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Oil Review Middle East

Covering Oil, Gas and Hydrocarbon Processing

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Covering Oil, Gas and Hydrocarbon Processing

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- Qatar Petroleum takes stock
- Data management strategies
- Living with lower oil prices
- Flow assurance in the Middle East's wet gas fields
- Pumping oil from subsea platforms
- Digital oilfields for production optimisation

Effective oilfield water management

Experts from the energy industry converged to share their expertise and views at the *Big Data Analytics for Oil & Gas* conference
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Covering Oil, Gas and Hydrocarbon Processing

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Editor's note

BIG DATA IS something of a hot topic right now, and that was the focus of our recent event in Abu Dhabi, where experts from the energy industry came together to share their views and expertise (see page 24). The Middle East oil and gas sector is generating unprecedented volumes of data, which has the potential to bring great benefits to the industry if exploited to the full. But it also brings challenges, such as the need to devise effective data collection, management and storage strategies as well as to protect against security threats. These areas were fully explored at the event, and we will bring you further analysis on this subject in future issues.
As we go to press OPEC has just announced that it will, as expected, maintain its production ceiling at 30mn bpd, noting the slow-down in supply growth and the forecast increase in global demand. We look forward to seeing how this plays out in the oil markets in the coming weeks.

Contents

Front cover courtesy of Dow Chemical

Safeguarding our energy future

Deliverability and sustainability are key to meeting future energy needs, says HE Abdalla Salem El-Badri, OPEC Secretary General.

THE WORLD WILL need more energy in the decades ahead, as the global population expands and economies grow, and as countries seek to provide the energy poor with access to modern energy services. In OPEC's most recent World Oil Outlook, energy demand is set to increase by around 50 per cent between 2015 and 2040.

The world has enough energy resources to meet these expected future energy needs. Key questions about our energy future relate to deliverability and sustainability. The basic challenge is twofold: firstly, to supply enough energy to meet demand and help provide access to modern energy services for all; secondly, this needs to be done in a sustainable way, balancing the needs of people in relation to their social welfare, the economy and the environment.

All forms of energy will be needed. Renewables certainly hold promise, but, globally, their share of the energy mix will still be just 4 per cent by 2040, given their low initial base. The share of biomass, nuclear and large hydro is expected to remain at steady levels up to 2040, at around 9 per cent, 6 per cent and 2.5 per cent, respectively.

This means that fossil fuels will continue to play a dominant role in meeting energy demand, although their overall share will fall from around 82 to 78 per cent during this period. By the 2030s, the share of oil, coal and gas are anticipated to be at similar levels, at around 25 to 27 per cent.

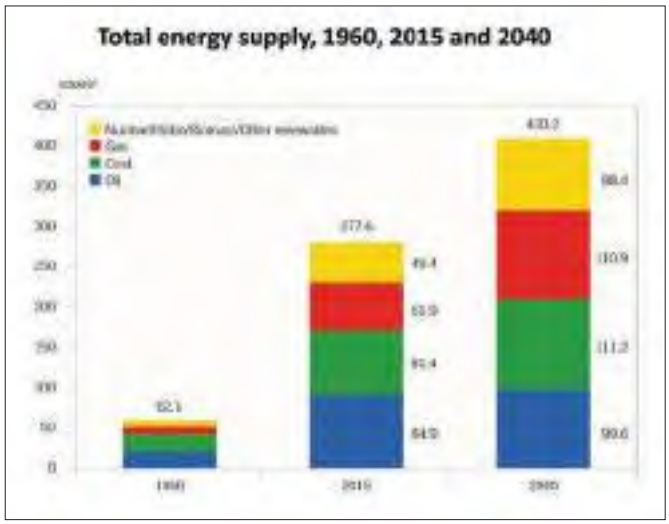
Much of our economic growth has been fuelled by fossil fuels. This has not been the story for everyone. Today, around 2.7bn people, or more, still rely on biomass for their basic needs, and 1.3bn have no access to electricity. These people need access to reliable, safe and secure modern energy services to live and prosper.

> "Fossil fuels will continue to play a dominant role in meeting energy demand"

Of course, the economics of wanting more, coupled with growing populations and rising energy demand, have created unexpected challenges – the environment and climate change. This is a concern for us all. Current climate change negotiations to develop an agreement in Paris at the end of the year and raise the level of ambitions for the pre-2020 period are extremely important. But we need to make sure the interests and concerns of all are taken into account.

Yes, we need to continue to develop renewables; but they cannot be seen as a replacement for fossil fuels. Yes, we need to continue to use energy more efficiently; but some people still have no access to modern energy services. Yes, there are environmental concerns regarding fossil fuels; but these can be overcome through use of cleaner fossil fuel technologies.

It is vital to have a clear understanding of our energy future – whether this is 5, 10 or even 20 years ahead. There is a fine balance between stability and instability in energy markets.



Source: OPEC

Looking ahead, from the perspective of oil, we see demand growing to 111mnbbl a day by 2040, an increase of around 18mnbbl a day. This expansion will require huge investments. It means we need to have clarity in terms of demand and, in turn, supply. This requires an understanding of the impact of the energy and environmental policies that are already in place, and those that are proposed.

Producers and investors will want to see some signs of certainty; no-one wants to waste huge amounts of capital on unused plants and equipment. But if these signs are not forthcoming, we could find there is not enough new capacity and infrastructure in place to meet rising demand levels. It is essential that stability returns to the market, to allow for the necessary investments to be made to meet future energy demand. It is also essential to have a producer-consumer environment that is conducive to reaching constructive end results.

We also welcome recent OPEC and non-OPEC discussions. Reports suggesting OPEC is targeting specific non-OPEC countries or producers with its decisions are not true. We welcome all producers. In the current market environment, maintaining the supply-demand balance and reaching price stability require the cooperation of major non-OPEC producers. We should remember what cooperation between OPEC and non-OPEC producers achieved back in the 1998-1999 crisis. ■

This is an edited version of the speech given by the OPEC Secretary General at the 6th OPEC International Seminar held in Vienna on 3 June.

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JUNE 2015			
17-18	**IADC World Drilling Conference & Exhibition**	ROME	www.iadc.org
23-24	**FLNG World Congress**	SINGAPORE	www.flngworldcongress.com
23-26	**13th Moscow International Oil & Gas Exhibition**	MOSCOW	www.mioge.com
SEPTEMBER 2015			
6-7	**Middle East Health & Safety Forum**	DUBAI	www.hse-forum.com
8-11	**Offshore Europe**	ABERDEEN	www.offshore-europe.co.uk
9-10	**22nd Annual IORS**	MUMBAI	www.oilasia.com/IORS
15-17	**MEPEC**	MANAMA	www.mepec.org
23-24	**Global Oil & Gas Black Sea and Mediterranean Exhibition and Conference**	ATHENS	www.global-oilgas.com/BlackSeaMed
OCTOBER 2015			
11-14	**KOGS**	KUWAIT	www.kogs2015.com
18-20	**Plastics & Petrochem Arabia**	DAMMAM	www.plaschem.4p-arabia.com
19-21	**Negotiation in Oil & Gas**	DOHA	www.cwcschool.com
27-30	**Gastech**	SINGAPORE	www.gastechsingapore.com
NOVEMBER 2015			
9-12	**ADIPEC**	ABU DHABI	www.adipec.com
23-25	**Saudi Arabia International Oil and Gas Exhibition**	DAMMAM	www.saoge.org
25-26	**Middle East Heavy Oil Congress**	MANAMA	www.meheavyoil.com
30 Nov - 2 Dec	**KIOG**	ERBIL	www.cwckiog.com

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

A health and safety forum for the industry's best and brightest

THE OIL AND gas industry is filled with hazards of every imaginable kind, from exposure to chemicals, to risk of fire and equipment hazards.

