to clients."

Another important aspect that we took into account was the fact that every project is unique, with different needs and challenges. Therefore, our project solution also needed to be unique and fit-for-purpose while achieving our clients' investment goals.

Reducing costs

Fluor looked at ways to reduce costs across the entire life cycle of a project. We devised an integrated engineering, procurement, fabrication and construction (EPFC) approach that could deliver numerous benefits. Benefits that translated into lower unit costs, enabling clients to move forward on

projects that would otherwise not be economic. By controlling a project's delivery through its entire life cycle, phases are seamless and integrated, eliminating handoffs and unnecessary costs. Examples of how integrated project solutions achieve savings at each phase include the following:

- In engineering, leveraging Fluor's patented 3rd Gen Modular Execution℠ approach, reduced plot space requirements through modularisation, in turn reducing materials and on-site labour. Use of 3rd Gen Modular Execution on one oil and gas project helped reduce the plot plan requirements by 40 per cent compared with a traditional design approach.
- Commercial strategies reduce costs – by engaging strategic global sourcing expertise early on in a project, significant procurement savings can be delivered to clients by monitoring global supply and demand trends, market intelligence, optimising currency exchange, using global sourcing approaches and logistics strategies. More than US$100mn was saved on a refinery mega project through sourcing equipment, piping and electrical items.
- Construction-driven execution – construction and operations teams are engaged on projects from day one, creating designs that are focused on efficient construction. This develops a construction-driven mindset for the entire project team and improves productivity and safety in the field. One result of this integration is that better build designs are developed. For example, our integrated scaffolding solution designs scaffolding into 3D models to save construction hours and improve safety.
- Innovation – Fluor is leveraging innovation in every facet of the company to improve project delivery. Over the past years, many tools have been developed, both by Fluor and with our suppliers, that allow us to deliver projects more efficiently. Fluor is also participating in many industry working groups, including the European Construction Institute, to assess what other opportunities can be leveraged across the construction industry to improve efficiencies.

Fluor's goal is to provide integrated, capital-efficient projects locally while maximising supply chain efficiencies. (Photo: Fluor)

> "With this type of delivery control and integration, projects can achieve capital efficiency and delivery certainty."

With this type of delivery control and integration between phases, projects can achieve the capital efficiency and delivery certainty that are so needed in this environment. This new execution approach, coupled with our 60-year history in the Middle East, and a proven track record of increasing local content wherever we work in the world, will help us meet our goal of providing integrated, capital-efficient projects locally, while maximising supply chain efficiencies. ■

Vision 2030 and Saudi Arabia's energy future

Bassam Fattouh and Amrita Sen assess the implications of Saudi Arabia's Vision 2030 for the Kingdom's energy sector.

A KEY GOAL OF Saudi Arabia's ambitious new strategy, known as Vision 2030, is to build a well-diversified economy which is less dependent on oil revenues. A number of key elements are highlighted which are designed to achieve this, such as support for SMEs, privatisation of government services and improving education. Another key element is maximising the country's investment capabilities, which involves restructuring the Public Investment Fund (PIF) and transferring ownership of Saudi Aramco to the PIF, with the aim of creating the largest sovereign wealth fund in the world.

Through these and other initiatives, Saudi Arabia aims to achieve some very ambitious goals, including moving the economy from the 19th largest in the world into the top 15; increasing the private sector's contribution from 40 per cent to 65 per cent of GDP; raising the share of non-oil exports in non-oil GDP from 16 per cent to 50 per cent; increasing non-oil government revenue from SAR 163bn to SAR 1 trillion; growing PIF assets from SAR 600bn to more than SAR 7 trillion; and increasing foreign direct investment from 3.8 per cent of GDP to 5.7 per cent.

The National Transformation Programme (NTP) approved in early June, provides more information on the implications of Vision 2030 for the energy sector.

While such broad visions are hardly new, there is much optimism that this time the plan will be implemented – at least partially, and thus it is no surprise that Vision 2030 has captured the interest of the energy markets. The replacement of veteran oil minister Ali Al-Naimi by Khalid Al-Falih, the creation of the enlarged Ministry of Energy, Industry and Mineral Resources, and plans to publicly list a minority stake in Saudi Aramco, have been interpreted by some analysts as clear signs of a drastic shift in energy policy.

While the recent announcements and organisational changes are substantial, and the overall objectives of Vision 2030 are very ambitious, the impact on oil policy and the energy sector is likely to be more subtle than current expectations, not least because the last few years have already seen deep transformations in the Saudi energy sector.

2020 energy sector targets in the NTP

Performance Indicator	Baseline	2020 Target	Unit
Petroleum production capacity	12.5	12.5	mb/d
Dry gas production capacity	12	17.8	bcf/d
Refining capacity	2.9	3.3	mb/d
Share of pharmaceutical sector in non-oil GDP	0.98	1.97	Percentage (%)
Efficient utliation of fuel in electricity power generation	33	40	Percentage (%)
Number of job opportunities in the mining sector	65	90	Thousand jobs
Decrease in water and electricity subsidies	0	200	SAR Billion
Generation from renewable energy	0	3,450	Megawatts (MW)
Share of renewable energy in total	0	4	Percentage (%)
Job opportunities for citizens in atomic and renewable sectors	500	7,774	Jobs
Local content contribution within the renewable sectors	25	35	Percentage (%)

Source: Vision 2030 Kingdom of Saudi Arabia; Energy Aspects

The Kingdom has launched initiatives to generate more value added, through investing in downstream assets and integrating refineries with petrochemicals, increasing the role of gas in the energy mix, deploying renewables into the power sector, improving efficiency in energy use and, more recently, increasing domestic energy prices. On the oil policy front, the current policy of leaving it to 'prices' to rebalance the market in the absence of a collective agreement on cutting output remains very much in place.

> "The impact on oil policy and the energy sector is likely to be more subtle than current expections."

The central role of the oil sector and oil revenues

The Saudi economy, and the Kingdom's political stability, still rely heavily on government spending that is fuelled by oil revenues; Al-Falih in a recent interview, emphasised the critical role of oil revenues in building other economic sectors in the Kingdom. Despite the size of its fiscal buffers, low oil prices have been painful for the Kingdom. Saudi Arabia has been drawing down on its foreign reserves, increasing its borrowing, exploring ways to increase taxes, reducing government spending, cutting energy subsidies and scaling back spending on capital projects. These adjustments are taking their toll on the economy; recent data show that the economy expanded at its slowest rate in three years during the first quarter of this year, and consumers have been hit by higher energy prices and growing inflation.

Oil policy

The replacement of Ali Al-Naimi as oil minister represents a change of personnel

but not of policy. The current output policy is based on a fundamental principle: Saudi Arabia will not act unilaterally to rebalance the market. In the absence of a collective agreement among producers, Saudi Arabia has opted for a market share strategy. The increase in the Kingdom's refining capacity means that Saudi Arabia is not only competing in crude but also in the products markets. But history suggests that Saudi Arabia's oil policy is flexible and could change depending on a change in other producers' behaviour and/or changes in market conditions.

There have been suggestions that in the 'new global oil order', Saudi Arabia has no incentive to keep its official policy of maintaining spare capacity and this role will increasingly be played by US shale producers. But there may be a strong case for Saudi Arabia to play a more proactive role on the upside. One of the lessons for Saudi Arabia policy makers from the latest cycle is that a high oil price environment will accelerate supply and demand responses, especially as environmental concerns intensify. It is in the Kingdom's interest to prevent prices from rising to high levels, putting a cap on the oil price. To achieve this, Saudi Arabia would need to maintain healthy spare capacity and develop market tools to help influence the price on the upside. So far, there is no indication that Saudi Arabia has abandoned its policy of maintaining spare capacity, which is still considered to be a cornerstone of oil market stability.

> "Another area of policy continuity is the goal of using more natural gas domestically."

The focus on gas will accelerate

Another area of policy continuity is the goal of using more natural gas domestically rather than liquid fuels. One of the government's key policy objectives is to increase the share of natural gas to more than half of total primary energy demand to satisfy increasing demand from new petrochemical plants and to reduce crude burn in the power sector to free up more oil for exports. Domestic production will remain the primary focus. Saudi Aramco recently commissioned the 1.3 bcf/d offshore Hasbah field, that, along with the 1.2 bcf/d Arabiyah offshore field, will feed 2.5 bcf/d of raw gas to the Wasit gas plant. Along with the 75 mcf/d Midyan project on the Red Sea, and the expansion of two existing fields, these projects will

add 5 bcf/d of raw gas output for around 3.2 bcf/d of sales gas. Saudi Aramco has also invested heavily in shale gas in recent years. Much of this gas will go to the power sector, where over 13 GW of gas-fired plants are due in the next few years.

The drive for downstream integration

Saudi Arabia has increased its refining capacity significantly in recent years,the most important motivation being to substitute expensive imported petroleum products. Investment in refining is also considered as a key step towards creating added value by converting crude oil into refined products and establishing the link between the upstream and petrochemicals. This in turn provides opportunities for diversification and downstream integration into the full value chain, including the development of new industries. Saudi Arabia has been increasingly encouraging their petrochemical industries to diversify the feedstock mix away from ethane towards refined products such as naphtha, butane, and propane. The use of refined products also provides opportunities to produce more sophisticated petrochemical products that are needed to extend the value chain and generate employment opportunities.

Saudi Arabia is pressing ahead with the 0.4mn bpd Jazan refinery, which will take total Saudi refining capacity from 2.91mn bpd in 2015 to 3.3mn bpd by the end of 2018, although it may well be delayed.

Local content requirements

While continuing to accelerate the path towards downstream integration, the drive to increase the local procurement of goods and services in the energy sector will intensify, with a view to encouraging service companies to manufacture more equipment in Saudi Arabia, diversifying the economy by creating a large Saudi-based oil service industry, and generating employment. Saudi Aramco has launched its In-Kingdom total Value Added (IKTVA) programme with the aim of doubling the percentage of locally manufactured energy-related goods to 70 per cent by 2021. It also plans to raise the export of Saudi-made energy goods to 30 per cent over the same period. The NTP has set an objective of increasing the percentage of local content in the total expenditure of public and private sector from 36 per cent to 50 per cent by 2020. This represents a fundamental shift from current policy where local content has not been a formal requirement, to one where local content development is required across Saudi Aramco's domestic and international supply chain.

Saudi refinery projects, thousand b/d

Company	Capacity	Start Date
Operating		
Ras Tanura	400	Q4 12
SATORP	400	Q4 13
YASREF	400	Q4 14
Planned		
Jazan	400	2020
Possible		
Yanbu	400	2023

Saudi upstream additions, thousand b/d

Project	Type	Capacity	Start date
In production			
Manifa Phase 1	Medium	500	2013
Manifa Phase 1	NGL	65	2013
Manifa Phase 2	Medium	400	2014
Manifa Phase 2	Condensate	65	2014
Under development			
Shaybah expansion	Light	250	2016
Khurais expansion	Light	300	2018
Khurais expansion	NGL	34	2018

Source: Energy Aspects

Hurdles for Saudi Aramco IPO

While many of the themes discussed above represent a continuation, and perhaps acceleration, of existing policy objectives, plans for the partial public listing of Saudi Aramco have caused a significant stir. No exact timeline has been announced, but 2017-2018 has been mentioned as a desired target. The potentially biggest IPO in history is likely to be fraught with challenges. For instance, given the size of the IPO, a listing in a foreign exchange may be required, as the small size of the Saudi stock exchange can't absorb such a high value IPO. A listing overseas would expose Aramco to a number of obligations, such as conforming to standards on reserves accounting. Listing outside the kingdom would also raise the possibility of 'frivolous lawsuits' against the Kingdom. It also raises key issues such as to whether it will result in a fundamental shift in the management of the oil sector. For instance, any potential transfer of Saudi Aramco's shares to the Public Investment Fund (PIF) will entail changes in the governance structure, the decision-making process and the main bodies that are responsible for the investment strategy and the future direction of the company.

Looking ahead

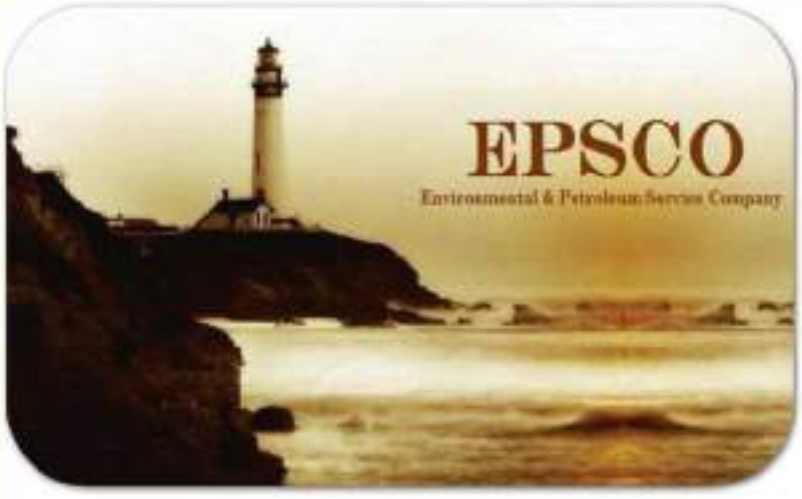
Structural reforms outlined in Vision 2030 are much needed to shift the economy to a more sustainable path, and even if only a small part of it is implemented, the Saudi economy will look very different in 2030 than it does now. The key question is whether these changes will have a substantial impact on oil policy and the evolution of the energy sector.

> "The Saudi energy sector remains key to a smooth transition to the vibrant economy envisioned."

In spite of expectations of a diminished role, the Saudi energy sector (and particularly the oil and gas sector) remains key to a smooth transition to the vibrant economy envisioned, and will continue to play a vital role in the country's future. Furthermore, the overall direction of Saudi oil policy is not likely to change in the next few years, as has been confirmed by the NTP. In fact, one could argue that the Saudi energy sector could benefit from a more integrated energy policy that takes a holistic view about the energy challenges facing the Kingdom. But the Saudi energy sector will not be immune from the changes in other parts of the economy, as the recent restructuring of the Energy Ministry, the recent increase in energy prices, the emphasis on local content policy and plans for a partial public listing of Saudi Aramco have shown.

The restructuring and reorganisation of such a vital sector and the acceleration of some policies may bring benefits and achieve efficiency gains, but they will also generate uncertainties and risks, which need to be carefully assessed and managed so policymakers don't end up killing the goose that lays the golden eggs. ■

Bassam Fattouh is the director of the Oxford Institute for Energy Studies, and Amrita Sen is founding partner and chief oil analyst at Energy Aspects. This is an abbreviated version of paper on 'Saudi Arabia's Vision 2030, oil policy and the evolution of the energy sector' published by the Oxford Institute for Energy Studies.
For the full version, see https://www.oxfordenergy.org/publications/saudi-arabias-vision-2030-oil-policy-evolution-energy-sector/



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SAOGE 2016
Date: 17-19 October 2016
Venue: Dhahran International Exhibitions Center

Tackling hydrocarbon challenges

Saudi Arabia's premier oil and gas exhibition will provide a platform for industry players to discuss and critically evaluate commercial and technological innovations, against the backdrop of depressed crude prices.

SAOGE 2015 attracted almost 8,000 visitors. (Photo: IES)

HELD UNDER THE patronage of HRH Prince Saud Bin Naif Bin Abdulaziz, Governor of the Eastern Province, the 8th Saudi Arabia International Oil and Gas Exhibition (SAOGE) 2016 will host some 100 companies from 25 countries, with more than 10,000 visitors set to attend the show. Participants from countries including China, Egypt, France, Germany, Italy, South Korea, Russia, the UAE, the UK and the USA are expected at the event.

Set against the backdrop of reduced global demand and depressed prices, and with the rise of newly emergent oil and gas exporters, the event will address the need for innovation, asset optimisation and efficiency to secure the bottom line and ensure healthy refining margins. As the foremost hydrocarbon producer in the world, with production reaching a record 10.62 mn bpd in July 2016, and with a number of midlife assets, the Saudi Arabian oil and gas sector plays a pivotal role in supplying global demand.