There is now a growing focus in the industry on occupational safety.

A report by *Transparency International* has stated that the global personal protective equipment (PPE) market is set to witness a compound annual growth rate (CAGR) of 7.3 per cent until 2020, and whose value will touch US$55.5mn by 2020. In fact, the PPE sector is touted to be the fastest-growing sector in the industry, mainly fuelled by industrialisation and the rise in construction activities.

In light of these developments, The Middle East Health & Safety Forum will be held between 6 and 7 September 2015 in Dubai, and will focus on employee safety. While great advancements have been made in the field of health and safety equipment (HSE), a world-class level of best practice is yet to be achieved, say the organisers of the event.

The Middle East Health & Safety Forum will bring together stakeholders from governments, regulators, industry leaders and solution providers to create a platform for knowledge sharing, best practice discussions and finding solutions. There will be a mix of presentations, panel discussions and networking.

The panel of speakers includes Andrea Tithecott, head of regulatory law at Al Tamimi & Co., Dr. Clarence Rodrigues, associate professor of mechanical engineering and acting HSE advisor at the Petroleum Institute, Firas T. Al Yousef, HSE section head – system analysis and auditing at Abu Dhabi City Municipality UAE, Ismail M.A. Hussain, superintendent safety and occupational hygiene at BAPCO, Raed Mohammed Al-Marzouqi, head of occupational health and safety at Dubai Municipality, Said Husain Al-Gahtani, senior manager EHSS at Saudi Basic Industry Corporation (SABIC) and Saleh Ali Saleh, HSE director – shared services department at TECOM Investments.

Workshops with industry leaders:

At the HSE Forum, there will be 12 key workshops, on developing business-critical safety processes; embedding a culture of safety; emergency response planning; docks, ports and cargo safety; oil spill response and clean up techniques; developing a fire safety awareness campaign; creating competency-based safety training systems; improving occupational health and safety regimes; assessing the employer's duty of care responsibilities; measuring safety performance; securing the right insurance cover and finally, disaster and hazard management.

This forum is ideal for those in the oil and gas, construction, marine, manufacturing or industrial sectors with responsibility for health, safety, environment, fire protection and security.

The event is being organised by Alain Charles Publishing's newest title *Health, Safety & Security Review Middle East,* and official media partners are *Oil Review Middle East* and *Technical Review Middle East.*

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Are we entering the low-price phase of a commodity super cycle? Middle East NOCs face unique challenges and opportunities if we are.

Since 2010, upstream oil investment has grown 13 per cent year-on-year (photo: Gulhem Vellut)

Living with lower oil prices

TODAY'S REDUCED OIL prices could signal the beginning of the low-price phase of a commodity super cycle, as happened after 1986, according to global management consulting firm A.T. Kearney. Years of high oil prices fostered massive upstream investments, leading to oil reserves growing much faster than demand. Furthermore, hydrocarbons may represent the last major commodity to start a downward price trend, in part due to the strength of OPEC. In short, oil prices hovering around $60 to $80 per barrel for several years appears likely, posing both challenges and opportunities for national oil companies (NOCs) in the Middle East, as outlined in the firm's new report *Beware the Oil Price Super Cycle*.

Might the recent dramatic fall in oil prices, from a peak of $115 bbl in July 2014 to $45 bbl by January 2015, be a 'blip' similar to that of 2008-2009, which by mid-2011 had all but reversed? Or, conversely, could this signal the downward phase of a super cycle, similar to the oil price collapse from 1981 to 1986?

Since 2010, upstream oil investment has grown 13 per cent year-on-year, while the global economy has mostly stagnated. As a result, oil demand has increased by just 6 per cent since the 2007 global economic downturn, while proven oil reserves have risen 26 per cent.

Furthermore, since the 2007-2008 recession, metals have experienced a sustained downward slide, while hydrocarbon fuel prices have hovered around their 2011 highs. This suggests that, as in the early 1980s, OPEC can keep oil prices high against market forces for a while longer than metals, but probably not forever. And the recent oil price collapse would simply reflect the market's rush to respond to the supply glut once OPEC signalled it was no longer willing or able to contain it.

> "The Middle East NOCs are in a position to benefit from other companies' reaction to extended low oil prices"

A transition from high to lower oil prices almost reverses everything one took for granted: what used to be profitable may no longer be, whereas what seemed a second priority may suddenly gain relevance. The impact will be different for each segment in the hydrocarbon value chain.

Upstream

Sustained cheap oil will hurt revenues for all upstream producers, but the impact will differ among them. The Middle East NOCs, in particular — due to their low production costs — are in a position to benefit from other companies' reaction to extended low prices. Many independents and even IOCs will be in financial trouble, having taken on large amounts of debt to finance investments in high-cost hydrocarbon sources. These companies often have cutting-edge expertise that could be applied to lower-cost Middle East basins. Therefore, as IOCs and independents reallocate resources away from unprofitable reservoirs, NOCs could acquire and absorb this expertise, and at far more favourable terms than would have been possible previously.

At the same time, the dominant focus of upstream business investments tends to shift in response to low prices, away from exploration and more towards improving the efficiency of existing production.

Downstream

Typically, when crude prices fall, but GDP (and subsequent demand for oil products) continues to rise, refinery utilisation is higher and margins wider. Global economic growth is currently relatively muted, but if, as in the 1980s, global GDP growth resumes faster than oil prices, investment in refining will once again become attractive. Also, the global economy tends to recover faster precisely because oil prices are low.

Of course, refining capacity expansion projects are well underway in the Middle East and in target markets in East Asia. So capacity is already expected to grow substantially. In fact, if all current refinery projects deliver on time, global refining capacity will almost double between 2015 and 2020. Yet, while the potential for improved refining margins may already be factored in, there are still attractive M&A opportunities for Middle East NOCs in this space, particularly as cash-poor IOCs and independents decide to raise cash by offloading their downstream assets. ■

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ADNOC's oil output to reach 3.5mn bpd by 2017

ADNOC aims to raise oil production capacity to 3.5mn bpd by 2017 (Photo: Kool Cats/Flickr)

ABU DHABI NATIONAL Oil Company (ADNOC) is on target to reach oil production capacity of 3.5mn barrels per day (bpd) by 2017, with plans to expand its gas production and refining capacity to 920,000 bpd.

The company, which has a 60 per cent holding in Al Hosn Gas (Occidental Petroleum Corporation holds the remaining 40 per cent), said that it seeks capital investment of US$32.6bn in 2016, US$32.3bn in 2017, US$19.6bn in 2018 and US$17.9bn in 2019.

Speaking at the Al Gharbia Development Forum in Abu Dhabi, Al Hosn Gas chief executive Saif Ahmed al-Ghafli said the company has "other programmes to raise gas production and our refinery (capacity) to reach 920,000 bpd," referring to the gas production from the US$10bn Shah Field which commenced in January.

The Al Gharbia Development Forum is an annual event organised by the Department of Economic Development of Abu Dhabi that covers a range of topics including oil & gas and the progress of the UAE's nuclear energy programme.

Libya capable of producing 1mn barrels per day

THE CHAIRMAN OF Libya's National Oil Company (NOC), Mustafa Sanallah, has said the country is capable of reviving production levels to reach 1mn barrels per day (bpd).

Speaking at Platts Global Crude Oil Summit in London on 19 May, Sanallah said Libya was working hard to return national oil production to pre-revolutionary volumes, following damage to its oilfields and the closure of its exporting terminals due to political instability.

NOC was aiming to repair the damaged facilities over the next two months, Sanallah said, in a move which he asserted will immediately increase output by 200,000 bpd.

Sanallah said Libya is focusing on offshore gas and condensates (Photo: JournoJen/Flickr)

Production levels currently stand at around 436,000 barrels per day (bpd) and are expected to average 400,000 bpd in 2015 - down from pre-revolutionary levels of around 1.6mn bpd.

"Over the past three years we have lost production because of our situation, and other producers have taken advantage," Sanallah commented. "We are working to resume production and develop projects, focusing in particular on offshore gas and condensates, to preserve our market share."

"If political issues are resolved, we can easily increase production to 1mn bpd," the chairman said, noting that several discoveries had been made in 2011 and the cost of production was relatively low.

Sanallah was keen to emphasise that NOC was maintaining a dialogue with tribes which had closed terminals and blockaded oilfields, adding that the company had maintained its neutral position despite the existence of two rival governments.

Speaking about OPEC, the chairman voiced his support for the Saudi-led strategy of focusing on market share, predicting no change in tactics at the next OPEC meeting in June.

"The concensus is that the oil price will recover in the second half of this year and continue to rise in 2016," he explained, adding that he expected the increase in global demand to absorb higher OPEC production and Libya to make a smooth return to the oil market without negatively impacting prices.

Hydrocarbons make a critical contribution to the Libyan economy, accounting for around 96 per cent of the country's hard currency revenues.

Questerre to develop Jordan's oil shale acreage

CANADA'S QUESTERRE ENERGY Corporation has signed a Memorandum of Understanding (MoU) with Jordan's Ministry of Energy and Mineral Resources for the appraisal and development of oil shale acreage in the country.

Company officials have said that the initial term of the MoU is for two years and might be extended. The Canadian company is expected to spend nearly US$3bn to US$5bn over the two-year initial term.

The MoU covers two blocks spanning 388 sq km in the Isfir-Jafr area, located approximately 200km south of Amman.

To date, a total of 35 core holes have been drilled in these two blocks by the Natural Resources Authority of Jordan. Questerre Energy Corporation is now analysing available data from these wells to develop its work programme.

To date, 35 core holes have been drilled in the Isfir-Jafr area

The programme, which will assess the acreage for potential oil shale development, will include economic viability, geological, geophysical, hydrological studies as well as the feasibility of using oil shale for internal project electricity generation.

Depending on the outcome, Questerre Energy Corporation will develop a subsequent work programme that will be conducted during the initial phase of a future concession agreement.

Jordan imports about 96 per cent of its energy needs, since it has virtually no deposits of conventional oil or natural gas. However, it does have large basins of kerogen-based oil shale, which it is ready to harness with the help of major energy companies.

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OPEC production highest in two years, says Reuters survey

OIL SUPPLY FROM the Organisation of Oil Producing Countries (OPEC) in May 2015 has risen to its highest level in more than two years, with record-level outputs from Saudi Arabia and Iraq and increased exports from Angola.

The results, revealed by a Reuters survey based on shipping data provided by oil companies, OPEC and consultants, show OPEC's May production rose to 31.22mn barrels per day (bpd) from a revised 31.16mn bpd.

Within the figures, Saudi Arabia and Iraq managed to maintain record output levels of more than 10mn bpd and three million bpd respectively, outweighing many of the smaller oil producing nations.

Angola was also a leading producer, having loaded 58 cargoes worth of oil in May as opposed to its original April target based on loading schedules.

However, Libya posted a decline as supply was disrupted by unrest, while production in Nigeria also fell due to pipeline leaks that prompted Shell's local venture to declare force majeure on exports from the Forcados stream.

The overall boost from OPEC nations has stretched the total output above the group's target of 30mn bpd, highlighting the significance of Saudi Arabia and other major members as key market shareholders.

OPEC was due to meet on 5 June 2015, and is not expected to change its strategy. Oil has risen to hover around US$60 a barrel from a low of US$45 a barrel in January 2015, and there are signs of slowing growth in the higher-cost supplies that have been eroding OPEC's market share.

Mazarine finds oil onshore Tunisia

MAZARINE ENERGY HAS announced the discovery of a net oil-bearing reservoir in Zaafrane Permit in central Tunisia.

During a production test, the Cat-1 well - drilled by CTF (Compagnie Tunisienne de Forage) to a total depth of 3,950m - flowed at a rate of 4,300 barrels per day (bpd) and 395,000 cu/m of natural gas per day.

The well was drilled at a depth of 3,950m (Photo: Imahornfan/Flickr)

Mazarine said the main objective of the well was to test the hydrocarbon potential of the Ordovician El Hamra and El Atchane Formations, which extensive logging and sampling have proved to contain 19m net pay each.

Mazarine Energy executive chairman Edward van Kersbergen said, "We are delighted to announce the first discovery in the Zaafrane Permit. The Cat-1 well is not only a success in its own right, it also upgrades the resource potential of a string of prospects in this large permit, notably DGH-1, our next well in the sequence. We look forward to the fast-track development of this discovery."

The Zaafrane Permit - a 5,168 sq km area in a historically prolific oil and gas producing region – is operated by Mazarine, in partnership with ETAP and MEDEX.

Qatar Petroleum invites bid for its biggest oil and gas field

QATAR PETROLEUM (QP) has invited international oil companies to compete for operating and developing Al-Shaheen oilfield from mid-2017.

The revelation was reportedly a blow to the current operator of more than two decades, Maersk Oil, which, according to industry sources, had hoped to extend its production sharing agreement.

QP said that Maersk Oil, oil & gas unit of giant conglomerate AP Moller - Maersk, was invited to bid after its 25-year agreement expires in 2017.

Maersk Oil has operated Al-Shaheen for more than 20 years (Photo: Maersk Drilling/Flickr)

Maersk Oil chief executive Jakob Thomasen said in a statement, "We have known that we would be challenged on terms and conditions in connection with the 2017 extension and have been awaiting more information on how Qatar Petroleum wished to go about such a process. We look forward to this opportunity to continue our partnership with Qatar Petroleum, based on our long-term commitment and detailed technical knowledge."

The oilfield, 80km off Qatar's coast, currently produces around 300,000 barrels per day (bpd). QP has not yet specified a deadline for submitting bids.


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Qatar launches Jetty Boil-off Gas Recovery project


LNG vessels at Ras Laffan

HIS EXCELLENCY SHEIKH Abdullah Bin Nasser Bin Khalifa Al Thani, Prime Minister and Minister of Interior of Qatar, has officially inaugurated the US$1bn Jetty Boil-Off Gas Recovery (JBOG) project at Ras Laffan Industrial City (RLIC). Reported to be the largest project of its kind in the world, it will reduce gas flaring by 90 per cent while loading at the six Ras Laffan LNG loading berths, representing a significant milestone in the State of Qatar's efforts to reduce carbon emissions from its LNG industry.

According to Qatari officials, the reduction is equivalent to annual greenhouse gas savings of 1.6mn tonnes of CO_2, which is equivalent to the annual GHG emissions of about 175,000 vehicles.

The project is expected to save 821mn standard cu/m of gas per year, enough to power 300,000 homes or to produce 750 MW power, and is part of the Common Facilities Projects at RLIC. It is led and operated by Qatargas on behalf of Qatar Petroleum and RasGas Company Limited.

Jordan receives its first LNG shipment

QATARGAS OPERATING COMPANY Limited has delivered the first cargo of LNG to the Kingdom of Jordan from Ras Laffan on-board the Floating Storage and Regasification Unit (FSRU), Golar Eskimo, according to a company press release. The conventional-sized cargo, which was sold Free-On-Board (FOB) to Royal Dutch Shell, arrived in Aqaba, Jordan on 25 May 2015, where it will be permanently moored on the Red Sea coast.

The most recent entry of Jordan into the LNG industry represents an important milestone for the Kingdom's energy security and is a sign of the growing importance of the Middle East as an LNG market. Jordan imports around 96 per cent of its energy needs and is increasingly looking to LNG, which will provide a more cost-effecitve and cleaner alternative to the deisel and heavy fuel oil which it currently relies upon to meet its rapidly increasing demand for energy. Shell is set to commence deliveries of 150 mmcfd of LNG to Jordan from July 2015.