SAOGE, organised by International Exhibition Services (IES) and hosted as per tradition in Dammam, the hub of the Saudi Arabian oil industry, will provide a platform for local and international industry leaders, technical experts and decision makers to assess the key fundamentals and drivers forging the global markets, and discuss the challenges facing the Saudi Arabian oil and gas industry.

According to the organisers, with planned investment opportunities, sector restructure and privatisation, as well as the divestment of Saudi Aramco, the Saudi oil and gas industry is set to play a key role in mitigating the Kingdom's exposure to hydrocarbon fundamentals risk.

One of the key goals of Saudi Vision 2030 is to identify and implement transformative projects that promote industrial diversification. SAOGE will provide a platform to explore opportunities for establishing joint ventures, which are central to this plan.

Founded in 2008, SAOGE has enjoyed steady growth over the past eight years with a 23 per cent year-on-year annual growth rate, both internationally and within the Kingdom, the organisers stated.

At this year's event, SAOGE will run concurrently with the Machine Tools Exhibition (MTE), which is expecting more than 100 companies from 20 countries, the organisers commented. MTE exhibitors enjoy many synergies with oil and gas industry, many of their key customers coming from upstream operators. ■

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Future trends in the demand for **refined products**

Moin Siddiqi, economist, examines some significant trends emerging in the refined products market.

IMPORTANT CHANGES ARE anticipated in the oil products market over the coming decades – affecting fuel supplies for the transportation, industrial, residential/commerical/agriculture and electricity generation sectors. (The transportation sector covers road, aviation, marine bunkers, rail and domestic waterways, while the industrial sector comprises petrochemicals and other industries, primarily composing iron/steel, glass and cement production, construction and mining).

Based on OPEC Secretariat figures, road transportation remains the leading contributor to demand, with 38.7mn barrel of oil equivalent per day (boe/d) of consumption in 2015 (44 per cent of total offtake), followed by the 'other industry' and petrochemicals sectors at 13.2mn and 9.6mn boe/d, respectively. The use of oil in the residential/commercial/ agriculture subsectors, power generation, aviation, and marine bunkers[1] was reported at 9.2mn; 5.9mn; 5.5mn; and 4.2mn boe/d during 2015. The rail and domestic waterways navigation sector reported the smallest level of oil usage, accounting for 1.9mn boe/d.

In road transportation, gasoline, including ethanol, is currently the main product used, followed by diesel, including biodiesel. Jet kerosene accounts for almost all demand in the aviation industry, whilst in shipping, residual fuel[2] accounts for four-fifths of sectoral demand, with the remainder as gasoil/diesel. Ethane/liquefied petroleum gas and naphtha are essential feedstocks in petrochemicals. Currently, naphtha accounts for half of sectoral demand, while ethane/LPG comprises over one-third.

Bitumen, lubricants and petroleum coke constitute around 60 per cent of sectoral demand in the 'other industry' sector, whilst in residential/commercial/agriculture subsectors, gasoil/diesel and LPG are the most important refined products consumed. Gasoil/diesel is used for heating, lighting and traction, while LPG is mostly used for cooking and heating in the residential sector.

For electricity generation, three refined products are widely used: residual fuel, gasoil/diesel, and other products, such as bitumen, still gas and lubricants. Residual fuel constitutes almost half of sectoral demand.

Sectoral demand

There are several interesting trends worth noting regarding future demand by product:

> "40 per cent of global demand growth between 2014 and 2040 will be met by gasoil/diesel."

Table 1: Global product demand, shares and growth, 2015-2040

	Mn bpd						% of total	
	2015	2020	2025	2030	2035	2040	2015	2040
Light products	40.5	42.9	44.6	46.1	47.4	48.6	43.6	44.3
Ethane/LPG	10.5	11.1	11.7	12.2	12.6	12.9	11.3	11.7
Naphtha	6.2	6.6	7.1	7.7	8.1	8.7	6.7	7.9
Gasoline	23.9	25.1	25.8	26.3	26.7	27.1	25.7	24.7
Middle distillates	34.5	37.3	39.4	41.1	42.8	44.3	37.1	40.3
Jet/Kerosene	6.8	7.3	7.8	8.2	8.7	9.2	7.3	8.4
Diesel/Gasoil	27.6	30.0	31.6	32.9	34.1	35.1	29.7	32.0
Heavy products	17.8	17.2	17.0	17.0	17.0	16.9	19.2	15.4
Residual fuel*	7.8	7.1	6.8	6.6	6.4	6.2	8.4	5.6
Other**	10.0	10.1	10.2	10.4	10.5	10.7	10.8	9.7
TOTAL	92.8	97.4	100.9	104.2	107.2	109.8	100.0	100.0

**Includes refinery fuel oil*
***Bitumen, lubricants, waxes, still gas, petroleum coke, sulphur, direct use of crude oil, etc.*
Source: World Oil Outlook 2015, OPEC

- **Gasoil/diesel** is the most refined product in terms of volume, with multiple usages. Road transportation comprises 60 per cent, followed by residential/commercial/agriculture subsectors (16 per cent) and 'other industry' (nine per cent). Its use in power generation, rail and domestic waterways navigation, and marine bunkers is currently modest. In fact, 40 per cent of global demand growth between 2014 and 2040 will be met by gasoil/diesel. In the transportation sector, diesel offtake should be fuelled by increasing number of commercial vehicles running on diesel from 149mn in 2014 to 361mn by 2040. Similarly, the number of passenger cars using diesel will surge from 147mn to 449mn during the same period. Diesel demand is predicted to reach 31.6mn and 35.1mn bpd, respectively, by 2025 and 2040, representing one-third of global demand.
- **Gasoline** is used almost exclusively in the road transportation sector. Between 2014 and 2040, the number of gasoline passenger cars will increase from 829mn to 1.2bn, thus boosting demand from 23.3mn bpd in 2014 to 27.1mn bpd by 2040. Fuel efficiency gains in gasoline vehicles and the gradual penetration of alternative fuel and electric cars will limit the scope for a further demand hike, especially in Europe and North America. In Asia-Pacific, however, gasoline offtakes are expected to surge, with rising income levels and urbanisation promoting the need for

> “Regional demand growth for ethane/LPG will derive mostly from Asia-Pacific and China.”

greater mobility and car ownership. Marginal demand growth is expected in the Middle East and Africa.

- **Ethane** is main feedstock for petrochemicals and residential/commercial/agriculture subsectors. It is estimated that demand for ethane/LPG could reach 11.7mn and 12.9mn, respectively, by 2025 and 2040 (see Table 1). Demand surge is expected to come mainly from the petrochemicals industry – thanks to ample supplies of low-priced ethane resulting from North America's shale gas boom, which will increasingly displace liquid steam cracker feeds such as gasoil. Over the longer-term, regional demand growth for ethane/LPG will derive mostly from Asia-Pacific and China as a result of expanding petrochemicals capacity. Furthermore, economic development and urbanisation in developing regions will lead to switching away from traditional fuels for cooking and heating, such as wood, dung or crop residues, to commercial fuels, such as LPG.
- **Other 'heavy' products** such as bitumen, lubricants, waxes, solvents, still gas, coke and sulphur are used mostly in iron/steel, glass and cement production, road construction and mining. Electricity generation also relies on direct crude burning and petroleum coke. The use of heavy products in the petrochemicals sector is marginal, whilst demand in the residential/commercial/agriculture subsectors is also low. In 2015, offtakes for 'other products' totalled 10mn bpd, with North America, Asia-Pacific and Europe being the major markets.Regional demand is expected to increase significantly in emerging Asia, led by road construction. In China and India, the total length of road network rose from 3.5mn and 4mn km, respectively, in 2007 to 4.2mn and 4.8mn km in 2012. According to official sources, by 2020 China's highway network will reach three million km. By contrast, no further large-scale capacity expansion is envisaged in North America and Europe, since the road network in these regions is already developed – thus future demand for bitumen will be focused on road maintenance only.
- **Residual fuel** is used mainly (nearly 80 per cent) in the marine bunkers sector, and the remainder in electricity and industrial activities. In 2015, demand for residual fuel accounted for 7.8mn bpd globally, with Asia-Pacific representing two-fifths of total offtake. Residual fuel is the only refined product whose demand is projected to decline over the coming decades, particularly in Europe and Asia-Pacific – largely due to regulatory developments in the marine bunkers sector. The International Maritime Organisation (IMO) regulations call for global standards for sulphur content in marine fuel to be tightened to 0.5 per cent from 3.5 per cent currently. It is estimated that by 2020 and 2040, 1mn and 1.6mn of intermediate fuel oil will switch to gasoil/diesel. Furthermore, the use of residual fuel in power generation will face strong competition from alternative sources, chiefly natural gas, solar photovoltaic (PV) and biomass.
- **Jet fuel** comprises two similar products: jet kerosene, used in the aviation industry, and domestic kerosene, used in the residential/commercial/agriculture subsectors. While demand for domestic kerosene is expected to fall because of a switch to alternative fuels (mainly LPG and gasoil/diesel), demand for jet kerosene will remain strong. Jet/kerosene is projected to be the second fastest growing refined product, with higher offtakes mainly in Asia-Pacific and Middle East. Robust aviation demand from domestic and inter-regional market, supported by the establishment of low cost carriers, will be the main drivers in Asia-Pacific. Demand for aviation services in the Middle East

Table 2: Projections of refined product offtakes by region, (mn bpd)

	World		USA & Canada		Latin America		Africa		Europe		Russia & Caspian		Middle East		China		Other Asia-Pacific	
	2020	2040	2020	2040	2020	2040	2020	2040	2020	2040	2020	2040	2020	2040	2020	2040	2020	2040
Product																		
Ethane/LPG	11.1	12.9	3.1	3.0	1.3	1.4	0.5	0.6	1.1	0.9	0.5	0.5	1.3	1.6	1.0	1.5	2.4	3.3
Naphtha	6.6	8.7	0.4	0.3	0.3	0.4	0.1	0.1	1.1	0.9	0.4	0.4	0.2	0.4	1.2	2.0	3.0	4.1
Gasoline	25.1	27.1	10.5	8.2	2.9	3.6	1.0	1.4	2.2	2.1	1.2	1.2	1.5	1.9	2.4	4.0	3.5	4.6
Jet/Kerosene	7.3	9.2	1.6	1.3	0.4	0.5	0.5	0.7	1.2	1.0	0.4	0.4	0.6	0.9	0.6	1.1	2.1	3.2
Diesel/Gasoil	30.0	35.1	4.8	3.8	3.1	3.8	1.9	2.6	6.7	6.1	1.0	1.0	2.4	3.0	4.4	6.5	5.7	8.3
Residual Fuel*	7.1	6.2	0.2	0.1	0.9	0.7	0.7	0.7	0.7	0.4	0.4	0.3	1.3	1.3	0.6	0.5	2.4	2.0
Other **	10.1	10.7	1.7	1.1	0.7	0.7	0.8	1.1	1.6	1.3	0.5	0.4	0.9	1.2	2.2	2.4	1.8	2.4
TOTAL	**97.4**	**109.8**	**22.3**	**17.9**	**9.6**	**11.2**	**5.4**	**7.2**	**14.5**	**12.8**	**4.2**	**4.3**	**8.2**	**10.3**	**12.4**	**18.0**	**20.8**	**27.9**

**Includes refinery fuel oil.*
***Bitumen, lubricants, waxes, still gas, petroleum coke, sulphur, direct use of crude oil, etc.*
Source: World Oil Outlook 2015, OPEC

region will be fuelled by the development of business hubs, growing connectivity services and the establishment of more traffic hubs.

- **Naphtha** is used almost exclusively as feedstock in the petrochemicals industry. When cracked, it produces ethylene as well as propylene, butadiene, benzene, toluene and para-xylene. Naphtha is expected to be the fastest-growing refined product, with an average growth of 1.3 per cent a year between 2014 and 2040, according to OPEC estimations. Almost all of this growth will be concentrated in Asia-Pacific – reflecting rising demand for petrochemical products in the region. China alone will account for about two-fifths of the growth.

Asia the principal market

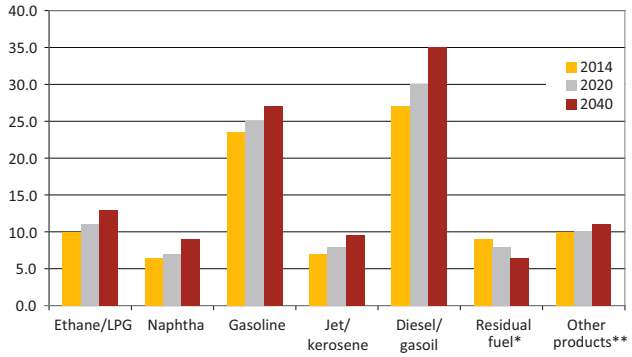
Looking ahead, fuel consumption is projected to expand in every sector except power generation, where continuous competition from natural gas and alternative energy will reduce offtakes for heavy fuel oils. The road transportation, petrochemicals and aviation sectors are expected to contribute most to additional demand for diesel/gasoil, ethane, naphtha and jet/kerosene. According to OPEC estimations, road transportation will account for one third of global demand growth between 2014 and 2040, while the petrochemicals and aviation sectors will together comprise another third. The remaining growth will come mainly from marine bunkers, residential / commercial / agriculture and other industry sectors.

> "Product demand growth is increasingly shifting towards Asia"

Table 2 shows that product demand growth is increasingly shifting towards Asia, whereas offtake in North America and Europe is set to decline in the medium- and long-term. While global demand for refined products is forecast to rise at an average annual rate of 0.7 per cent during 2014-2040, growth in China and Asia-Pacific is reportedly much higher – 2.1 and 1.4 per cent a year respectively – driven by robust demographic and economic growth. ■

[1]Bunker is the name given to the fuel used to operate ships.
[2]Mazut is a residual fuel oil, often derived from Russian petroleum sources.

Global product demand (mn bpd)



**Includes refinery fuel oil*
***bitumen, lubricants, waxes, still gas, petroleum coke, sulphur, direct use of crude oil, etc.*

Source: World Oil Outlook 2015, OPEC

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Banishing leaks from reciprocating compressor packings

A revolutionary new technology from HOERBIGER replaces traditional rod packings with pressurised oil, completely eliminating a significant source of gas leakage.

RECIPROCATING COMPRESSORS ARE an essential part of the hydrocarbon supply chain. Their ruggedness, flexibility and ability to be driven directly from engines running on natural gas makes them valuable in gas production, gas re-injection, and pipeline transport. In refineries, their high energy efficiency and ability to generate pressures of 3,000 psi and above are key to the safe and economic handling hydrogen and hydrogen-rich gas mixtures. Reciprocating compressors are also commonly used in the wider process industries.

Compared to turbocompressors, reciprocating compressors are inherently long-lived, thanks to their robust construction and low operating speeds (typically a few hundred RPM). Fitted with the latest valves, sealing components and capacity control systems, properly maintained reciprocating compressors boast efficiencies that will surprise anyone who thinks of them as old technology.

With today's emphasis on minimising emissions, however, there is one aspect of reciprocating compressors that operators must consider seriously: the need for piston rod seals (Figure 1). Thanks to modern materials and computer-aided design techniques, high-performance rod packings such as HOERBIGER's BCD can achieve practically zero gas leakage when they are new. Over time, however, wear is inevitable – and with wear comes leakage that can have significant financial and environmental consequences.

> "It works by surrounding the piston rod with pressurised oil rather than solid packing rings."

A genuinely leak-free sealing solution

HOERBIGER's new XperSEAL rod sealing system enables the complete elimination of gas leaks from rod packings for the first time, using pressurised oil to keep the gas in place and ensuring genuinely leak-free sealing for the lifetime of the compressor. This radically new sealing system is fail-safe, and can be retrofitted easily to existing compressors.

It works by surrounding the piston rod with pressurised oil rather than solid segmented packing rings. Since the oil conforms perfectly to the surface of the rod, gas cannot leak out as long as the oil pressure is above the gas pressure in front of the barrier. This is true even when the compressor is stationary, so a compressor that must remain pressurised during shutdown does not need extra static seals to back up the XperSEAL system.

The oil, in turn, is kept in place by two specially-designed sealing rings ("1" and "2" in Figure 2). These rings operate virtually wear-free, because they ride on a film of oil at all times.