"The sale of this first cargo to Jordan further demonstrates Qatargas' commitment to expand its reliable supply of a clean, safe and efficient source of energy to more countries," said the company statement.

Qatargas has been active in supporting the commissioning of both land-based LNG receiving terminals and FSRUs. To date, it has supported the commissioning of 15 LNG terminals across the Americas, Europe, the Middle East and the Far East, according to the company. Today, Qatargas is the largest LNG producer in the world, with an annual LNG production capacity of 42mn tonnes per annum (mtpa).

Eni announces Libya discovery

ENI HAS ANNOUNCED a new offshore gas and condensates discovery offshore Libya.The Italian multinational oil and gas firm said the find was made 140 km from the Libyan coast in the Bouri North exploration prospect of Area D.

The discovery was made through the A1-1/1 well, located 20 km north of the production field at Bouri and drilled at a water depth of 125 metres, encountering gas and condensates in the Metlaoui group of Eocene Age.

During the production test, which Eni said was constrained by the available surface facilities, the well reportedly flowed at a rate of 1,340 boepd, with a choke size of 64/64-inch.

However, at full flow, the firm added that it estimates the well to be capable of delivering more than 3,000 boepd.

The new well represents the second discovery this year in Libya's offshore Area D, which is operated by Eni through its subsidiary, Eni North Africa BV, with 100 per cent working interest in the exploration phase.

The company currently produces more than 300,000 boepd in the country.


The find was made 140 km from the Libyan coast (photo: DHL)

Egypt to lease second LNG import terminal

Egypt is looking to lease its second FRSU (photo: Ken Hodge)

EGYPT HAS ISSUED a five-year tender to lease a second LNG import terminal, according to Reuters. The ship is expected to have a capacity of producing 42 LNG shipments on an annual basis, with the single shipment volume capacity ranging between 140,000-170,000cf, according to a Daily News Egypt report. Egypt received its first floating storage and regasification unit (FSRU), Höegh Gallant, in April.

Egypt has reached a number of LNG supply deals with international companies to tackle its energy deficit, including Russia's Gazprom, Trafigura, Vitol, Noble, and Algeria's Sonatrach.

In a separate development, it is reported that Egyptian Natural Gas holding Company (EGAS) and the Egyptian General Petroleum Corporation (EGPC) have given the private sector a green light to import natural gas or LNG through the state-owned national gas network, to further boost supplies of gas.

OneSubsea wins North Africa deal

OneSubsea specialises in providing subsea equipment (photo: OneSubsea)

ONESUBSEA HAS BEEN awarded a subsea production systems contract totalling more than $330mn for a natural gas project off the coast of North Africa.

According to Cameron CEO, Jack Moore, the award is the largest for a subsea production system within the North Africa region to date, and is the second phase of a natural gas project spanning 13 deep-sea wells. The scope of supply includes subsea production equipment, tooling, installation and commissioning services. Deliveries are expected to begin in Q3 2016. OneSubsea was also the supplier for the first phase of the offshore project.

"For 2015, this is probably going to be one of the bigger ones," said Caitlin Traver, senior market researcher at Quest Offshore.

"It's definitely significant in terms of current market conditions, and while it's not a mega-project, it's a mega-project in North Africa."

Houston-based OneSubsea was set up three years ago by subsea equipment maker Cameron International and oilfield services company Schlumberger. It is now among the five biggest subsea equipment providers in Africa, specialising in various categories of equipment such as subsea trees and production systems, according to data collected by Bloomberg.

A time to take stock

Qatar's rise to prominence in the gas world has been in no small part down to the unwavering efforts of state energy firm Qatar Petroleum, but, with oil prices drifting downwards, change is in the air, writes Martin Clark.

ONE OF THE Gulf region's true energy giants, Qatar Petroleum (QP) has been a champion of the global gas sector for decades, transforming Qatar from a sleepy backwater producer into the world's top seller of LNG.

From practically nothing 30 years ago, the country now has LNG capacity tallying over 77mn tonnes per year, which is sold to markets far and wide, from Europe to Asia.

Qatari gas also underpins rising regional demand, especially in places like the UAE, via the Dolphin pipeline.

More recently, it supplied its first LNG cargo load to a new import terminal in Jordan.

But it is not just gas or LNG that QP is known for: its activities now span the exploration, production and sale of crude oil, natural gas and gas liquids, LNG, refined products, synthetic fuels, petrochemicals, fuel additives, fertilizers, steel and aluminium.

And to do all of that, it has established dozens of subsidiary businesses, plus multiple joint venture partnerships with foreign investors.

The LNG sector, for instance, is dominated by two entities, Qatargas and Rasgas, both QP partnerships with leading international firms such as ExxonMobil, Total, Shell and ConocoPhillps.

However, after achieving its long-stated LNG production targets, and seeing first output from the equally ambitious, and enormous, Pearl GTL (gas-to-liquids) project come on stream, it has become something of a time of reflection, a time to take stock.

To a great extent, this has been driven by the oil price drop, which has caused producers the world over to reassess their game-plan; it means efficiency drives, cost cutting, and other measures to navigate the climate with greater confidence.

Restructuring efforts

Do not expect any dramatic turnaround, but, in the ultra conservative realms of the region's energy sector, these are changing times for QP.

The Pearl GTL project is the largest GTL project in the world (photo: Shell)

> "A restructuring exercise is expected to take shape in the coming year"

A restructuring exercise is expected to take shape in the coming year, according to QP insiders, to adapt to the downturn in market conditions.

This includes absorbing its overseas arm, Qatar Petroleum International (QPI), into its main structure as part of a consolidation drive, first announced back in January.

"The restructure comes at the right time, with low oil prices a great motivation for the institution to be more capable of facing challenges in the upcoming years by getting rid of all burdens that accumulated during the previous period," QPI chief executive Nasser Khalil Al-Jaidah told state news agency QNA recently.

It could, potentially, mean consolidation of the group's overseas investments too, with Al-Jaidah adding that QPI's projects are also now being evaluated given the "current challenges" facing the industry overall.

Founded in 2007, QPI has built up a portfolio of 10 joint ventures spanning four continents.

And it is just one part of what is now a gigantic QP empire.

Potentially, it could spell change for other strands of this mighty energy business.

No one is expecting radical change, of course - that doesn't tend to happen in the Gulf's rich oil and gas industry - but new dynamics are certainly coming into play.

As well as tougher market conditions, other drivers include the need to incorporate more local content into big energy projects and the companies that undertake them.

Qatar is not immune to this shift, with similar plans being rolled out across the Gulf (indeed, with a fraction of the population of Saudi Arabia, it is also clearly less pressing). Nonetheless, Qatarization has been an important theme for all industry players in recent years and will continue to be for the foreseeable future.


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Investment partners

And it seems inevitable that QP's overhaul may also have some knock-on effects for the private sector as well.

There have already been some pretty big projects to have been knocked back as a result of the oil price slump.

Shell and QP ended their plans to build the Al-Karaana petrochemicals plant in January following the drop in crude prices. The US$6.5bn project was to be operated as a standalone joint venture, led by QP (80 per cent) and Shell (20 per cent). The two companies are already closely linked through Qatargas 4 - one of the country's big LNG exporters - and the Pearl GTL venture.

These ripples are running down to a smaller tier of companies as well.

QP is now seeking new partners for the Al-Shaheen oil field, Qatar's biggest oil producer, with a view to starting in mid 2017. That is when the contract term ends for current operator Maersk Oil, which has also been selected to bid, but is understood to be facing much tougher terms.

QP president and chief executive Saad Sherida Al-Kaabi said the future partner choice depends on who can provide the best technological solutions to take the field's development forward, as well as "the best financial return to the state".

Located 80 km from the shore, Al-Shaheen currently produces around 300,000 bpd. Maersk has operated the field since 1992.

Germany's Wintershall is also calling time on its long upstream involvement in Qatar.

> "Qatar sits on a huge portfolio of local and international projects"

Qatar's LNG is sold to markets far and wide (photo: Shell)

The company, which has been active there for decades, says it was not given access to local infrastructure to allow it to profitably develop its offshore Al-Radeef gas find.

The company, part of German chemical maker BASF, now plans to close its Doha office and hand back Block 4 North off the Qatar coast, a decision that it says was not taken lightly or "overnight".

Efficiency drives

What seems clear, though, is that while QP readjusts its focus and gets a handle on a new energy pricing paradigm, it does not plan on sitting back.

The group is now conducting feasibility studies for utilising ethane feedstock made available after the decision not to proceed with the Al-Karaana petrochemicals project.

Specifically, this could mean further expanding petrochemical plants under two other units, Industries Qatar (IQ) and Mesaieed Petrochemical Holding Company (MPHC).

These studies bring together various other QP subsidiaries, including Qatar Petrochemical Company (QAPCO), Qatar Chemical Company (Q-Chem) and Ras Laffan Olefins Company (RLOC).

Qatar's financial war chest means it sits on a huge portfolio of local and international projects which means immense scope for new developments as well as rationalisation.

Efficiency improvements, and efforts to cut the group's carbon footprint, have also inspired QP in more recent times.

Major projects here include a US$1bn jetty boil-off gas recovery project to capture gas that would otherwise be lost in the process of loading LNG tankers at Ras Laffan. Although it commenced operations last year, this was officially inaugurated in April, and enables boil-off gas to be collected from LNG ships and compressed at a central facility. The gas is then sent back to the LNG producers (Qatargas and Rasgas) to be consumed as fuel or converted back into LNG. When fully operational, it will recover the equivalent of 0.6mn tonnes of LNG per year, enough natural gas to power more than 300,000 homes.

Another recent initiative is the Qatar Fuels Additives (QAFAC) recovery unit, which pairs QP subsidiary IQ with OPIC Middle East. The facility, at Mesaieed Industrial City, has the capacity to recover 500 tonnes of carbon dioxide daily, with the captured gas to be turned into methanol.

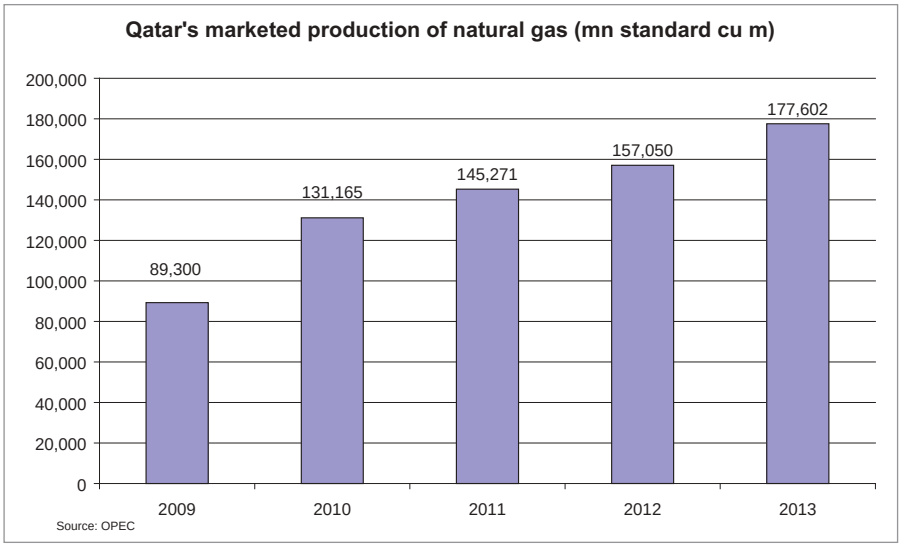
New competition

Such efficiency drives are an ideal way to regroup during the prevailing investment climate, as well as tick the climate change box. With Qatar facing up to other challenges too - including the rise of Australia and the United States as rival LNG sellers - QP will need to leverage all of its might to maintain the nation's competitive edge in the gas markets.

Qatari LNG exports shrunk for the first time in years, the International Group of Liquefied Natural Gas Importers said in its annual report recently.

Although the country still holds almost a third share of the global LNG market, new gas production from other territories, and expanded LNG output, means competition is here to stay.

For a country that radically changed the look of the LNG business in the first place – and given its immense gas wealth from the North Field – that is not likely to be a daunting prospect. It does, however, mean that QP will need to run a tight ship if it is to thrive in such an environment. ■



Capital investment plans **remain on track**

Despite lower oil prices, Saudi Aramco continues to invest heavily in exploration and production, focusing particularly on gas for domestic energy and as feedstock for value-added products.

SAUDI ARAMCO'S RECENTLY released 2014 Annual Review outlines plans for significant investment over the next decade across all areas of its business. The report states that the bulk of this spending will be in its upstream activities to ensure it maintains adequate spare crude oil production capacity to help stabilise the world oil market whenever disruptions occur. Saudi Aramco stresses, too, that it is committed to making key advances in areas such as reservoir management that will strengthen its ability to reliably meet the needs of its customers, while also bolstering the long-term efficiency and sustainability of its operations.

Significantly, Saudi Arabia's gas exploration and production programmes, both conventional and unconventional, made major advances in 2014.

"The importance of this progress cannot be overstated, as natural gas is increasingly vital to the Kingdom to provide clean energy for domestic needs and feedstock for value-added products that help to diversify the national economy," said HE Ali I. Al-Naimi, Minister of Petroleum and Mineral Resources, in the report.

"The year highlighted our focus on becoming the world's leading integrated energy and chemicals company by the end of the decade, with developments spanning the spectrum of our businesses and covering the entire value chain," said HE Khalid A. Al-Falih, now Chairman of the Board of Saudi Aramco.

"Upstream, we reliably met domestic and international demand, discovered eight new fields, and booked reserves that significantly exceeded production — despite our combined oil and gas production approached an all-time high. We also made significant progress on major projects that will help us provide feedstock for chemicals production, deliver cleaner fuel for power generation, and support the Kingdom's economic diversification."

"Downstream, we increased our level of integration from refining to chemicals, power generation, and marketing. We pushed ahead on a number of ventures and projects, many of which we have undertaken in partnership with other leading companies. Once complete, these projects will help us to be the world's top refiner and a world-leading manufacturer of chemicals," added Al-Falih.