As well as the oil seal rings (Figure 3a, b, and c), the complete XperSEAL packing contains two or three conventional single-acting packing rings (1), a buffer volume (2), and a wiper ring (4). All the rings are free to move laterally with the piston rod.

Any oil leaking past the oil seal ring on the crankcase side (3c) is wiped off the rod by the oil wiper (4) and recovered via a drain line.

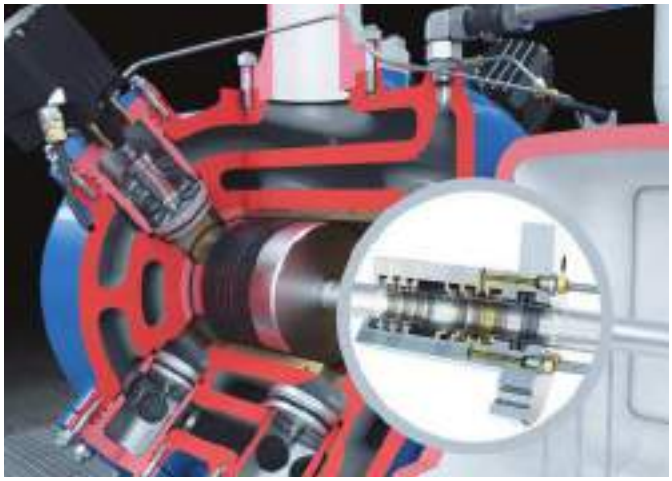

Figure 1: Conventional rod packings made from solid materials will always show some degree of gas leakage

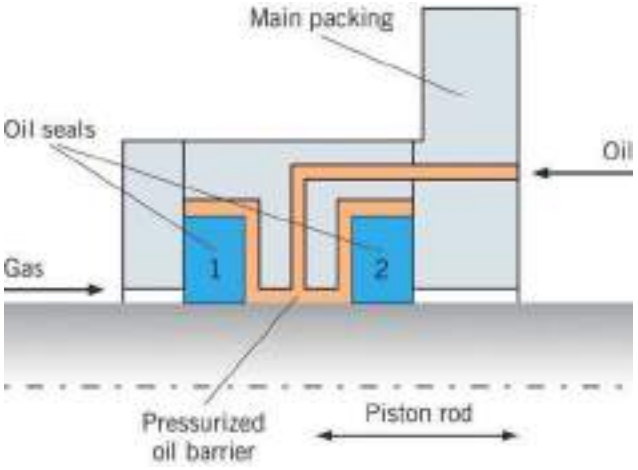

Figure 2: The new packing design uses pressurized oil to keep the gas in place. The oil, in turn, is retained by two sealing rings

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The buffer volume (2) lowers the gas pressure against which the oil has to act, allowing the oil pressure to be set just above the suction pressure of the cylinder and so reducing the loads on the oil seal rings. Without the buffer, the oil pressure would have to be set above the cylinder discharge pressure, so loads and oil consumption would be higher.

> “Almost all of the oil that leaks out of the packing is “pumped” back in by the motion of the rod”

The buffer volume remains at the suction pressure thanks to the conventional packing rings (1) upstream.

Any leakage past these rings during the compression stroke will increase the pressure in the buffer, but because the rings are single-acting, the pressure immediately falls again during the suction stroke. In practice, even worn rings are capable of holding the buffer volume at the suction pressure.

“Pump effect” minimises oil loss

So far, so good – but since we require sealing rings to keep the oil in place, have we not simply exchanged one sealing problem for another? It is true that oil will always leak past the sealing rings, just as gas leaks from a conventional packing box. However, there are two important differences from the conventional setup.

First, the much higher viscosity of oil compared to gas means that the rate of oil leakage is very slow. Second, almost all of the oil that leaks out of the packing is “pumped” back in by the motion of the rod.

The idea of a seal that pumps oil seems counter-intuitive, but in fact it is a well-known property of hydraulic seals. The difference is that it has never before been applied to compressor seals, and for understandable reasons. One measure of the difficulty of a sealing problem is the product of differential pressure and mean rod speed, known as the load collective; in the case of the new seal this is much higher than for a typical hydraulic seal. The other reason is that the compressor seal must accommodate a much greater range of rod movement perpendicular to the main axis of motion.

Designing an oil seal that will pump effectively requires an understanding of viscous flow, hydrodynamics and elasticity. The seal lip is designed so that the motion of the rod pulls the oil film into a narrowing gap. As the oil velocity increases, so too does the hydrodynamic pressure. If this pressure is large enough, it forces the oil back into the packing case. Since the shape of the seal lip deforms under pressure, the design calculation becomes an iterative process.

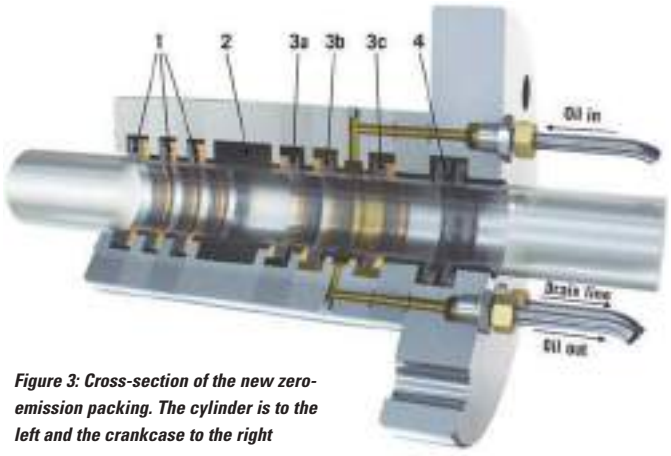

Figure 3: Cross-section of the new zero-emission packing. The cylinder is to the left and the crankcase to the right

With several much larger-scale iterations of the design, HOERBIGER engineers have succeeded in developing sealing rings that return more than 99 per cent of the oil leakage to the packing case during the in-stroke of the piston. The resulting net oil consumption is no higher than that from a conventional lubricated packing: typically 0.5–1.5 litres/day per packing. And, since the sealing rings ride on a film of oil at all times, their wear rate is practically zero.

The core of the new system therefore meets its three original design goals: zero gas leakage through the pressure packing along the piston rod, oil consumption according to market requirements and stable operation under a wide variety of operating conditions.

Ensuring a fail-safe system

The pressurised oil for the packing box comes from a purpose-designed oil supply unit that is approved for use in explosive environments (Figure 4). This circulates oil at a defined flowrate and pressure through the channels in the oil barrier, where it picks up frictional heat released by the oil seal rings. On its return journey the oil is cooled by an integral heat exchanger, so no additional packing cooling is required. Depending on rod size, speed and gas pressure, one oil unit can supply up to six packing cases.

> “The new sealing system has been tested successfully at three plants handling natural gas”

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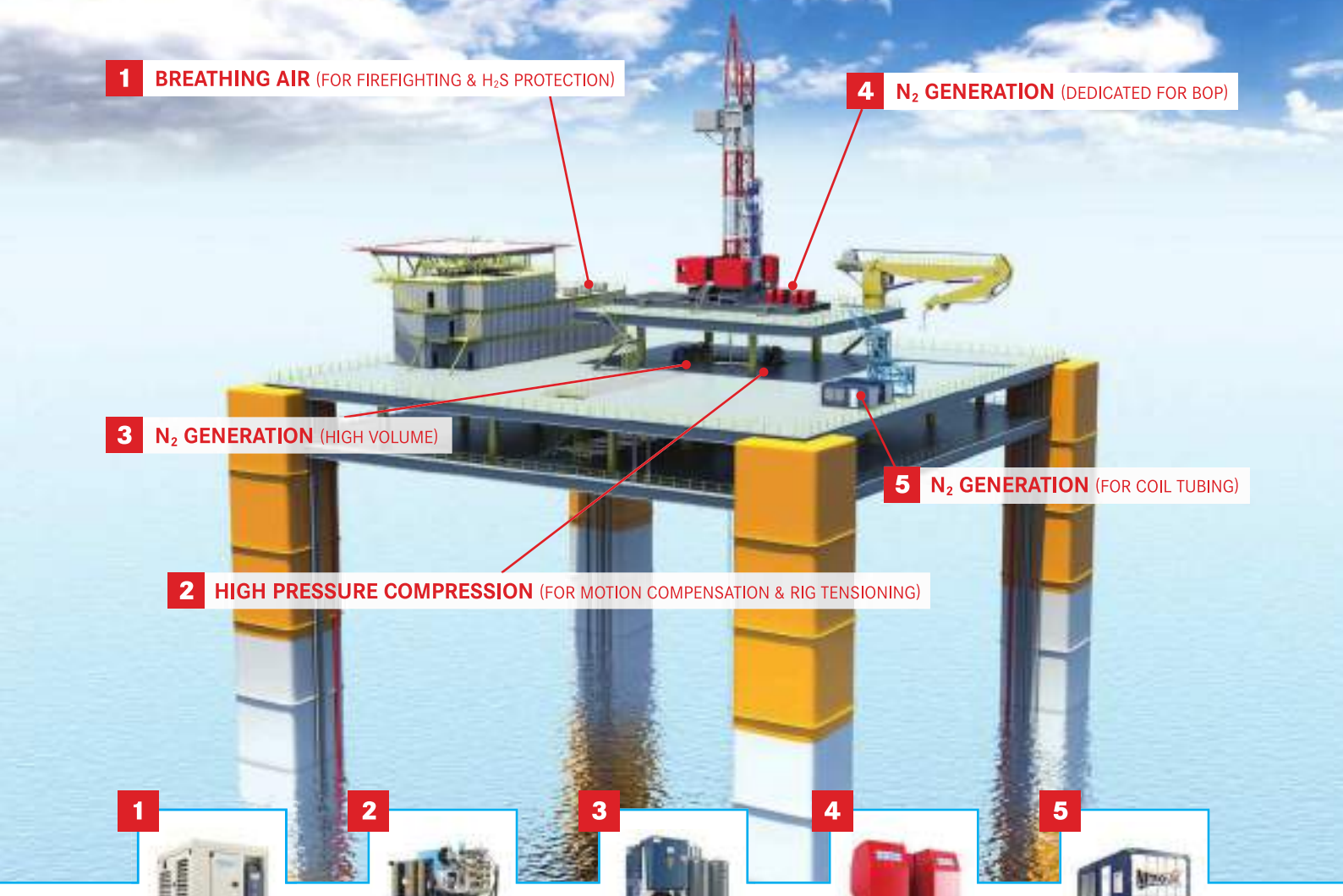

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The oil supply unit continuously monitors the oil temperature, pressure and level. In the event of excessive oil loss or a loss of pressure, the system switches automatically into failsafe mode (Figure 5, bottom).

In failsafe mode the system simply acts as a conventional vented pressure packing, with no power supply needed. The conventional packing rings ("1" in Figure 3) take over the job of gas sealing, and the oil supply line acts as a vent line. The buffer volume is at vent pressure, and the downstream oil seal ring ("3c" in Figure 3) works as a vent seal. In applications where a purge system would normally be used, this can be arranged to switch in when the system enters failsafe mode.

Figure 4: The central oil supply unit incorporates an oil pump, oil cooler, and functions for control, monitoring and safety

The use of the buffer volume to reduce the necessary oil pressure does have one potential drawback if the compressor remains pressurised when it is stationary. Under these conditions, a leaking discharge valve could allow the buffer pressure to rise to the full discharge pressure, which is higher than that of the oil. The solution is straightforward: the oil supply unit oil pressure gets manually increased temporarily whenever the compressor is at a standstill.

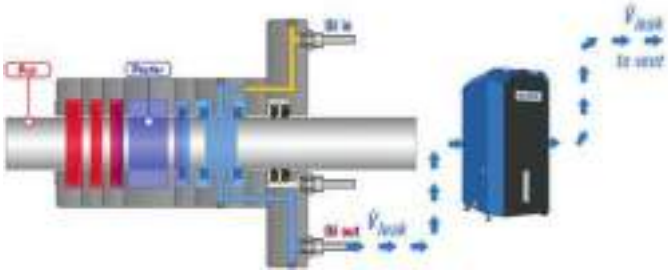


Figure 5: Normal operation (top) and failsafe mode (above). In failsafe mode the system operates as a conventional vented packing, with purge if required

Because the packing box itself is built up from individual components, the system is easy to retrofit and can be tailored for any compressor size.

Confirming real-world performance

The new sealing system has been tested successfully at three plants handling natural gas (a natural gas gathering and treatment plant, a refinery application on a saturated gas unit (SGU) in India, and a large propane refrigeration compressor). In each case, XperSEAL was able to eliminate gas leakage, and the current seal profile now maintains oil consumption at or below its previous values.

The new leak-free packing will not be necessary or appropriate for every reciprocating compressor, but it is surely of interest in cases in which low gas leakage has proved difficult to achieve, or where safety or environmental restrictions set stringent limits on acceptable leakage rates. ■

Setting the standard for high pressure breathing air compressors

BAUER COMPRESSORS, INC, a leader in high pressure breathing air compressor systems and components for more than 70 years, has introduced the UNICUS® 4i, an "all-in-one" compressor package which centralises all high pressure breathing air system components into one appliance-type package. Central to the compressor is an air-cooled compressor coupled to a high pressure breathing air purification system.

UNICUS 4i incorporates touchscreen technology to the operations panel, providing immediate operator interphase with the unit for system operations and fault condition assessment. Operators can turn the compressor on, or off, from one touchscreen; control the processed air into or out of the onboard ASME air storage cylinders by the tap of a screen; or even fill the SCBA (self-contained breathing apparatus) cylinders within a three-position NFPA compliant containment fill station, while at the same time controlling the function of individual fill pressures at each (SCBA) filling position.

If obtaining an accurate air sample for analysis and locating a qualified lab has been a problem, BAUER's Lab On Locale 2™ proprietary option takes the guesswork out of the equation. A specific hardware component is integrated into UNICUS 4i which, at a keystroke, provides immediate access to a qualified third party lab over the internet or via cellphone. As for data logging, the company's optional RFID Technology utilises proprietary antennas to read SCBA tags to record all data in accordance with NFPA.

The UNICUS® 4i compressor

BAUER's optional Gas-Tek™ sensor technology allows gas monitoring requirements to be tailored to the user's specific needs. Included is a fault alarm with shutdown to prohibit it from processing contaminated air.

All the key components within the UNICUS 4i system are manufactured by BAUER.

Take it, or leave it – TCOM® mobile high pressure breathing air compressor system

Have you ever responded to an incident and wished you had more full SCBA's on-scene, rather than spending time shuttling cylinders back and forth? Or perhaps the ability to enter a confined space with tethered air, so you don't have to tow a cascade system back to the station and fill the cylinders?

One of the many unique features of the TCOM trailer package is BAUER's proprietary dual drive system. At the fire station the united supplied shore power cable can be plugged into the station's affixed electrical connection, while in the field, the compressor can be powered from a water-cooled diesel. Other amenities incorporated within the weather proof enclosure include storage for up to twelve SCBA cylinders; four ASME-type air storage cylinders; a two-position containment fill station (tested in accordance with the 2016 edition of NFPA 1901) which is housed behind an anodised aluminum roller shutter door, along with all the compressor and air management controls.

Middle East success for Gardner Denver Korea

THE MIDDLE EAST is a strong focus for Gardner Denver, a major name in compressed air systems and solutions.

The company offers custom engineered products for the oil and gas markets, meeting stringent specifications outlined by specialist consultants and meeting demanding project timelines. Gardner Denver Korea introduced its custom engineering product portfolio in 2008 and since then has been consistently active in oil and gas projects, both off-shore and on-shore.

Gardner Denver's detailed focus on the demands of Middle East market has contributed positively to its successful growth in the region. Compliance with extreme ambient conditions (50-55 deg C), hazardous zone classifications and special material requirements, has been a challenge, and the company is satisfied that it is able to meet needs of this market.

Gardner Denver's customised portfolio extends to air compressors, air treatment systems, nitrogen generation systems and air blowers.

The company recently delivered an instrument air compressor package for one of the major oil and gas companies for an offshore project, with Zone 2, IIA, and T3 Area Classification. It is currently executing an instrument air compressor package for a Middle East customer with Zone 2 IIB T3 / IEC ex certification Instrumentation suitable for Zone 1 IIB T3 Area Classification.