> "Average daily crude oil production in 2014 was 9.5 mn bpd"

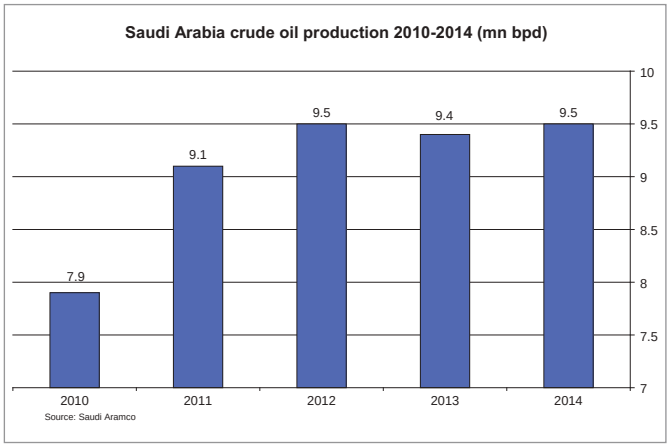
Infrastructure investments

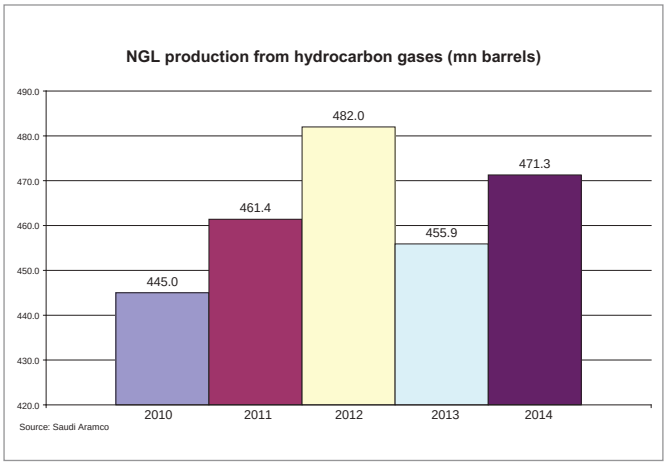
Extensive upstream investments and expanding production infrastructure helped Saudi Aramco maintain its role as the world's largest crude oil exporter. Average daily crude oil production in 2014

Saudi Arabia Oil & Gas

	2013	2014
Recoverable crude oil & condensate (bn barrels)	260.2	261.1
Crude oil production (mn bpd)	9.4	9.5
Crude oil exports (mn barrels)	2,677.0	2,544.0
Recoverable gas (trillion scf)	288.4	294.0
Total delivered gas (trillions of Btu daily)~	9.5	9.8
NGL from hydrocarbon gases (mn barrels)	455.9	471.3
Total NGL exports (mn barrels)*	320.7	329.9

~Feed to gas plants, sales gas (methane) and ethane
**Excludes sales on behalf of SAMREF and SASREF*
Source: Saudi Aramco





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was 9.5mn barrels per day (bpd) and a total of 2.5bn barrels was exported to customers around the world. (As of April 2015 the Kingdom had held production at above 10mn bpd for the second consecutive month, its highest level for many years).

A number of offshore wells were completed in the Red Sea, providing a deeper understanding of the hydrocarbon systems and potential resources in this region. Better appreciation of the Kingdom's resource base is instrumental in Saudi Aramco being able to book new recoverable reserves, with the long-term goal of growing the resource base.

Saudi Aramco discovered eight new fields, the most in the company's history: five gas fields, Abu Ali, Faras, Amjad, Badi, and Faris; two oil fields, Sadawi and Naqa; and one oil and gas field, Qadqad. This brings the total number of discovered fields to 129.

At the end of 2014, Saudi Arabia's crude oil and condensate reserves stood at 261.1bn barrels, while natural gas reserves registered 294 trillion cubic feet, both all-time record highs.

> "Saudi Aramco discovered eight new fields, the most in the company's history"

Shaybah projects

Saudi Aramco continued work on two major projects at the Shaybah field. First, to raise oil production capacity by 250,000 bpd for the second time, bringing total oil production capacity to 1mn bpd of Arabian Extra Light crude oil by April 2016 — double its original capacity when it came online in 1998. To do this, wells are being designed to maximise reservoir contact to 10km, enhancing production and recovery from deeper and tighter sections of the reservoir.

Second, major construction of the new natural gas liquids (NGL) recovery plant neared completion. The NGL facilities are expected to help meet increasing demand for petrochemical feedstock by recovering valuable NGL from produced gas. NGL production is projected to begin in the second quarter of 2015.

Robotic Inspection Crawler to detect steel thinning

Saudi Aramco continued with its strong focus on R&D and innovation in 2014, making progress in areas ranging from CO2 injection and SmartWater flooding to crude oil to chemicals technology. Over the past few years Saudi Aramco has developed globpal research networks in innovation hubs in the USA, Europe and Asia. In 2014 the company was granted 99 new patents by the US Patent & Trademark office, the most in a single year in its history.

Saudi Aramco's Intelligent Systems team has developed a fully working prototype of a robotic crawler capable of visual and ultrasonic inspection and gas sensing. Compact, self-contained, capable of manoeuvring on curved surfaces, and operated wirelessly, the Robotic Inspection Crawler is an industry first, says the company: an intelligent system that can detect steel thinning due to corrosion in pipes, tanks, vessels and other hard-to-reach steel structural assets.

The invention won the Industry Glory Medal of the International Federation of Inventors Association, and the potential for in-Kingdom commercialisation of the technology is currently being pursued, says the report.

HE Khalid A. Al-Falih, Chairman of the Board of Saudi Aramco

The company worked toward its goal of significantly increasing gas production to meet the Kingdom's rising energy demand for power and industry, while also meeting the global call on its crude oil.

In 2014, 11.3bn standard cubic feet per day (scfd) of raw gas was processed, an increase of nearly 3 per cent compared to 2013. All of the increase in gas production was from non-associated gas reservoirs.

Last year, further progress was made through the construction of the Wasit Gas Plant, one of the largest non-associated gas plants Saudi Aramco has ever built. At year-end, construction was 91 per cent complete and the plant is scheduled for start-up some time in 2015.

At full capacity, Wasit's integrated facilities will process 2.5bn scfd of non-associated gas from offshore fields. The plant also includes one fractionation module designed to process 240,000 bpd of NGL. The cogeneration facility at the plant, also scheduled to start up in 2015, will have the capacity to generate 750 megawatts of electricity, making the plant self-sufficient in power.

Midyan gas plant

The Midyan Gas Plant in the Tabuk region is the company's first such project in the Kingdom's northwest. The Midyan field, discovered in the early 1990s during Red Sea coastal plain exploration, was studied to identify ways to optimise economic production. Work on the plant commenced in 2013 and the facility is scheduled to be fully operational by the end of 2016. Midyan is designed to produce and process 75mn scfd of non-associated gas and 4,500 bpd of condensate.

The Midyan project will include the establishment of two pipelines stretching 98km to deliver sales gas and stabilised hydrocarbon liquids to the Saudi Electricity Company's solar thermal power plant near Duba to generate electricity. The feed from Midyan to the plant will displace the use of high-value diesel.

Fadhili gas plant

In its early phase, the Fadhili Gas Plant will process 2.5bn scfd from onshore and offshore fields and is on track to come on stream by 2019. Drilling for non-associated gas to supply the plant commenced in 2014 and Saudi Aramco issued the final project proposal in preparation for the detailed design phase during 2015.

Together, the Wasit, Midyan, and Fadhili gas plants will add more than 5bn scfd of non-associated gas-processing capacity, further enabling opportunities in Saudi industries such as steel, aluminium, and petrochemicals; water desalination plants; electricity production; and downstream value-added industries to produce antifreeze, solvent, fuels, and other advanced materials. ■

This article is based on extracts from Saudi Aramco's Annual Review 2014, which is available to download from the website at www.saudiaramco.com

The big data picture

Experts from the energy industry converged at Alain Charles Events' debut big data conference to share their expertise and views.

WHAT IS BIG data? Experts believe that for many it is only a buzzword as they do not understand the concept and the value it creates. Big data has been around for over two centuries, but it has gained momentum in terms of importance over the last half century. Big data today primarily focuses on four things — innovation, strategy, operating business, and faster and better decisions.

Big data analytics refers to the process of collecting, organising and analysing large sets of data (big data) to discover patterns and other useful information. Big data analytics can help organisations to better understand the information contained within the data and help identify the data that is most important to the business and future business decisions.

Amidst rising costs of extraction and falling oil prices, the oil and gas (O&G) industries have turned their attention to big data to tackle the present-day challenges of conducting their business. Oil is becoming an information technology-driven business. In this sector, all data is critical and is generated at an incredible rate. Companies, traditionally, have been generating a lot of data, but are now constantly generating extreme volumes of data at a higher exponential rate than ever before, with advanced analytical tools. According to the latest reports, O&G, however, uses only one per cent of the data it generates. Therefore, how to make the most of the remaining 99 per cent should be the focus of E&P companies.

> "The oil and gas industry uses only one per cent of the data it generates

Abdulhameed Aborshaid drilled the concept of digital oilfields into the attendees

This was the focus of the *Big Data Analytics for Oil & Gas* event held 19-21 April in Abu Dhabi. It provided a platform for business and technology professionals from around the world to share information and views on big data strategies. Experts from Wipro, CommScope, Halliburton, ADNOC Distribution, PPDM, Petrofac, Total and Sigmoid Consultancy came together to share insights and case histories.

Keynote speaker Dr. Satyam Priyadarshy, chief data scientist at Halliburton, spoke about how big data technologies can leverage innovations to derive business value in oil and gas. RoI (Return on Innovation) is a concept that he mooted to the attendees for optimising their business value and enhancing hydrocarbon production.

"Big data helps you find hidden inefficiencies in the organisation. This is a perfect time for the oil and gas industry to address this. Big data is all about innovation. There are five 'rEvolutions' happening today in that sphere — Internet, data, technology, hardware and the 'Need for things to get done'.

Taking things further, he added that oil and gas can apply big data analytics to make real-time decisions, reduce operational costs and improve revenue and services.

Recent years have seen O&G companies investing a considerable amount of their budget in software and tools to understand the data coming onto their systems better. And, with each year, the systematic output is increasing that provides O&G explorers with better information. However, no method is fool-proof. There are challenges that the sector is still facing with respect to data analytics and availability of data banks. With

potential value gains from having access to more data, often much of the data cannot be shared efficiently due to legacy systems in many companies, even though there are standardised data programmes. Therefore, data scientists should encourage companies to use the latest technologies and create a unified system for Open Source, whereby data is made available to everybody.

Priyadarshy pointed out that dashboards are good, but they do not give enough information to enable one to take action. "What you do not want is to produce static reports because you want to look at new patterns. Big data is partnership — business as well as technology as well as domain. Therefore, domain expertise is very important to understand the data. Raw data is the single source of truth. Once converted, the fact goes."

Moreover, complex data is important because it leads to innovations. When data sets from multiple places are connected, which are different in nature, the patterns are different. "Here is where the domain expertise comes into play. This is where innovations take place," the Halliburton expert stressed.

As data is becoming more complex, technology is coming in smaller sizes. Ali Rebaie, independent analyst, compared data traces to the Matryoshka doll toy, larger toys that fit into smaller ones. He said that the same can be aptly used for a lot of bigger data that is being pushed into efficient smaller devices like smartphones. "As data is becoming bigger, companies are looking for apps with built-in sensors that can be compact (for mobiles and tablets) and smarter. "It is the age of 'ephemeralisation', our ability to do more with less, until eventually we can do everything with nothing."

Atif Kureishy, principal, technology and analytics at Booz Allen Hamilton MENA, emphasised that two important elements of big data are pedigree and providence. From a pedigree perspective, any decision maker who wishes to protect their company's reputation will want to know where the data came from. You need to have traceability. Providence is when a firm wants to know what processing has happened to that data. That data is about trust and confidence. "I will not make a decision unless I trust the data sources and what prospecting has occurred on it." So companies need to ensure the pedigree and the providence due to compliance, ethical and regulatory issues.

Highlighting the importance of big data in downstream, Emmanuel Udeh, subsurface data analyst from Beneprojecti Nigeria, said that downstream uses data to deliver fuel accurately to customers and the finance department uses data to pay vendors and reconcile accounts. He also added that data determines oil or contract pricing and HR uses data to manage staff performance and improve productivity. In upstream, big data locates mature hydrocarbon prospects.

> "Consultant Booz Allen Hamilton believes that big data analytics can provide a six to eight per cent boost in production from data driven oilfields.

According to Wipro data analyst Sandeep Bhagat, big data analytics can usher in a new era of E&P technologies that will support the industry with seismic 4D and horizontal drilling, for example, and upstream activities will shift towards newer and more challenging fronts such

as deepwater, shale, the arctic and sensitive geopolitical areas requiring the industry to rely on more complex applications and platforms. We are moving towards rich, visual, flexible, mobile interfaces and myriad user platforms. "Using existing asset data integrated with digital visualisations, analytics and shared situational intelligence, pipeline operators can respond to potential events even faster. This helps prioritise maintenance tasks, resource allocation and capital spend more effectively based on risk assessment."

Some of the platforms that are critical to big data analytics include Hadoop, Appliance, Streaming and NoSQL.

However, many organisations are already struggling to manage their existing data and inflow of more data with improved technologies only adds complexity. Some questions from companies are what data should be stored, how long should it be kept, what data should be included in analytical processing, and how to properly analyse it? Do we keep existing technology, or upgrade it, or totally replace it?

Awad El Sidiq, senior database administrator at ADNOC Distribution, said that in light of the need for big data analytics, legacy systems must be either upgraded or replaced. The big data strategy of today works with the SMAC (social networking, mobile, advanced analytics and cloud computing) concept.

He quoted a Gartner report issued in 2012, saying that 78 per cent of enterprise legacy applications will witness a dramatic change in the next two years. "Most organisations are now talking about enhancing their legacy applications, discontinuing them and bringing new technology, or upgrading them to achieve SMAC elements. Replacing the legacy app with a vendor-friendly app will have new processes and best practices. The change in the enterprise can be costly but necessary as the current design is no longer service-enabled," Sidiq added.

As analytics, engines and programmes are getting bigger, better and more efficient, we can extract more interesting information. Therefore, how do O&G companies manage big data with a valid data centre strategy?

Ian Jones, global account manager, oil and gas at Commscope, said, "We are pulling a lot of information out of the ground, literally. As products are growing, there is a lot of information coming in. Whether it's the temperature, geoseismic data or the engineering, everything produces data. Depending on technology, the data may range from 2MB to 1GB a day."

Jess Kozman emphasised how big data can help real-time decision making and predictive analysis

> "Raw data is the single source of truth. Once converted, the fact goes."
> — Satyam Priyardarshy

According to Jones, a good data centre will be able to model and add changes and share all the information between the subsystems. He adds that a company should always look at a data centre which can reduce both capital and operational expenditure costs by maximising the existing physical footprint.

Another big role that big data plays is in predictive analysis and real-time decision-making.

Predictive analytics, in the O&G sector — upstream, midstream and downstream — can aid in predictive maintenance, forecasting, energy trading, risk management and optimisation. This gives an idea too as to where to look next for oil and gas.

Jess Kozmann, Asia Pacific regional representative of Professional Petroleum Data Management (PPDM), revealed that with falling oil prices "not only is this the best time to do data management, but the only time to do it. Since we do not have money to look into field activities, we are looking at engineering and HR data."

Kozmann explained how structured data can be extracted from surplus data and the properties then be analysed in software to put it all together. "Data analytics is high-value information. It can help predict and prevent losses. However, it is advisable not to overdo predictive maintenance as it may do more damage than repair," he added.

Experts also explored how data and data-related problems can affect business. Sergey Fokin, head of data management and geoinformation at Total E&P, said, that in order to understand this, companies need to map out a business contingency plan, and the first stage is to realise the risks. Risks will vary from entity to entity and from country to country.

Then, it is important to see how these risks will affect your data and how data problems will affect your business. Based on impact analysis, companies need to map out the risks to the business process. After that you can understand how business processes can be affected, and, with reverse engineering, you can understand what data problems can relate to it, and how it can affect your business. He advises that analysts go directly back to the data only after analysing the risks.