Gardner Denver takes pride in having delivered more than 300 installations of custom built packages around the world and is set to deliver many more in the coming years. It is committed to supporting projects right from the feed stages to successful completion.

A recent instrument air (air compressor + air dryer) package.

SPE Annual Technical Conference and Exhibition
Date: 26 - 28 Sep 2016
Venue: Dubai World Trade Centre, Dubai, UAE

Transforming and shaping the future

In advance of the SPE's Annual Technical Conference & Exhibition (ATCE), Khalid Zainalabedin, ATCE programme committee chair and manager at Saudi Aramco, shares his thoughts on the event.

What is the significance of holding the SPE ATCE in Dubai?
SPE has almost a century of history and this is the first time its flagship event, ATCE, is being held outside of North America and Europe, as a result of SPE's globalisation effort. This is significant for both SPE and the Middle East region, as evidenced by the fact that the event is being held under the patronage of HH Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the United Arab Emirates and Ruler of Dubai. We are delighted that it is being hosted by the Abu Dhabi National Oil Company (ADNOC), with Abdul Munim Saif Al Kindy, ADNOC's director of exploration and production, giving the welcome address.

What is your vision for the conference and what do you hope it will achieve ?
ATCE is the biggest international technical event for SPE. It brings leaders and professionals from NOCs, IOCs and service providers globally to the Middle East to exchange ideas, showcase the most advanced technologies and explore possibilities for collaboration.

My vision for 2016 Dubai ATCE is to enhance understanding and I hope it will help to promote technology development and application for the benefit of the oil and gas community, to tackle the challenges faced regionally as well as globally.

> "This is the first time the SPE's flagship event is being held outside of North America and Europe"

What is the thinking behind the conference theme?
The theme for this year's ATCE is 'E&P 2.0 - Transforming and Shaping the Future'. This is timely, especially at the current difficult environment of low oil prices. Challenging times provide great opportunities. We need to look back, reform and transform, then move forward with a clear vision to reach a prosperous future. We will have discussions and debates on this involving industry leaders, CEOs, technical professionals and academia.

Khalid Zainalabedin, ATCE programme committee chair, and manager at Saudi Aramco

How do you think the industry can best weather volatile oil prices?
The E&P industry has more than 100 years of history, and this is not the first time we have experienced a low oil price. Coming out of an industry downturn, we are always capable of becoming more

efficient and more technologically advanced. Innovation and collaboration are key for us to move forward successfully, especially during challenging times.

What do you think are some of the main issues facing the industry today, and how will they be addressed at the conference?

With a tough environment facing us, the E&P industry has been adjusting accordingly. I would advise industry leaders, especially those in the service providing business, to focus more on the long term vision during this adjustment. Two key challenges we may face today are that many senior professionals are leaving the industry, and not enough students are interested in studying petroleum engineering. These concerns will be discussed at 16ATCE through special sessions, such as 'How Is Academia Managing in A Cyclic Environment?'

> "We are delighted that the event is being hosted by the Abu Dhabi National Oil Company (ADNOC)."

E&P 2.0 has arrived, let us all work hard to achieve its goals. ■

The next generation: talent management for future energy

DURING THESE CHALLENGING times it is important to restore confidence in the oil and the gas industry, says Assim Alsuhaibani, vice president and general manager operations, Qatar, Pakistan and Yemen at Schlumberger.

"Although the current downturn may have shaken job seekers' confidence in achieving long-term successful careers, in fact, the industry can offer an exciting future for graduates and new hires. Those joining our industry now will be best placed to take advantage of the additional opportunities that will open up when activity ramps up again and will reap the career rewards potentially faster than in other industries.

"Importantly, establishing good and continuous relationships with major universities and educational institutes around the world are key factors for all oil and gas corporations to ensure the best quality graduates consider this interesting and technically challenging industry. These activities could include offering more internships, and sponsoring more students to attend technical conferences so they can see the exciting challenges of our industry for themselves, and to be closer to the key industry expertise. Attributes that recruiters should look for include enthusiasm, ambition, technical curiosity, and good team and communication skills.

"Investing in training and development is important to supply our industry with a competent workforce. Strategies will be different based on the industry sector, but they should all aim at reducing time to autonomy for new hires. We should also start relying more on new IT technology and simulators to be more effective with our training programmes and incorporate delivery channels, techniques and methodologies that are appealing to the new generations."

Assim Alsuhaibani, vice president and general manager operations, Schlumberger

So what measures should be put in place to retain young people and help them advance in the industry? "Motivation and engagement surveys are a good starting point, which can help identify trends and areas of importance," says Alsuhaibani. "But it's also important to encourage opportunities for engagement and interaction across all levels of the industry. Knowledge sharing and interaction with senior personnel can help to amplify the industry vision beyond just the top echelons. Finally, I think it's important also to look beyond our industry and to learn from successes and failures from other industries."

Assim Alsuhaibani is speaking in Panel Session 6, "The next generation: talent management for future energy", to take place on Wednesday 28 September.

Reinventing the E&P industry through collaboration

Three leading industry professionals share their views on how collaboration between stakeholders can be enhanced to maximise the benefits for all.

Collaboration is a natural choice in technically challenging projects. (Photo: 3Dmentat/Fotolia)

Oswaldo Pedrosa, president, Pré-sal Petróleo S.A. – PPSA

"Collaboration among operators, academia, partners and suppliers is crucial to improve existing technologies and develop new solutions for the oil and gas industry. The decisions taken together through intensive collaboration of different kinds of expertise and competences maximise cost optimisation and technical improvements.

"In Brazil, the discovery of the offshore pre-salt reservoirs ten years ago brought a full range of new perspectives and technological challenges to the oil and gas exploration and production sector. The joining forces and sharing of technical expertise among pre-salt operator Petrobras and partners have showed to be the best approach to deal with such challenging projects where activities are performed around 300 km off the coast, in water depths of more than 2,000m, reaching large reservoirs nestled 5,000m below the seabed, overlaid by a salt layer that is about 2,000m thick.

"One of the things that could bring great benefits and encourage team collaboration is to change the way most oil and gas consortia are traditionally organised. The decision-making is usually done in formal meetings of the operating committee, supported by technical sub-committees, where an asymmetry of information between the operator and non-operator teams can inhibit cooperation among the technical partners.

"Changing paradigms to count on the technical teams from all partners in a daily basis – with different know-how and capabilities - can contribute enormously to solving operational challenges and developing new solutions to provide the best results.

"The Libra field is one of the largest pre-salt discoveries to date in Brazil and is an excellent example of a successful collaboration project. The Libra Consortium is made up of Petrobras (operator, 40 per cent), Shell (20 per cent), Total (20 per cent), CNPC (10 per cent), CNOOC (10 per cent) and PPSA (contract manager). The working model between the consortium partners is pioneering a new way of conducting E&P joint venture operations. For the first time, a

Joint Project Team (JPT), composed of around 180 professionals from five partner companies, is working together in the same site. This daily side-by-side interaction promotes constant knowledge and experience sharing. Professionals from different nationalities work in synergy to deliver the best outcomes."

Zhou Hongbo, VP CNOOC International Ltd

"For those geographically difficult, technically challenging projects requiring large investment, like the pre-salt prospects and reservoirs offshore Brazil, partnership in sharing both risk and talent becomes a natural choice. In the current low oil price environment, the ultimate objective among partners, which is to reduce costs and enhance returns of the project, should be the same and fully aligned.

"In this case, Petrobras has done a great job in terms of putting together the expertise/best practice of each partner by establishing various committees through which partners can discuss and make decisions on important subjects, technical workshops, and providing secondees from each partner to the Joint Project Team.

"For projects to be successful, partners need to be aligned on objectives, which should be initiated and agreed among all parties, and share knowledge and capabilities, for example combining the local knowledge of the NOC and the international experience of the IOC. Parties with special expertise should be given the opportunity to contribute to ensure that the best industry practice and capabilities are used. Promoting technical innovation is key; further cutting down costs largely depends on the breakthrough and use of new technology, and new ways of operation. In the case of the Libra project, technical innovation should focus on subsurface geological understanding of the reservoir in reducing development uncertainties; and in offshore engineering optimisation in cutting investment costs.

"Each party in the project will have its own management style or internal procedures, which may not necessarily coincide with each other, especially those between operator and partners. In this case thorough communication and consultation procedures become critically important in achieving agreement and understanding on conducting the project.

"As the first deepwater pre-salt project under the PSC model, Libra involves huge investment and a long period of exploration and development. Given that it is still in the stage of exploration and evaluation, there is flexibility and the room to optimise, offering the chance to achieve lower cost and higher profits through collaboration between stakeholders. Many good examples for successful collaboration between the partners exist, for example, there are various brain-storming workshops to discuss ideas in order to reduce costs, and around 20 major technologies for optimisation have been identified from more than 100 proposed initiatives."

Wan Guangfeng, general director, CNPC Brazil

"Maximising the benefits of the project is the common goal of all partners, however, one should be aware that each partner may have different demands and expectations, which requires partners to establish good relationships of cooperation.

"The joint operations team should take measures to encourage partners to make full use of their advantages for contributing to the project. Operators should share

critical information with partners in a timely fashion based on the principle of openness and transparency during the whole commissioning process of the project. The use of secondees, technical committee meetings, operating committee meetings etc. should be maximised to provide more opportunities to deepen mutual understanding between all partners, so that they can better support the operator's work to ensure the maximum benefits..

"To encourage and facilitate further industry collaboration, I have three suggestions:

"The first is to strengthen communication and increase mutual trust. Faced with the challenges of technology and low oil prices, oil companies must change the way of thinking, strengthening cooperation in E&P technology in order to improve efficiency and minimise risk. But the premises of cooperation are mutual understanding and trust, which requires both parties to put themselves in the other's position to handle problems and reduce differences; good communication is needed to enable partners to work together to face the challenges.

> "Successful joint venture projects should share experience and knowledge on the international platform."

"The second one is exemplary demonstration and experience sharing. In recent years, many international E&P cooperation projects have achieved remarkable results, which have promoted international cooperation and enhanced the confidence of oil companies to overcome difficulties. Such successful joint venture projects should share experience, knowledge and improvement measures on the international platform. ATCE provides a very good platform for such exchanges.

"The third is removal of collaborative barriers though government support. Currently, most major oil and gas resources are in the hands of governments. In order to ensure oil and gas resources are scientifically developed and economically utilised, governments should fashion policies to encourage oil and gas producers to participate in the development of non-conventional and difficult-to-produce oil and gas resources, so both governments and partners can maximise efficiency."

The session on "Collaboration 2.0 – reinventing the E&P industry" will be held on Tuesday 27 September.

Innovation beyond the limits

"AT HALLIBURTON, WE think of innovation as an application of technologies to our field which has not been used in oil and gas before, which is different from invention, where new science is being created," says Greg Powers, VP Technology, Halliburton. "We are using science and engineering from other more mature businesses and applying them at the forefront of our industry. There can be uncertainties doing this because we operate in such a harsh environment, but the rewards are worth using this type of 'translation' from other industries to achieve the prize. For example, we create new molecules for some of our treatment formulations, but more often we use existing and well established molecules that are manufactured in bulk for other industries and find ways to use them in our environment. We break a lot of ground introducing these technologies to the oil and gas industry which is the basis for our strong patent portfolio.

"The role of innovation is critical for Halliburton to drive efficiency and reliability. Generally, technology is a key driver in changing the parameters of what we do. Technology, especially innovation, advances productivity and can also be used to lower cost, for example by substituting newer, lower cost materials and ingredients. A good example of that is our MicroScout™ Service, where we have learned to prop open more of the fractures created in hydraulic fracturing. We can get the smaller fractures propped with this technology, and they can create a great deal more production from the same fracturing event.

"The main ingredient in driving innovation is the organisational will to innovate. By its very definition, the outcome of innovation is not 100 per cent secure. There is risk, and the organisation must acknowledge that risk as well as allow for the probability of failures. At Halliburton, we separate innovation from the development of products. On the latter, we insist that we attain a high level of success because we live in a highly competitive world. For innovation, we are trying to 'change the game' and must acknowledge that every attempt does not do so. Management needs to continuously remind employees of the difference between innovation and product development and make provision for differing expectations of the outcomes of the two activities. When employees know they will not be punished for trying something new in an innovation programme, they can be freer to try novel ideas instead of being incremental with a safe development.

"Innovation should never go to zero in tough times. It is incumbent upon the organisation's leadership to keep innovation going and be even more selective, not in taking the risk of success, but in making sure that success in innovation is targeted at the best economic outcome. The bottom line: those that stop innovating will stop winning in the market. Halliburton is not stopping."

Panel Session 1, "Radical ideas - innovation beyond the limits" is being held on Monday 26 September.

Mitigating the effect of boom and bust

"TO WEATHER THE current uncertain environment, the challenge is not the need for new models, but rather the ability to effectively transition," says David Reid, chief marketing officer, NOV. "We need new strategies and a healthy knowledge of our business to cause effective change.

"Operational excellence can be critical in ensuring long-term project sustainability and mitigating volatility, but it can also be the cause that creates a snowball of escalating costs. The two concepts – operational excellence and project sustainability – need to be balanced. The drive towards excellence can compete with efficient operations. Sometimes "better" is the enemy of "good enough." Long term project sustainability comes from considering optimal cost solutions with practical operational excellence programmes. If the programmes deliver financial stability in low cost environments, volatility can become less of a disruptive factor.

"The need for collaboration can be an important factor in managing risk and cost, but the most critical method is often transparency within operations. Collaboration is the outcome of transparency and trust in business practice, which comes from honouring reasonable and sustainable profit growth within multiple parties. However, when the business wins do not align, and one party gains disproportionately for their contribution, collaboration is not the solution. Instead, intense watertight contract negotiation becomes important.

"This downturn is offering us an opportunity to move towards solutions that can work for the entire industry now, and if designed well, over time. These more transparent solutions can aid in delivering a lower cost per barrel while managing risk effectively."

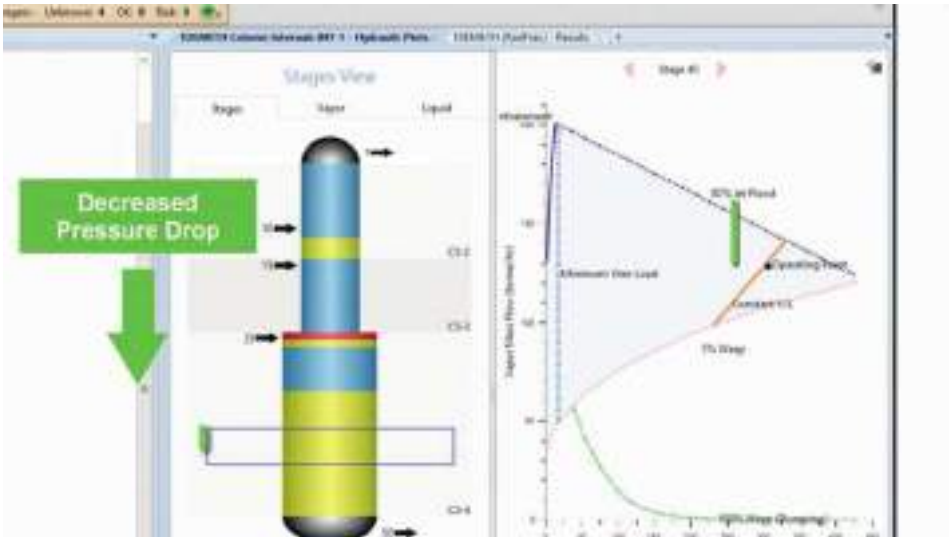
Panel Session 5, "Successful strategies for mitigating the effect of boom and bust," is being held on Wednesday 28 September.

Column of **strength**

AspenTech provides an insight into how visualising hydraulic behaviour and the related product ecosystem can lead to efficient operations.

GREATER VISIBILITY INTO asset performance can help chemical and energy companies gain a competitive edge. Having a better understanding of column hydraulic performance can significantly improve asset utilisation and reduce capital costs in revamp projects and new designs. Predicting the performance of units is a critical component in the simulation of towers for process design, performance and reconciliation purposes. And being able to see precisely what is happening to the behaviour of trayed and packed columns means that process engineers can quickly get to the root cause of operational issues and make informed decisions that impact the entire operation.

With advanced simulation tools, engineers can easily look inside the column to troubleshoot operational issues and evaluate the best options for efficiently designing new and existing units. Using interactive functionalities with enhanced software calculations, engineers are able to visualise the entire column's behaviour. Essentially, better decision-support reduces costs, time and project and operability risks.



AspenTech's Aspen Plus helps improve column operations with column analysis

A highly complex system

Distillation column analysis is one of the key areas of focus for chemical engineers. Gaining detailed knowledge of column internals is a high priority for engineers, especially with regards to the behaviour of equipment and processes. As one of the most expensive and energy consuming units in a plant, the fluid dynamics of the column can be complex.

Depending on the complexity of the task, further help from in-house column experts or engineering firms may be needed.

Oil prices, especially in the Middle East, are expected to remain low for the near future, although it would not surprise if the volatility returns. The availability of light crude oils and low natural gas prices particularly in the Middle East is propelling debottlenecking projects related to columns in both the chemicals and energy sectors. When capital is needed to debottleneck a process, engineers within engineering and construction companies (E&Cs) are similarly focused on minimising project capital expenditure (CAPEX) by reusing existing equipment (i.e. shell and piping), investing in lower cost adjacent equipment like feed heaters and coolers, or replacing the column internals, as well as evaluating different internal configurations to find the most economical option.

In improving operations, process engineers are focused on driving efficiencies and ensuring they make safe, confident decisions. For owner-operators, it is vital to increase capacity, minimise operational expenditure (OPEX), optimise product quality and troubleshoot operational issues. By determining issues quickly, it is possible to reduce costly shutdowns and expensive physical investigations. Pushing the capacity of the column, while operating closely to safety constraints, is important to optimise production performance.

Cutting-edge simulation technology helps users to better understand the behaviour of columns and enables them to swiftly address or predict operational issues by seeing the entire column in one view using visual presentations of inputs and results. In addition, engineers can look at the column as part of the larger process with an interactive solver for quick evaluations of multiple design options and operating cases.

Now users can improve workflow by creating and analysing column tray and packed sections for hydraulic design and rating using an interactive sizing mode. With intuitively designed functions, the engineers can tune their designs to perform within hydraulic limits by using hydraulic plots and clear system messages to quickly compare the results of multiple designs.

Understanding column performance

New technologies allow engineers to optimise energy use in columns and quickly pinpoint potential issues affecting the unit whether at the design stage, troubleshooting poor operational

performance or for revamp projects.

With enhanced hydraulic correlations, it is possible to decrease assumptions and produce more accurate modelling for column analysis. The use of intuitive, interactive and visual graphics for tray geometry or packing inputs and the resulting hydraulic plots for every stage gives greater detail on the hydraulic behaviour of the individual stages while simultaneously providing a view of performance of the whole column. The ability to easily evaluate the effects of changes in flowsheet inputs, as well as internals geometry on hydraulic performance, allows for better troubleshooting and design.

AspenTech recommends the use of Aspen Plus and Aspen HYSYS for column analysis, and the solutions include:

- Quicker insights into column performance problems and behaviour based on current operating conditions
- See the column as part of the larger process with an interactive solver for quick evaluations of multiple design options and operating cases
- Evaluate interactivity between columns and other equipment before making operations/revamp decisions
- Ability to evaluate multiple revamp options for more informed discussion with vendors
- Automated sizing capabilities and design templates save time and effort when designing a new column and assist less experienced users in getting up to speed
- Reduce time and manual labour

Seeing the whole picture

Greater visibility into asset performance provides the platform for better decision-making. Advanced process simulation offers engineers powerful chemical engineering capabilities for column analysis. Gaining insight into key processes enables better and faster problem solving. With new column analysis capabilities, new and experienced engineers can troubleshoot operational issues and evaluate new and revamp options with an interactive tool.

Now, column design and rating no longer needs to be done in isolation or viewed as a mysterious black box. Visualising operations can be achieved within an advanced process simulator to fully understand the behaviour of a critical capital and energy intensive piece of equipment. As a result, engineers can minimise capital expenditure and make discerning design decisions that affect the entire plant performance – great news for improving performance and increasing profitability. ■

Luc Chantepy, regional sales vice-president for Middle East and North Africa region at AspenTech

— By Luc Chantepy, regional sales vice-president for Middle East and North Africa region at AspenTech

Equipment rental unlocks new avenues for growth

Canadian Energy Equipment Manufacturing FZE production manager Shawn Dunbar speaks to *Oil Review Middle East* about the growing prospects of the rental equipment industry in the Middle East.

WITH THE DOWNTURN in the oil and gas industry, cutting costs and maximising revenues have become the top priorities for companies in the sector. Upstream oil and gas companies are feeling the brunt of low oil and gas prices and one way they are now dealing with the push to cut costs is equipment rental.

Recent market surveys show that integrated oil and gas companies in the Middle East have reduced their investment in equipment manufacture as renting oilfield equipment is a cheaper option. Renting equipment enables companies to reduce the overall capital cost for the operator and also passes the liability for performance to the equipment provider. This has encouraged various oilfield operators in the Middle East to opt for rental equipment for oilfield operations.

"The down turn in the oil and gas economy has affected the rental market drastically. The cost of new equipment for a lot of users is not in the budget. Rentals offer the customer a cheaper temporary way to complete the job," said Shawn Dunbar, production manager at Canadian Energy Equipment Manufacturing FZE (CEEMFZE), one of the leading providers of oilfield rental equipment in the Middle East.

CEEMFZE production manager Shawn Dunbar said that there has been a rise in the rental market throughout 2015 and 2016

The oilfield equipment rental market in the Middle East is expected to grow at a rate of 12.43 per cent annually in the period 2014-2019. (Photo: supakitmod/Fotolia)

Speaking about the demand for rental equipment, Dunbar noted that the company has seen a rise in the rental market throughout 2015 and 2016 and that its rental equipment request for quotation (RFQ) is consistent for many end users in the GCC.

The Middle Eastern market

A report on the rental equipment industry by Research and Markets titled "Oilfield Equipment Rental Market in the Middle East 2015-2019" predicts that the oilfield equipment rental market in the Middle East will grow at a compound annual growth rate (CAGR) of 12.43 per cent in terms of revenue over the period 2014-2019. . The rental facility has also reduced the entry barrier and exit barriers in the industry, by providing a more feasible option for new comers than buying costly equipment.

Dunbar pointed out that the market in the Middle East has a lot of potential. He said, "At CEEM we see the rental market a lot higher in the GCC than other markets we are involved in."

He noted that mud pumps, mud tanks, hydraulic power units, 1502 pump iron and DNV baskets were some of the equipment that the company was focussing on.

> "The down turn in the oil and gas economy has affected the rental market drastically."

Future projections

Discussing challenges faced by the industry, Dunbar said, "The main challenges we have faced thus far is equipment set up/modifications to meet certain contract specifications. Renting long term as well is a difficult challenge as most contracts are short term."

He is, however, confident about the future of the industry. "We feel that the rental industry is going to continue to rise as the economy is still in a down turn," Dunbar stressed. ■

Defusing the talent time bomb

Andrew Ryan, VP Middle East and Central Asia at Airswift, stresses the need for all organisations to have the right resources in place to develop the next generation of skilled and gas professionals.

THE OIL AND gas industry is facing what optimists call a demographic gap, and what pessimists describe as a talent time bomb. Even before the squeeze on resources caused by the drop in the price, an aging cohort of expertise was leaving the industry with little sign of replacement in sight.

Of course, in the past couple of years, the exodus of talent has been accelerated by cost-cutting and efficiency drives in the face of low oil prices. Airswift estimates that since March 2015, more than 290,000 jobs have been lost worldwide, with many employees opting for early retirement packages where offered.

Initial stopgap reductions are now extending deeper into organisations where some of the most skilled, and consequently most expensive, individuals have become expendable. At Airswift we have seen examples of Middle East operators and other participants across the value chain offloading talent with more than 10 years' experience on specific projects.

More than 290,000 jobs have been lost in the oil and gas industry globally since March 2015. (Photo: nirutft/Fotolia)

Talent transfer and long-term effects

Some individuals can transfer their skills to sectors that offer greater stability than the oil and gas industry. Project management and engineering talent is moving into other project-related sectors, for example mining, nuclear power, renewables, downstream and chemicals as well as infrastructure.

It's too soon to tell if the oil and gas industry has permanently lost this talent, but when the oil price recovers there may be a long-term, more pronounced talent shortage. And if companies are unable to fill essential positions, then the risk to their business is significant.

Oil and gas projects are bigger, more complex and more resource-intensive than ever before. This requires a large, international and scalable employee base with the right skills and experience to support projects through to completion. If the right people aren't available, these projects will be delayed, costing operators potentially millions of dollars.

Changing dynamics

This tipping point could arrive sooner than expected. Saudi Arabia's recently-appointed oil minister, Khalid Al-Falih, reasserted Saudi Arabia's commitment to its oil economy in a recent interview and his firm expectations that the oil market will grow over the next two decades.

Organisations may feel pressured to take proactive action to mitigate the risks of losing vital expertise. The priority has to be the retention of top performers. This is crucial to ensure that each organisation has the right resources in place to train the next generation of talent and ensure knowledge transfer.

> "The priority has to be the retention of top performers."

For many firms, this is also a time to re-think flexible workforce management. The industry has long been dependent on flexible workforces to fill gaps quickly when they occur. But the inherent advantage of this now comes at a cost that is proving to be unsustainable.

Initially, the instability and inherent risk of contingent and flexible contracts meant contractors could command higher remuneration packages. Although that risk element is much lower in an industry stretched for resources, the remuneration remains the same.

Thinking smarter

Flexibility therefore needs to get smarter and operate on a global scale rather than on a series of local operations. Before

Andrew Ryan, VP Middle East and Central Asia, Airswift

recruiting, organisations should develop the flexibility to identify where key skill-sets already reside within the business, and then develop the means to make them available where they are most needed.

Mobilisation services that support the movement of key personnel from one essential location to another in a quick, compliant and pain-free manner therefore form part of the solution.

> "The biggest change in recruitment practices will be in the use of advanced information technologies."

But there's no denying that the upturn will demand a return to recruitment. The traditional model where hundreds of suppliers are managed on an ad hoc basis has a lack of both transparency and cost-effectiveness.

However, the industry is seeing an increasing demand for outsourced services. Proven to save costs and deliver efficiencies they help streamline all recruitment activity, eliminate duplication, and provide greater control over budget.

Information technology

Perhaps the biggest change in recruitment practices will be in the use of advanced information technologies as a solution to both flexibility and the mobility problems.

One of the biggest challenges associated with a middle-aged workforce is the increasing reluctance to travel the world at the drop of a hat.

The digital transformation in upstream operations can address this challenge, enabling talent to collaborate without travel, providing mentoring and guidance from diverse locations, and optimising the value to be gained from retaining experienced individuals.

Not only does this make knowledge sharing more efficient, but by making working life less disruptive to personal life it could also delay the point at which experience leaves the organisation.

However, companies choose to resolve the problem of retention and recruitment, it is absolutely crucial that all organisations have the right resources in place to develop the next generation of skilled individuals. If knowledge transfer doesn't take place internally, then organisations will be facing off in an existential competition for the most experienced talent.

That time bomb is ticking… ■

MIDDLE EAST PETROTECH 2016
Date: 26-29 September 2016
Venue: Bahrain International Exhibition & Convention Centre

Advancing the Middle East's downstream industry

In the run-up to Middle East Petrotech 2016, *Oil Review* speaks to Bakheet Al-Rashidi, Petrotech 2016 chairman and president and CEO, Kuwait Petroleum International.

What value do you think Middle East Petrotech will bring to the global and regional downstream community?
Middle East Petrotech is a major biennial event which provides a timely insight into the solutions available to those operating in the refining and petrochemicals sector, which is so important to the future prosperity of the Middle East. It facilitates valuable opportunities to network and seek out new business opportunities.

Middle East Petrotech 2016 will bring together specialised businesses and some of the petroleum industry's largest corporations, besides the major international companies, joint venture partners and service providers. It's a venue where knowledge sharing and interaction between the big players take place, which is especially valuable in a volatile economic situation, when cost optimisation and efficiency enhancement are a must.

Delegates benefit from participating in direct interaction and discussions as well as the opportunity to evaluate the technology on display and take part in the highly regarded parallel pre-conference workshops, which attract technical experts from refining and marketing organisations worldwide.

The refining capacity of the Middle East currently stands in excess of eight million bpd, and this capacity is competitively increasing faster than any other region of the world. There are several new refineries coming on-line that are modern, complex and integrated with petrochemicals, along with existing refineries being upgraded or expanded. Therefore, the Middle East region is well poised to be a major supplier of petroleum products as well as a key market for those supplying the downstream petroleum industry.

> "The refining capacity of the Middle East currently stands in excess of eight million bpd."


Stand discussions at the 2014 event

What is the thinking behind the conference theme 'Teaming up for Excellence: Industry, Government and Education'?
Countries have demonstrated that cross-sector collaboration has enabled them to accelerate in all fields. This has been seen by the extent to which local downstream industries have leveraged natural resources further down the entire value chain. It is therefore imperative to unlock the full potential of collaboration, for the sake of building prosperity for future generations. This has never been as important as now, especially for the emerging economies and the Middle East region, given structural economic challenges, political uncertainties, increasing competition and the new younger demographic.

As such, it is vital to take a collaborative approach that aligns stakeholders – Government, Industry and Education/Training – to maximise value.

The framework should be enabled by "balanced autonomy" where the value of collaboration enriches the dialogue between the sectors, rather than a setup in which a unilaterally set agenda prevails. In addition, it should be based on transparency, where the free flow of information facilitates data analytics; for example, in a target setting process across sectors. The third enabler for this framework would be accountability on each sector to deliver the committed collaboration objectives.

Middle East Petrotech 2016 aims to intersect the realms of Education, Government and Industry to underscore distinctive elements of collaboration that could yield superior industrial development. This will be demonstrated with the sharing of real-life successes in the GCC region.

Synergy between downstream oil professionals, government officials and those active in the education and training fields will lead to the advancement of the downstream industries through the maximisation and exploitation of resources, as well as the implementation of best practices and benchmarking.

The conference will attract top scientists and business specialists, who will discuss how to promote business growth, diversification, job creation and career enhancement in the downstream industries.

Three independent sessions on the individual roles of Government, Industry and Education will facilitate the exchange of ideas and experiences on the sharing of resources, location, talent, technology and capital in the GCC region.

What do you think are the main challenges and opportunities faced by the region's downstream industry today, and how will the conference address these?

In the current challenging economic times and volatile market conditions, the interlink between Government, Industry and Education to optimise the best return on assets, will be the focus of discussions.

This can be achieved mainly through energy conservation, new tools for the successful completion of projects, operational excellence and encouraging a culture of reliability and efficient turnaround maintenance.

Of vital importance is to understand the latest developments and trends in the global economy and future shifts in market dynamics. Top business leaders and economists will discuss possible ways forward in an uncertain world.

Health, Safety and Environment will also be showcased in a bid to encourage the creation of a culture of plant safety and environmental practices to help ensure a safer and healthier future.

To highlight one of the major challenges, as the GCC economies look to diversify,

> "The interlink between Government, Industry and Education to optimise the return of assets will be the focus of discussions."

improve public sector efficiency and grow their private sector workforce, there is a vital need for a new mix of skill levels. This requires a team of dedicated education specialists who can offer deep strategic and operational expertise across the key sectors, from early learning through to secondary, vocational and higher education.

Are there any particular features of the event you would like to highlight?

There have been several positive changes and enhancements for this year's event. First and foremost we have changed the timing from May to September for the convenience of all stakeholders and participants, and to boost attendance.

For the Forum day on 26 September, we have secured a diverse range of top-class keynote speakers and have broadened the range of topics on the agenda. As to the technical programme, we have introduced a new features such as the certification examination, short courses and "Meet the Experts" sessions instead of the standard panel discussions. We have ensured a high diversity and mix of speakers representing more than 40 companies from across the globe for the 63 technical sessions.

We have targeted and made arrangements for high number of participants, with enhanced exhibition floor space, and expect an increase in delegates and visitors at the 2016 event.

All this would not have been possible without excellent support from the Executive and Technical Committees, as well as the event organisers - Arabian Exhibition Management - and partners.

Finally, I would like to encourage professionals from the different industries to participate, including national and international oil companies, professional societies and universities. We will all benefit from our mutual interaction at this prestigious Petrotech 2016. ■

Managing power safely in oil and gas

Frank Ackland, general manager – Eaton Middle East, discusses strategies for effective power management in the oil and gas industry.

POWER MANAGEMENT IN the oil and gas industry requires the highest levels of engineering excellence and expertise; operations are often located some distance from the national grid networks or in hazardous, remote locations that can make the distribution of reliable, efficient power a complex and often dangerous task.

To succeed in challenging environments, you need single-stop, customised solutions, industry tested engineering, as well as deep design expertise and innovation.

A tailored solution

Each stage of the oil and gas value chain presents its own unique power management challenge. In the tougher, more remote recovery environments of upstream operations, costs are rising inexorably as well as risks to people and the environment. In this context, the trend has been to 'de-man' using advanced remote monitoring systems in order to reduce physical risks and offset a growing shortage of expertise and reducing costs. Operators are also constantly looking for ways to reduce capital expenditure and operating costs by using smaller and lighter equipment on platforms coupled with energy efficient solutions such as LED lighting.

Midstream, the trend is towards ever-larger vessels with huge pressure requirements, ensuring asset integrity in ageing pipelines, tougher environmental scrutiny applied to new pipeline certifications and finally increasing safety concerns with vessel, road and rail distribution. This has led to the need for solutions with comprehensive safety, control and monitoring capabilities, together with optimised maintenance with the assurance of meeting all relevant regulatory and technical standards.

Downstream operators in this region continue to upgrade existing refineries and bring new ones online in order to process changing crudes – light sweet to heavy sour – all with a need for increased uptime.

Operators require solutions that can be customised, on time and on budget, with the unnecessary manning and downtime.

There is also a need for enhanced monitoring and remote control to ensure safety, asset integrity and environmental performance whilst reducing equipment maintenance needs. Working with one supplier that provides electrical, hydraulic and mechanical power management solutions, enables customers to simplify their supply chain, while working with experts who understand their business challenges. We often find that we can bring a new dimension of expertise, as well as accountability, to help master the heavy power capabilities and safety systems integral to uninterrupted operations in the harshest of environments and to the maximisation of production and refining operations – without compromising safety.

Powering through innovation

Power generation and distribution goes far beyond the ability to 'flip the switch'. Technology plays a vital role in ensuring that power is used in the most efficient and effective ways possible, helping operations to perform to the very best of their ability.

> "Each stage of the oil and gas value chain presents its own unique power challenge."

Technology must focus on the ability to solve customers' toughest power management challenges, and a culture of collaboration means innovations can be taken from one industry and applied to many others that face similar issues. The oil and gas industry is no exception, and we find that many of our most innovative and valuable products first developed for other applications, are now used on offshore rigs.

These innovations must enable customers to concentrate on their day-to-day operations, safe in the knowledge that their critical power systems will run reliably, efficiently and safely.

Managing power, whether electrical or hydraulic, is a dangerous business, especially in the oil and gas industry. Yet, safe and efficient power must go hand in hand, whether that be ensuring that remote maintenance can be upheld, through self-cleaning filters, or the installation of products that absorb and dissipate thermal loads related to even the most severe clutch and brake operations, to more advanced piping and valves that ensure oil and gas recovery in the safest but most efficient way.

And a number of solutions are designed to identify potential problems before they occur, by combining remote monitoring with technology that encourages lower maintenance-schedules as well as those that can sense a potential fault or risk before it occurs, for example, corrosion. Signal, alarm and surveillance solutions operate in extreme conditions, utilising a secure technology that protects its network during a disaster and reconfigures automatically if a unit goes down, providing alerts that continue broadcasting without interruption. The system can be custom built from light-weight, flame-proof horns, to explosion-proof relays and bells to ensure the correct level of monitoring is provided for the surrounding environment.

The oil and gas industry is one of the most complex for the power industry, with the need to provide solutions that accommodate remote, hazardous locations, as well as a high-pressure and high-temperature industrial environment. This needs highly evolved technology that can continually meet the demands of the industry, while providing the necessary risk management and safety requirements to ensure that all employees and the business itself can take on day-to-day work without worrying about the power behind it. ■

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Protecting people, processes and critical infrastructure

Andrea Sorri, director business development – government, city surveillance and critical infrastructure – Axis Communications, discusses how network video can play a valuable role in securing critical infrastructure facilities as well as supporting HSE processes.

EVERY CRITICAL INFRASTRUCTURE facility has a duty to protect the health and safety of workers and the public, as well as to protect the environment. Typically, there are strict processes and policies in place to ensure employees work in a safe way, use the right tools and equipment, and adhere to set procedures in case of an emergency – for example during a plant evacuation. But, beyond the main focus of keeping people and the environment safe and complying with legal requirements and industry standards, health, safety and environment (HSE) considerations are also increasingly evolving, with plant operators seeking – and gaining – a better understanding of the actual risks and effects of production processes within their plant, and how best to mitigate those risks.

While HSE processes are often still managed manually, some operators are now starting to turn to network video technology to help them automatically monitor process adherence, evaluate risks in real-time, and improve health and safety practices.

Network video cameras may already be in place to protect a plant against unauthorised access, sabotage and theft. The same technology can also be used to ensure the safety of the workers within the facility. For example, with the help of network cameras that are integrated with the access control system, operators can have an overview of how many workers are present in each area of the facility, at any given time. In case of an emergency, this information can be crucial to ensure the safe evacuation of every person within the plant and its surrounding area.

Integrated with access control and using advanced image processing techniques for license plate or facial recognition, the network cameras can identify, inspect and track vehicles, drivers and passengers from the moment they pass through the gates, and ensure that safety procedures are followed and no worker or visitor enters a zone that they are not authorised to or that is not safe to access.

Similarly, the same cameras can be used to make sure employees are working in a secure and clean environment and in a safe manner at all times. With add-on video analytics applications such as cross-line detection, the cameras can, for instance, automatically alert individuals if they are getting too close to a dangerous zone or to the machinery. Thermal network cameras can track whether safety helmets, high-visibility vests or safety glasses are worn, while at the same time protecting the employees' privacy as they don't record facial features. And finally, to detect dangerous and hazardous situations, network cameras can be used to check for any leakages, smoke, or gas flares, and raise automatic alarms so operators can act quickly and minimise any risk of injuries, or damage to the plant or the environment.

While safety procedures help minimise the number of incidents, emergencies do occur. In case of an incident such as a fire, a fast response is crucial. Intelligent network cameras installed throughout the facility enable operators to identify the type, scope and severity of the incident so that proper action can be taken. They can assist the safe and rapid evacuation of the plant by detecting smoke and how it develops, tracking the flow of evacuation through the building, and tracking and supporting the rescue team as they enter the facility. Advanced camera technologies that enhance image quality help provide a clear picture of the situation, even in situations where visibility is poor due to smoke, dust or darkness.

> "Intelligent network cameras enable operators to identify the type, scope and severity of the incident."

Andrea Sorri, Axis Communications

While it is easy to see how network cameras can aid an operator to safely run a plant in day-to-day operation, identify hazards and mitigate risks, and to deal with emergencies, long-term reviews and improvement of HSE practices are also an area worth considering.

The key to continuously evaluating risks, and improving equipment, processes and services for maximum safety is to know exactly how workers and visitors move inside a plant. Who is doing what, when and where? Network cameras let the operator not only follow a situation in real-time, but also collect statistical data over a period of time to gain a better understanding of what happens inside the facility day to day – helping the security and the safety manager to adjust and update safety and environment policies and procedures as and when needed, and serving as a training tool when instructing employees on safe practices.

Due to their superior image quality, connectivity, scalability, and scope for adding video analytics applications, network video cameras are increasingly replacing analog CCTV cameras to secure critical infrastructure facilities. With the added benefit of being able to support HSE processes, the transition to network video becomes an even more obvious choice. ■

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ISDS first for DNV GL-classed world's largest semi-submersible rig

DNV GL WELCOMED the world's largest semi-submersible drilling rig into class recently. At 123 metres long and 78 metres wide, Ocean Greatwhite was built by Hyundai Heavy Industries (HHI) in Ulsan, South Korea.

Owned by the Houston-based drilling contractor Diamond Offshore, the rig will be chartered to oil major BP and will operate in the Great Australian Bight.

The rig is a new design MOSS CS60E high specification state-of-the art semi-submersible drilling unit, which has also been designed to be suitable for operations in harsh environments.

The Ocean Greatwhite is the world's largest semi-submersible drilling rig. (Photo: HHI)

Karl Sellers, SVP, technical services, at Diamond Offshore, said, "The Ocean Greatwhite is purposely built for drilling in harsh environments. HHI and DNV GL were integral in helping us get this rig to market as we prepare for the drilling project in Australia with BP."

Youngseuk Han, senior executive vice-president at HHI, added, "We have a strong relationship with both DNV GL and Diamond Offshore. We are proud to deliver the first drilling ship of this size and look forward to many more projects on this scale."

According to Paal Johansen, V-P and regional director, Americas at DNV GL, Ocean Greatwhite is capable of operating in depths of up to 3,000 metres and can drill down to a depth of 10,670 metres.

Ocean Greatwhite is also the first new-build rig to receive the DNV GL Integrated Software Dependent Systems (ISDS) notation.

ISDS are systems whose performance is dependent on the overall behaviour of their integrated software components. DNV GL's ISDS standard helps owners and operators minimise software integration errors and delays in projects involving complex integrated systems.

According to DNV GL, the certification ensures that software and integration issues are identified and resolved early on during the project design stages.

"It also represents a new approach to verification, as it emphasises a review of the working methods and processes that lead to the delivery the systems, rather than simply focusing on the final review of documents and installations to ensure they meet product requirements," the company added.

Industry data suggests that high specification mobile offshore drilling units may experience 30 per cent downtime during the first years of operations, which makes a systematic framework for ensuring that ISDS achieve the required reliability, availability, maintainability and safety essential. "We expect that the operational performance of Ocean Greatwhite will demonstrate how the ISDS notation can contribute to increasing the reliability of the systems onboard," added Johansen.

DNV GL's ISDS teams in South Korea, Norway and the USA contributed to the project. DNV GL has also provided advisory services to HHI on the integration of the systems throughout the building process.

From valves to pistons and everything in between

THE SEALCORE NETWORK is looking to expand its product sales in the Middle East.

The Sealcore Network is the result of the union of some entrepreneurial Italian companies active for many years in the production of customised articles and technical components for various industrial sectors. The companies falling under the Sealcore Network are active in industries such as aerospace, wind, mining, primary metals, pulp and paper, naval and marine, food, automation, petrochemicals, pharmaceutical, hydraulic, dynamic sealing and general industry. Sealcore products operate in several applications and encompass a variety of equipment, from valves to compressors, pumps, electric gearboxes and general industry machines, with specific applications related to pistons, cylinders, machine tools, motors, connectors, actuators and more.

The Network serves distribution and the aftermarket business, as well as OEM customers and end-users, engineering solutions to the applications.

Some examples of Sealcore products

The 12 companies that fall under the network comprise a total of 582 employees and reported US$118mn in sales last year. More than US$16.7mn is planned to be invested in the years 2015-2106 in addition to the US$33mn already invested between 2012 and 2014, in order to strengthen, expand and modernise the existing production facilities, all located in Italy, and extend the presence of the Network abroad through new offices and warehouses.

The lean management and a focus on customer service, in addition to the quality made in Italy guaranteed, are the strength of the Sealcore Network, according to the firm, which has been structured on the basis of seven main activities divided into product divisions. These include: OringOne – large sizes and endless O-rings produced with an innovative step-molding method, DUCI – O-rings in various compounds with many approvals and certificates of quality, DUEPI – molds design and manufacturing (injection molding of custom-made articles in many techno-polymers and liquid silicon), FLUORTEN – PTFE and high performance polymers, and others.

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Challenging times for rigs and drilling

THE RSI GROUP specialises in professional drilling rig surveys and technical project support. RSI provides its inspection services to the majority of the small, medium and major oil companies in business today.

During the ongoing downturn in the oil industry, many offshore and onshore drilling units have been stacked and laid up. If operators are to avoid rig equipment NPT during their future drilling operations, then close scrutiny of the drilling unit equipment, systems and operations on these stacked drilling units would be required. The pressures on the industry stakeholders to ensure that costs are kept to a minimum can certainly have an adverse effect on the condition of stacked drilling units.

The RSI Group chairman and CEO, Craig T Sinclair said, "In these challenging times the RSI Group provides peace of mind for the operators. RSI represents the professional end of the rig inspection market and for 16 years we have consistently delivered very high standards of drilling rig inspection. In fact, there is no other inspection company in business today that comes close to the quality of service and professional delivery that RSI provides."

Craig T Sinclair, RSI Group chairman and CEO. (Photo: RSI)

The worldwide drilling industry is said to be shrinking by the day, with the departments being trimmed and staff becoming redundant. All of these events could have a negative impact on the condition, maintenance and operations on stacked drilling assets. It is therefore almost imperative for prospective operators to ensure that these stacked drilling assets are thoroughly inspected and tested prior to reactivation and drilling operations commencing.

RSI Group would ensure the safe and efficient working of its drilling operations through its companies – Rig Survey International, RSI Engineering and RSI Well Control Services. The companies work 24/7, dispatching engineers to the ongoing projects to check on the rig equipment, systems and operations.

Halliburton introduces global rapid intervention package

BOOTS & COOTS Services, a subsidiary of Halliburton, has developed a global rapid intervention package (GRIP), a suite of services to help reduce costs and deployment time in the event of subsea well control events. According to the company, GRIP provides well planning and well kill capabilities facilitated by its global logistics infrastructure and existing product service lines. This includes an inventory of well test packages, coiled tubing units and relief well ranging tools.

In addition, GRIP features 'RapidCap', a high temperature, 15,000 psi air-mobile capping stack.

It incorporates a specially designed gate valve-based system making it significantly lighter, less expensive and more mobile than options currently on the market, the company claims.

According to Boots & Coots, capping stack systems currently available are extremely difficult to deploy due to their size and weight (roughly 100,000 – 140,000 kg) and are expensive to transport and reassemble on a job site.

GRIP and the RapidCap air-mobile capping stack are expected to be ready for deployment by the end of 2016. (Photo: Pichitstocker/Fotolia)

To address the need for a more portable and cost-effective solution in capping stack systems, RapidCap aims to reduce deployment time by up to 40 per cent over competing systems. RapidCap can be air transported on a Boeing 747-400F and lifted by a 110 tonne or lighter crane and does not require specialised infrastructure.

"We are proud to offer the global rapid intervention package that will provide our customers with easy access to containment and relief capabilities even in the most remote areas," said Boots & Coots vice-president consulting and project management Jim Taylor.

"Boots & Coots has long been recognized as a global leader in well control response and GRIP furthers our commitment to safe offshore operations," he added.

GRIP and the RapidCap air-mobile capping stack are expected to be ready for deployment by the end of 2016.

Founded in 1919, Halliburton is one of the world's largest providers of products and services to the energy industry. Boots & Coots Services, established in 1978 and later acquired by Halliburton, specialises in well control.

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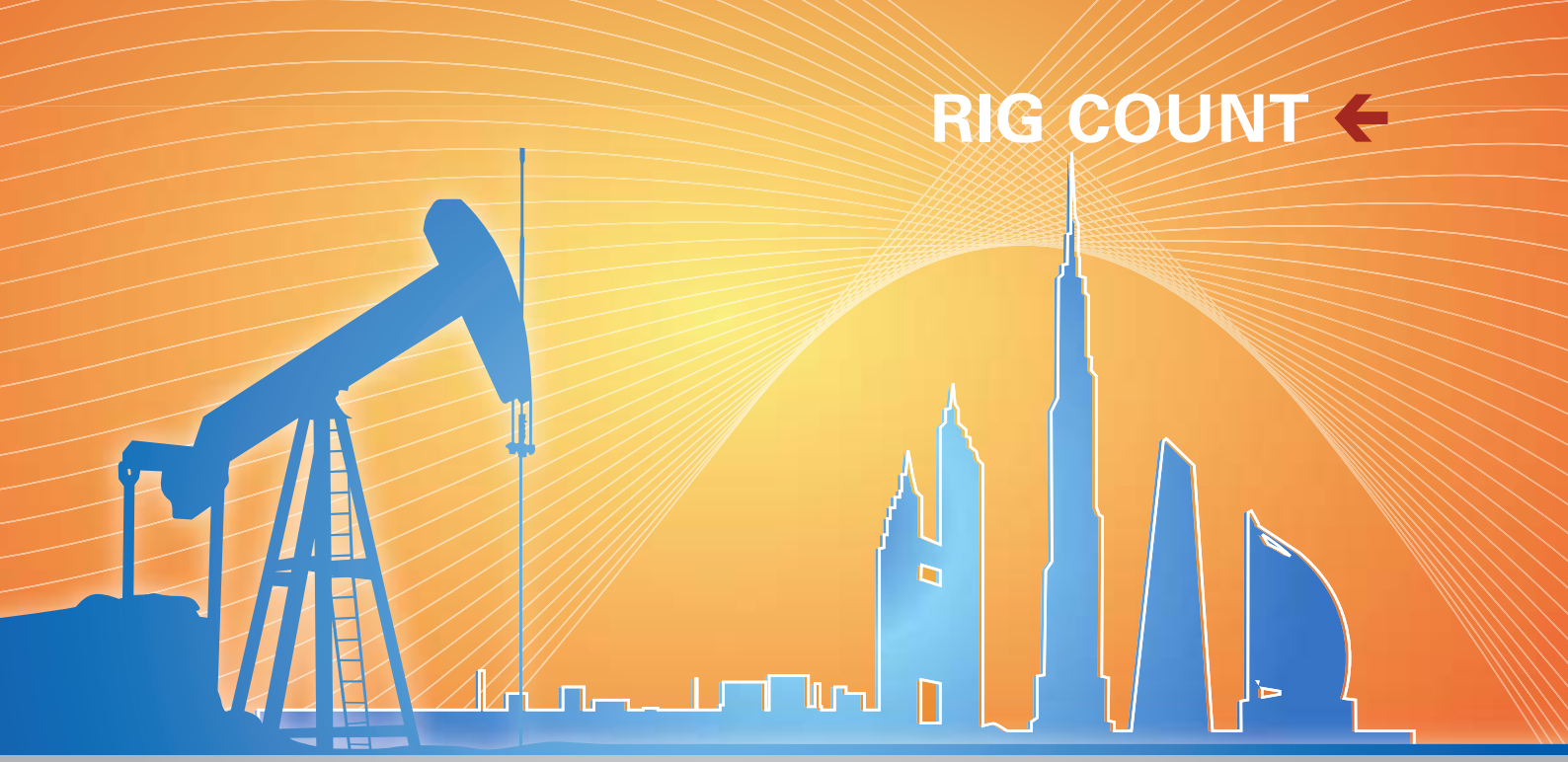

Middle East & North Africa

The Baker Hughes Rig Count tracks industry-wide rigs engaged in drilling and related operations, which include drilling, logging, cementing, coring, well testing, waiting on weather, running casing and blowout preventer (BOP) testing.

	THIS MONTH			VARIANCE	LAST MONTH			LAST YEAR		
Country	Land	OffShore	Total	From Last Month	Land	OffShore	Total	Land	OffShore	Total
Middle East										
ABU DHABI	28	20	48	0	32	16	48	25	11	36
DUBAI	0	2	2	0	0	2	2	0	2	2
IRAQ	39	0	39	-2	41	0	41	61	0	61
JORDAN	0	0	0	0	0	0	0	0	0	0
KUWAIT	47	0	47	3	44	0	44	45	0	45
OMAN	65	0	65	-1	66	0	66	57	0	57
PAKISTAN	29	0	29	-1	30	0	30	19	0	19
QATAR	3	4	7	0	3	4	7	2	7	9
SAUDI ARABIA	108	17	125	1	106	18	124	97	18	115
SUDAN	0	0	0	0	0	0	0	0	0	0
SYRIA	0	0	0	0	0	0	0	0	0	0
YEMEN	0	0	0	0	0	0	0	3	0	3
TOTAL	319	43	362	0	322	40	362	309	38	347
North Africa										
ALGERIA	55	0	55	2	53	0	53	49	0	49
EGYPT	19	8	27	1	18	8	26	46	16	52
LIBYA	0	1	1	0	0	1	1	4	3	7
TUNISIA	1	0	1	1	0	0	0	0	3	3
TOTAL	75	9	84	4	71	9	80	102	9	111

Source: Baker Hughes

Project Databank

Compiled by Data Media Systems

OIL, GAS AND PETROCHEMICAL PROJECTS - KUWAIT

Project	City	Facility	Budget ($ US)	Status
KGOC - Al Khafji Gas and Condensate Export System	Al-Khafji	Gas	2,000,000,000	Construction
KGOC - Wafra Central Gas Utilization Project	Wafra	Gas Processing	1,000,000,000	FEED
KNPC - Mina Abdulla Refinery Sulphur Recovery Units	Mina Abdullah	Sulphur Recovery	1,000,000,000	EPC ITB
KNPC - Al Zour LNG Import and Regasification Terminal	Al Zour	Liquefied Natural Gas (LNG)	3,330,000,000	Engineering & Procurement
KNPC - Al Zour New Refinery - Overview	Al Zour	Refinery	15,500,000,000	Engineering & Procurement
KNPC - Al Zour New Refinery - Package 1 (Main Process Plant)	Al Zour	Refinery	3,000,000,000	Engineering & Procurement
KNPC - Al Zour New Refinery - Package 2 (Support Process Plant)	Al Zour	Refinery	3,000,000,000	Engineering & Procurement
KNPC - Al Zour New Refinery - Package 3 (Utilities and Offsites)	Al Zour	Offsites & Utilities	3,000,000,000	Engineering & Procurement
KNPC - Al Zour New Refinery - Package 4 (Tankage)	Al Zour	Refinery	3,000,000,000	Engineering & Procurement
KNPC - Al Zour New Refinery - Package 5 (Marine Facilities)	Al Zour	Refinery	850,000,000	Engineering & Procurement
KNPC - Al Zour New Refinery - Soil Reclamation & Treatment Works	Kuwait	Dredging/ Reclamation	700,000,000	Construction
KNPC - Clean Fuels Project - Mina Abdullah Refinery - Phase 1	Mina Abdullah	Refinery	4,000,000,000	Construction
KNPC - Clean Fuels Project - Mina Abdullah Refinery - Phase 2	Mina Abdullah	Refinery	4,000,000,000	Construction
KNPC - Clean Fuels Project - Mina Abdullah Refinery Oil Processing Units	Mina Abdullah	Refinery	550,000,000	Construction
KNPC - Clean Fuels Project - Mina Al Ahmadi Refinery - Phase 3	Mina Al Ahmadi	Refinery	5,000,000,000	Construction
KNPC - Clean Fuels Project - Mina Al Ahmadi Refinery Substation Upgrades	Mina Al Ahmadi	Refinery	71,800,000	Construction
KNPC - Discharge of Treated Effluent	Various	Pipeline	100,000,000	Feasibility Study
KNPC - Expansion of Ahmadi Depot	Ahmadi	Mixed-Use Development	250,000,000	Construction
KNPC - Kuwait Clean Fuels Project - Overview	Various	Refinery	13,000,000,000	Construction
KNPC - Matlaa New Depot	Northern Kuwait	Oil Storage Tanks	500,000,000	EPC ITB
KNPC - Mina Abdulla Refinery Flare Gas Recovery Unit	Mina Abdullah	Mixed-Use Development	100,000,000	Construction
KNPC - Mina Al Ahmadi Refinery Fifth Gas Train	Mina Al Ahmadi	Gas Production	2,000,000,000	Construction
KNPC - Mina Al Ahmadi Refinery LNG Storage & Re-gasification Services	Mina Al Ahmadi	Liquefied Natural Gas (LNG)	250,000,000	Construction
KNPC - Mutla Ridge Project	Mutla Ridge	Oil Storage Tanks	1,000,000,000	Feasibility Study
KOC - Al Zour New Refinery Crude Oil Pipeline	Ahmadi	Oil	800,000,000	EPC ITB
KOC - Flow Lines Repair and Rehabilitation	Various	Flowlines	50,000,000	Construction
KOC - Exxon Mobil Corporation - Ratqa Lower Fars Heavy Oil Handling Facilities - Drilling Package	Jahra	Oil Field Development	500,000,000	Construction
KOC - Kuwait Bay and Divided Zone Offshore Exploration	Various	Exploration	900,000,000	Engineering & Procurement
KOC - Kuwait Environmental Remediation Program (KERP) - North Package	Northern Kuwait	Oil & Gas Field	100,000,000	Construction
KOC - Kuwait Environmental Remediation Program (KERP) - Overview	Kuwait	Oil & Gas Field	3,000,000,000	Construction
KOC - North Kuwait High Pressure Flowlines for Jurassic Wells	Northern Kuwait	Flowlines	230,000,000	Construction
KOC - North Kuwait Jurassic Early Production Facility (EPF) - Phase 2	Northern Kuwait	Oil Production	100,000,000	EPC ITB
KOC - North Kuwait Jurassic Oil and Gas Field Development	Northern Kuwait	Oil & Gas Field	1,300,000,000	EPC ITB
KOC - North Kuwait Manifold Gathering System	Northern Kuwait	Gas Gathering Centre	2,500,000,000	Construction
KOC - North Kuwait Manifold Group Trunkline (MGT) System	Northern Kuwait	Oil	800,000,000	Construction
KOC - Ratqa Lower Fars Heavy Oil Development - Phase 1	Northern Kuwait	Steam Injection	4,500,000,000	Construction
KOC - Soil Remediation Services - Lot A	Kuwait	Oil & Gas Field	100,000,000	Construction
KOC - South and East Kuwait Oil Flow Lines	Various	Flowlines	50,000,000	Construction
KOC - Southeast Kuwait Installation of Flowlines	Southeast Kuwait	Flowlines	100,000,000	Construction
KOC - Southeast Kuwait Manifold Scheme	Southeast Kuwait	Flowlines	350,000,000	EPC ITB
KOC - Southeast Kuwait Replacement of Air System	Southeast Kuwait	Flowlines	100,000,000	EPC ITB
KOC - Southeast Kuwait Replacement of Hydrogen Compression Units	Southeast Kuwait	Compressor Station	50,000,000	Construction
KOC - Southern Kuwait Maintenance of Oil Production Facilities	Kuwait South	Oil Production	150,000,000	EPC ITB
KPC - Northern Oil Field Development	Northern Kuwait	Oil Field Development	900,000,000	EPC ITB
PIC - Olefins 3 Petrochemicals Plant	Al Zour	Linear High Density Polyethylene (LHDPE)	5,000,000,000	Feasibility Study

Project Databank

Compiled by Data Media Systems

Project Focus

Compiled by Data Media Systems

Project Summary

Project Name	KOC - NORTH KUWAIT MANIFOLD GATHERING SYSTEM FOR GATHERING CENTRES (GC) 29, 30, 31
Name of Client	KOC - Kuwait Oil Company
Estimated Budget ($ US)	2,500,000,000
Facility Type	Gas Gathering Centre
Status	Construction
FEED/PMC	AMEC
Main Contractor	Dodsal (Gathering Centre 31), Petrofac (Gathering Centre 29), L&T - Larsen & Toubro (Gathering Centre 30)
Project Start	Q1-2011
End Date	Q4-2017
Award Date	Q3-2014

Background

Kuwait's oil fields are connected to 26 gathering centres, which serve as a collection location for crude produced at several wells connected by flowlines, providing initial treatment through the separation of associated gas and removing salt. The three new gathering centres are needed as part of KOC's long-term strategy to develop the oilfields of North Kuwait.

Project Status

Date	Status
Jul 2016	Overall project construction works will be 25 per cent completed by the end of July 2016. The project is on schedule to be completed by December 2017.
Mar 2016	Construction on GC 30 and GC 31 is underway.
Dec 2015	Construction works on GC29 are underway.
Sep 2015	Gulf Spic General Trading & Contracting Company has been awarded a subcontract for mechanical, structure, piping, electrical, instrumentation and telecom works for US$56mn on GC 29.

Project Scope

The scope of the project involves the construction of three gathering centres, each of which has to meet the following criteria:

- Produce oil at 100bpd
- Handle water up to a rate of 240MBWPD
- Handle gas from wet fluids at up to 60MMSCFD
- Oil product must meet the Kuwait exports crude requirement
- Export water to the central injection pumping facilities
- Export gas to lower pressure to BS131 and / or BS132 for compression

Each of the facilities will be divided into six main process systems:

- Gas / liquid separation
- Oil / water separation
- Dehydration and desalting
- Tank gas compression and gas handling
- Crude oil storage and transfer
- Effluent water treatment and handling

To support the main process systems the following facilities will be required:

- Test separation and storage
- Chemical injection
- Brackish water
- Fuel gas
- Flares
- Instrument / plant air
- Firewater
- Diesel
- Potable water

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كواحدة من مزودي الخدمات الهندسية المخصصة، تعكف شركة Well-SENSE على إنشاء الحلول التي من شأنها خفض تكلفة التدخل في الآبار وجمع البيانات. وقد كان استخدام توجه مغاير لذلك المستخدم في حقول النفط ودراسة الطرق التي يتبعها عمالقة التكنولوجيا أمثال جوجل وأبل لاستكشاف وحل هذه المشكلات، إيذانا بميلاد تكنولوجيا تدخل الخط الليفي FibreLine Intervention (FLI). هذه التكنولوجيا، التي تعتبر جديدة بالكلية، تجمع بين العديد من المفاهيم المبتكرة في حزمة واحدة، وتمثل قفزة نوعية لشركات إنتاج أدوات الحفر. الحل مستوحى من الصناعات خارج مجال النفط والغاز. فقد تم التغلب على عوامل التكلفة والخطورة المرتبطة بالتدخل في الآبار باستبدال البنية الأساسية للأدوات ببديل أصغر حجما وأقل تكلفةً ووحيد الاستعمال.

وتعتبر تكنولوجيا FLI في شكلها الأوّلي وسيلة لتركيب كبلات الألياف البصرية بشكل مؤقت في الآبار لغرض إجراء عمليات الاستشعار السمعي الموزع أو استشعار درجة الحرارة الموزع أو استشعار الضغط الموزع. وبزيادة عدد كبلات الألياف البصرية المُركبة في الآبار، سوف ترتفع وتيرة جمع بيانات الآبار بشكل أسرع، وهو ما يفضي إلى فهم أفضل لأداء وسلامة الآبار، ومن ثم توفير المزيد من الفرص لعمليات سلامة الآبار وتحسين الإنتاج، مع خفض التكلفة واحتمالات الخطورة.

في الحالات المثلى، يُجري المُشغلون مسحاً سيزمياً مُصغراً على كل عملية تكسير لفهم فاعلية التكسير في الوقت الفعلي. ويعتبر تركيب السماعات الأرضية في الآبار القريبة بهدف الإنصات وإنشاء صورة مرئية للكسر بالداخل، عملية مكلفة للغاية تشمل إغلاق الآبار وتركيب واسترداد السماعات الأرضية.

أما البديل عن إدخال السماعات الأرضية، فهو تركيب كبل ألياف ضوئية وإجراء مسح سيزمي مُصغر باستخدام الاستشعار السمعي المُوزع (DAS). غير أنه، ولسوء الحظ، فإن التكلفة الباهظة تحول أيضا دون تطبيق الطرق الحالية المتاحة لاستخدام الألياف الضوئية. هذا في حين يؤدي تركيب الألياف الضوئية باستخدام تكنولوجيا FLI إلى التخفيف من حدة هذه المشكلة بدرجةٍ كبيرة، إلى جانب تقليل المخاطر المرتبطة بها، طالما كان من الممكن إجراء عمليات المسح السيزمي المُصغر على جميع الآبار.

الطرق الحالية للتدخل في الآبار عالية التكاليف وتحتاج كثيرا من العمال

FLI هو نظام صغير الحجم وموفر للتكاليف ووحيد الاستعمال، وهو يقلل كمية معدات السطح والعُمال والوقت الخاص بإجراء عمليات التدخل النموذجية.

الإمكانية

تعتبر الألياف الضوئية وعمليات المسح باستخدام الاستشعار السمعي الموزع فقط مجرد خطوات أولية في نظام التدخل الجديد هذا، والذي يمثل التعاون جزءا محوريا فيه. فالعمل الجماعي هو نقطة الانطلاق، ليس فقط في تطوير تكنولوجيا FLI وإنما أيضا في جميع أوجه الصناعة بوجه عام. وتطبيقات FLI تتميز بنطاقها الواسع، وحتى تحقق أعظم تأثير، فإنها تتطلب شركات أخرى متخصصة من القطاع الصناعي الأوسع نطاقا لتطوير التكنولوجيا المُكملة لهذه التطبيقات. وأخيرا، تعتبر هذه التكنولوجيا منصة تنطلق منها أجيالٌ جديدةٌ وعديدةٌ لأدوات التدخل الآخذة في التطور.

فالتحسينات الإضافية، التي يتم إدخالها على تكنولوجيا FLI، ستوفر الفرصة لإجراء عمليات التدخل في الآبار الشائعة الأخرى؛ مثل تسجيل البيانات والتثقيب وعمليات المسح الاتجاهي، على سبيل المثال وليس الحصر. ومن شأن التصميم الموفر للتكاليف لتكنولوجيا FLI، الإسراع من دورة تطوير المنتج إلى حد كبير. فعلى شاكلة خضوع الهواتف الذكية لتحديثات مستمرة واستبدالها بالإصدارات الأحدث، تتيح طبيعة تكنولوجيا FLI وحيدة الاستعمال إدخال تحديثات منتظمة عليها، ومن ثم يستفيد حقل النفط من التطورات التكنولوجية السريعة التي تطرأ على صناعات أخرى.

إن الطريق أصبح ممهداً الآن أمام العقول المنفتحة والمتطلعة نحو المستقبل. وربما تصبح طرق التدخل التي نعرفها اليوم مرتبطة بتكنولوجيا عتيقة من الماضي. ومع التداول التجاري لتكنولوجيات التدخل مثل FLI، ربما لا يصبح لهذه الطرق أثرٌ في الوجود.

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مفكرة رجال الاعمال

سبتمبر/ أيلول

٢٦ ـ ٢٨ ـــ المؤتمر التقني السنوي لجمعية مهندسي البترول ـــــ دبي

٢٦ ـ ٢٩ ـــ معرض الشرق الأوسط للتكرير والبتروكيماويات- بتروتك ٢٠١٦ ـــ المنامة

أكتوبر/ تشرين الأول

١ ـ ٣ ـــ مؤتمر البترول- إيران ـــ طهران

١٧ ـ ١٩ ـــ المعرض السعودي للنفط والغاز SAOGE- ـــــ الدمام

٢٣ ـ ٢٤ ـــ منتدى الشرق الأوسط للصحة والسلامة ـــــ دبي

نوفمبر/ تشرين الثاني

٧ ـ ١٠ ـــ مؤتمر ومعرض أبوظبي الدولي للبترول- أديبك ٢٠١٦ ـــ أبوظبي

مفهوم جديد للتدخل في الآبار

في هذا المقال، يقدم دان بوركيس، مدير قسم التكنولوجيا في شركة Well-SENSE Technology تكنولوجيا جديدة من شأنها تغيير قواعد اللعبة للتدخل في الآبار، والتي يجري تطويرها بالتعاون بين مركز Oil & Gas Innovation ، الذي مقره أبردين، وجامعة روبرت جوردون.

لتحقيق أعلى مستويات الإنتاجية، يتعين على المُشغلين دوما مراقبة وصيانة وإصلاح آبار النفط والغاز. وفي الظروف الحالية، حيث تحول التكاليف الباهظة دون حفر آبار جديدة واستكمالها، يكون اللجوء إلى متخصصي التدخل في الآبار جزءاً مهماً من عملية الإنتاج. وقد تم ابتكار البنية الأساسية لطرق التدخل في الآبار الحالية، ومنها الأنابيب المرنة والكبلات الكهربائية والكبلات الرفيعة غير الكهربائية، منذ أكثر من ٥٠ عاما ماضية. ومعروف أن كلا من هذه الخيارات يحتاج إلى معدات ضخمة وعالية التكلفة لا تتطلب فقط رأس مال استثماري كبير، وإنما تتطلب أيضا العمل لساعات طويلة. وإلى جانب ذلك، فهي تشترك في خاصية واحدة، وهي لف الكبلات أو الأنابيب من السطح، والتي يجب استردادها بعد ذلك.

وإذا تعذر استردادها وطرأت مهمة لسحب الأدوات من داخل البئر، فيمكن تصنيف هذا النوع من الفشل على أنه مزعج جدا أو كارثي في المحصلة النهائية. ونتيجة لذلك، لا يتم المضي قدما في العديد من عمليات التدخل المحتملة، أو حتى المُخطط لها. إذ يكون من المتوقع أن تفوق المخاطر المزايا التي يمكن الحصول عليها. وينعكس ذلك- على وجه الخصوص- على عمليات المراقبة، لا سيما عمليات إيقاف العمل في الآبار، عندما لا يكون هناك عائدٌ على تكلفة إجراء أعمال التدخل.

وباستثناء الجرارات، التي تعتبر ميزة مُحسنة مضافة إلى خط التنقيب، لم يتم إدخال عمليات تطوير كبرى خلال العشرين عاما الأخيرة على صعيد الطرق التي يتم توظيفها للتدخل في الآبار. صحيحٌ أنه تم مؤخرا توظيف أنظمة قضبان الدفع المصنوعة من الكربون، ولكنها غير معممة بأي حال من الأحوال، لأنها تحتاج رأس المال الضخم وعدد العمال الكبير، على غرار الطرق المتبعة الأخرى.

ومن بين العوامل المهمة في تبرير التكاليف المرتفعة والمخاطر المرتبطة بأية عملية تدخل، امتلاك البيانات الكافية لفهم النتائج المحتملة. ففيما يتعلق بكبلات الألياف الضوئية للبئر، يعتبر استخدام الاستشعار السمعي الموزع واستشعار درجة الحرارة الموزع واستشعار الضغط الموزع، طرقا ممتازة للحصول على الكثير من البيانات الرئيسية التي تنبني عليها قرارات مهمة. غير أن تكلفة تركيب هذه الكبلات، سواء بشكل دائم أو مؤقت، عادة ما تكون مرتفعة للغاية في جميع الآبار، باستثناء عدد قليل منها.

دان بوركيس، رئيس قسم التكنولوجيا في شركة Well-SENSE

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وذرفورد تشارك آي بي إم لتوفير حلول تحسين الإنتاج من الجيل التالي

أعلنت شركة وذرفورد إنترناشونال عن توقيع اتفاقية مبادرة مشتركة مع شركة آي بي إم للتعاون في تطوير منتجات وحلول جديدة لمنتجي النفط والغاز تستفيد من الإمكانيات التحليلية المتطورة التي تقدمها آي بي إم وقدرات إنترنت الأشياء على سحابة آي بي إم، إلى جانب تعزيز تكنولوجيا تحسين الإنتاج الرائدة على مستوى الصناعة من وذرفورد. وفي إطار المبادرة المشتركة، سوف تتولى وذرفورد وآي بي إم تطوير حلول تحليلية جديدة، تتوفر جميعها عبر سحابة آي بي إم، وتعتمد على نظام البرامج الهندسية وتحسين الإنتاج الشامل لشركة وذرفورد، والتحكم الإشرافي وتحصيل البيانات (SCADA)، وأجهزتها الخاصة بالاستشعار والتحكم . وسوف تمثل الحلول، التي سيتم تطويرها بشكل مشترك، جزءاً من وحدة الأعمال العالمية الجديدة لشركة ReservoirSolutions التي تم إطلاقها في مطلع ٢٠١٦ ، وهي معنية بتوفير العروض المتكاملة التي من شأنها مساعدة عملائها على خفض تكاليف التشغيل وزيادة الإنتاج. وقال أوسكار ريفييرا، نائب رئيس شركة ReservoirSolutions: «تقوم وذرفورد بتعزيز عروضها الحالية الرائدة على مستوى الصناعة باستخدام البنية الأساسية لإنترنت الأشياء والبرامج التحليلية المتطورة كجزء من التزامنا بمساعدة المُشغلين على تحقيق أقصى استفادة من أصولهم. وأضاف: تمتلك هذه الحزمة، غير المسبوقة من التكنولوجيات المتكاملة، القدرة على إحداث ثورة هائلة على صعيد تحسين الإنتاج، وتمنح وذرفورد فرصة أفضل لمجابهة التحديات التي يواجهها منتجو

المبادرة الجديدة ستعمل على تطوير حلول تحليلية جديدة

النفط والغاز». وقال جون برانتلي، المدير العام العالمي لقسم الصناعات الكيماوية والبترولية بشركة آي بي إم: «بينما يتطلع منتجو النفط والغاز لحلول أكثر توفيرا للتكاليف، تتزايد الحاجة إلي الحلول التحليلية الأكثر تطورا، والتي تساعد على اتخاذ قرارات أفضل». وقال: «إن من شأن الجمع بين البرامج الهندسية لشركة وذرفورد وبرامج تحليل البيانات لشركة آي بي إم في سحابة آي بي إم، التمهيد للتحول التالي نحو تحسين الإنتاج».

المعرض السعودي للنفط والغاز ـ SAOGE : بابٌ مفتوحٌ على آفاق جديدة

افتتاح المعرض السعودي للنفط والغاز ٢٠١٥

هى واحدة من الأهداف الرئيسة لرؤية السعودية لعام ٢٠٣٠م لتحديد وتنفيذ المشاريع التحويلية التي تعزز التنوع الصناعي. هذه المشاريع التحويلية تركز، في المقام الأول، على الصناعات المتقدمة، والتي بدورها سوف تدفع الاستثمار في جميع أنحاء القطاع الصناعي. من الذي سيقوم ببناء تلك المرافق؟ ومن الذي سيوفر الخبرة التكنولوجية؟ من الذي سيوفر فرص الابتكار، والمنتجات والخدمات، ويقوم بالتدريب؟ التقييم هو صفر. كل شيء أصبح على الطاولة لإقامة مشاريع مشتركة ومركزية بهذه الخطة. فكيف يمكن للشركات الأجنبية الحصول على نصيب من هذه الخطة وضمان دورها في زوبعة التنمية هذه؟

لاشك أن المعارض التجارية تعتبر الوسيلة الأكثر فاعلية لتجميع المعارف المحلية ووضع البائع والمشتري معاً. وقد دفعت الثورة الصناعية الرياح في أشرعة «المعرض التجاري» ولم تنظر أبداً إلى الوراء. أو بعبارة أخرى، ببساطة ليس هناك أفضل من عائد الاستثمار والتسويق الخاص بالعرض في المعرض التجاري. دورة هذا العامة الثامنة للمعرض السعودي للنفط والغاز ـ SAOGE تعتبر شاهداً على مكانتها في الجدول الصناعي في المملكة. فهذا العام سوف يرحب SAOGE بحوالي ١٠٠ شركة من ٢٥ بلداً، وأكثر من عشرة آلاف من الزوار القادمين لحضور ذلك المعرض الذي سيقام تحت رعاية سمو الأمير سعود بن نايف بن عبد العزيز، أمير المنطقة الشرقية، وسيجرى معرض SAOGE وفقا للتقاليد في الدمام، العاصمة الصناعية للمنطقة الشرقية. يجدر بالذكر أن المعرض السعودي للنفط والغاز ـ

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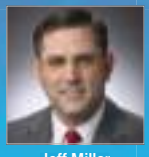

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أمين الناصر في حفل توقيع اتفاق عقد مشروع الفاضلي للغاز

المضي في تنفيـذ مشـــروع الفاضلي للغـــاز

ترأس أمين النـاصـر، رئيس شركة آرامكو السعودية ورئيسها التنفيذي، حفل توقيع مشروع غاز الفاضلي الذي أقيم في شهر يوليو/تموز، والذي يعتبر علامة فارقة جديدة في مساعي الشركة لزيادة إنتاج وإمدادات الغاز لمواكبة الاحتياجات المحلية المتنامية من الطاقة. وقالت الشركة، في بيان لها، إن هذا المشروع الجديد الضخم لشركة أرامكو السعودية سيعمل على تعزيز إنتاج وإمداد الغاز الطبيعي النظيف، وتقليل الاعتماد على النفط لتوليد الطاقة. وقد حضر الحفل كبار الإداريين والمسؤولين التنفيذيين من شركات الأعمال الهندسية والإنشاء والتوريد الأخرى، علاوة على موردي الخدمات الآخرين المشاركين في تطوير وتنفيذ مشروع غاز الفاضلي.

ووفقا لشركة أرامكو السعودية، سوف يصبح مشروع غاز الفاضلي مكونا رئيسيا في النظام الرئيسي لإمداد المملكة بالغاز. فهو سيقوم بمعالجة الغاز من حقول النفط البحرية والبرية.

ومن المتوقع أن يوفر مشروع الفاضلي، إلى جانب مشروعي الغاز العملاقين الآخرين اللذين تضطلع بهما شركة أرامكو السعودية: واسط ومدين، أكثر من ٥ مليارات قدم مكعب يوميا من الغاز غير المصاحب لطاقة المعالجة. وسوف تعمل هذه الزيادة في إمدادات الغاز الطبيعي، التي من المتوقع أن تصل إلى أكثر من ١٧ مليار متر مكعب يوميا بحلول ٢٠٢٠ ، على إيجاد مزيد من الفرص في العديد من القطاعات الصناعية السعودية؛ مثل الحديد والصلب، والألومينيوم والصناعات التحويلية ذات القيمة المضافة.

كذلك تعكف أرامكو السعودية أيضا على دراسة الفرص المستقبلية للأهمية البيئية لمشروع الفاضلي، والتي ربما تشمل مصنع إعادة تدوير الهيليوم ووحدة إعادة تدوير ثاني أوكسيد الكربون لتقليل الانبعاثات.

علما بأن هذا المشروع قد مُنحت له بالفعل عشرة عقود. كما وقعت أرامكو السعودية في ٢٠ يوليو/تموز أربعة عقود أخرى كبرى: وهي عقد بناء مرافق الغاز البحرية لحقل الفاضلي مع شركة «لارسن أند تربو» ومشروع ربط الفاضلي بمراكز الطلب عبر خطوط الأنابيب مع شركة «كاد السعودية»، وعقد إنشاء مرافق التوليد المشترك للطاقة والحرارة مع «الشركة السعودية للكهرباء»، وعقد إنشاء المرافق السكنية مع شركة «محمد السبيعي وأبناؤه القابضة للاستثمار».

SNC Lavalin تفوز بعقد في قطر

فازت شركة SNC Lavalin بعقد للاستشارات الهندسية وخدمات الدعم من قبل Oryx GTL وهو مشروع مشترك بين قطر للبترول وساسول الجنوب أفريقية، لمُجمع تحويل الغاز إلى سائل في منطقة راس لفان الصناعية في قطر. هذا العقد، الذي تبلغ مدته خمس سنوات مع شركة Qatar Kentz، يهدف إلى دعم خطة Oryx GTL للاكتفاء الرأسمالي على المدى البعيد، بحسب SNC-Lavalin. وينص الاتفاق على معدلات محددة مسبقا من عناصر العمل المطلوبة في المنشأة، والتي تشمل الهندسة العامة ودراسات الجدوى ووضع النماذج والرسوم وتقديم الوثائق.وقال كريستيان براون، رئيس قطاع النفط والغاز في شركة SNC-Lavalin : «نحن سعداء لإبرام هذا الإتفاق على مدى خمس سنوات مع Oryx GTL في الوقت الذي تحتاج فيه هذه الصناعة إلى التطوير المستمر للأصول. فهذا الاتفاق يضع SNC-Lavalin على المسار الصحيح لتحقيق رؤيتنا بأن نصبح شريكا

تم منح العقد لـ Oryx GTL

آساسيا ومحل ثقة لعملائنا. ونحن على أتم الاستعداد للمشاركة السريعة على جميع الجبهات التي يتطلبها المشروع خلال السنوات المقبلة».

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