Geoff Nesbitt, physical chemist at Petrofac, spoke about how data analytics aids EPC, asset integrity and integrated systems in midstream and upstream.

"In a hydrocarbon value chain, the data is collected from geology, engineering and production sets and evaluated. An E&P company will ideally look at the downhole and then suggest a field plan."

Nesbitt said that what makes the EPC value chain more interesting and varied are faster sensors, lots of storage, and the penetration of advanced machinery into

RELIABILITY IN OIL WELL CEMENTS

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the industry by the licensors and companies. He noted that M2M interphase and IoT is slowly penetrating into the O&G industry. "Advanced process control companies like Yokogawa, Honeywell, Emerson are currently selling process control systems for plants and refineries."

After the data is put into datasets, EPC companies visualise the data in terms of value. With that comes the opportunity of developing metadata metrics, physical modelling and machine learning.

"As we go downstream, reactors are becoming more intelligent as sensors and valves are making decisions on their own and feeding data back to the master programme. It is then looking at integrated plant performance and at how all the components of the plants are looking and behaving together and passing information back to the sensor and giving it new instructions."

Data sets, Nesbitt noted, are important and relevant because they help companies make money — both operationally and commercially. As safety and production gain ground, big data helps suggest how to run plants longer, schedule maintenance and replace fragile items.

Improved technologies and data assessment tools are often followed by security risks. And Open Source software brings in the additional challenge of cyber security.

According to Mustafa Dafallah, senior consultant at Booz Allen Hamilton, the O&G industry is a target as it is high-profile, revenue-driven and critically important to national infrastructure. Previously, it was thought that industrial cyber security was secure. But, recently, there have been multiple attacks on control systems. So it is no longer a theoretical question of attack. It is real and the impact can be huge. As a result, companies have to start considering industrial security at every stage of a project's lifecycle.

Many companies collect around 7PB of data in compressed forms daily. The goal is to predict who the attackers are in a predictive manner rather than just analysing the data. However, it is impossible to predict completely as it all depends on the data being connected.

In the Middle East, IOCs and NOCs have national cyber authorities that enforce deployment of security measures to protect brownfield operations and the creation of security architecture for greenfields.

Ian Jones spoke about the importance of efficient data centres in enterprises

> "Bottomline of the analysis is to get people to the right place at the right time." — Jess Kozmann

O&G operators are increasingly turning to digital oilfield (DOF) technology to weather the current oil price environment and to allow them to emerge with more efficient, streamlined operations.

As most brownfields are being turned into DOF, the downhole technology in drilling that many explorers talk about is trying to pull out more acoustic data off the ground during the drilling phase to make sure that the well is more efficient. Therefore, instead of having the recovery rate at 30-40 per cent, now companies are reaching 45-50 per cent.

Big data can help companies develop the DOF that unite operational technology with information technology to improve decision-making and enhance operational and business performance. Adding empirical analytics to existing physics-based analytics can take the industry to a new level of business improvement in these tough times of lower oil prices.

IDC predicts the global big data and analytics market will reach US$125bn in hardware, software and services revenue in 2015. ■

Sergey Fokin describes how data management aids business processes at Total

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Gulf Capital and Carbon Holdings sign financing deal

Petrochemicals plays a major role in building Egypt's economy

INVESTMENT FIRM GULF Capital and Egypt's petrochemical major Carbon Holdings have signed a debt financing agreement worth US$25mn to support three of the latter's mega-industrial projects in Ain Al Sokhna on the Suez Canal in Egypt. The projects are Egypt Hydrocarbon Corporation, Oriental Petrochemicals Corporation and Tahrir Petrochemicals Corporation.

Egypt Hydrocarbon Corporation is a US$550mn mining Grade Ammonium Nitrate plant, Oriental Petrochemicals Corporation a polypropylene production plant, and Tahrir Petrochemicals Corporation is a US$7.4bn greenfield naphtha cracker, olefins production complex with associated derivative units.

Basil El-Baz, chairman and CEO of Carbon Holdings, said, "We are fortunate to be partnering with Gulf Capital which shares our views and vision for Egypt's future, and prepared to back it with investments."

Accenture launches excellence centre in Saudi Arabia

GLOBAL MANAGEMENT CONSULTANT Accenture has launched a new centre of excellence in Al Khobar, Saudi Arabia to provide services and skills for petroleum refinery and petrochemical companies in the GCC nations. Called the Accenture Resources Manufacturing Center of Excellence, it will help meet increasing demand for services in the Gulf including designing, building, deploying and operating integrated refinery information systems, manufacturing operations and management systems.

The centre is expected to provide end-to-end services ranging from IT strategy, solution design and engineering to deployment and operations management, supported by Accenture's worldwide network of centres of excellence, plant and commercial services teams. Especially for companies that are keen to build, operate and maintain effective production plants, the Al-Khobar centre will develop new business processes and information systems, deliver design and construction phases of an expansion project, and manage future operations.

Sadara awards EPCM contract to USA's Jacobs Group

SADARA CHEMICAL COMPANY (Sadara) has awarded the USA's Jacobs Engineering Group a four-year contract for engineering, procurement and construction management (EPCM) services, for an undisclosed amount.

Sadara, which is currently building the world's largest chemical complex in Saudi Arabia's Jubail Industrial City II, has appointed Jacobs Engineering Group to provide in-Kingdom and out-Kingdom EPCM services. The chemical complex is worth an estimated US$20bn and will introduce a host of new products to the Kingdom such as the first isocyanate and polyol (polyurethane) plants. The complex is going to be constructed in a single phase, with 26 world-scale manufacturing plants with a total capacity exceeding three million metric tonnes a year.

Jacobs Engineering Group has been involved with Sadara since 2011

Bassim Shebaro, vice-president of Jacobs Engineering Group, said, "We are proud to deepen our relationship with Sadara, which began in 2011. Since then, we have developed a strategic business relationship built on value, trust, partnership and commitment."

Sadara is a JV that was developed by Saudi Arabian Oil Company (Saudi Aramco) and The Dow Chemical Company (Dow) in 2011. Its differentiated product portfolio employs cutting-edge technologies, and will add downstream value chains to expand and transform Saudi Arabia's existing chemicals landscape.

GPCA recommends customs reforms in the UAE

REFORMS IN CURRENT customs regulations will be crucial for the export-oriented GCC petrochemical industry, in order to reach the milestone of manufacturing 190mn tonnes of products by 2020, stated the Gulf Petrochemicals and Chemicals Association (GPCA).

Dr. Abdulwahab Al-Sadoun, secretary general of GPCA, said, "The GCC petrochemical industry has been growing on a CAGR of eight per cent over the past five years increasing from 37.2 in 2008 to 67.6mn tonnes by 2014.

"As an industry with increasingly competitive worldwide players, operating agile and flexible supply chains will be essential in the development of our export portfolio. In order to ensure that we are preferred partners for wide-ranging customers, introducing customs and clearance procedures reforms will be key to ensuring global market share."

Dr. Abdulwahab Al-Sadoun, secretary general of GPCA

In order to maintain the industry's status as a petrochemical major, there is a need to introduce some reforms in customs in the UAE. The GPCA research has revealed that the UAE ranks 38 globally in terms of chemical export volumes, export costs per container have averaged US$656 and clearance time is a week – the lowest in the GCC. Despite all these standards of delivery and performance, Al-Sadoun pointed out that container costs have marginally risen in the past two years – an indication that stakeholders must work together to ensure the UAE's position as a top chemical exporter isn't compromised and they must all work together.

A limited domestic market has made the Gulf an export-driven region, which Al-Sadoun feels must remain a cornerstone. "Easing access to our products destined for export markets will help enhance the competitiveness of our players." As the GCC's chemical industry is expected to add an additional 50mn tons of capacity by the end of this decade, the petrochemicals sector is set to grow.

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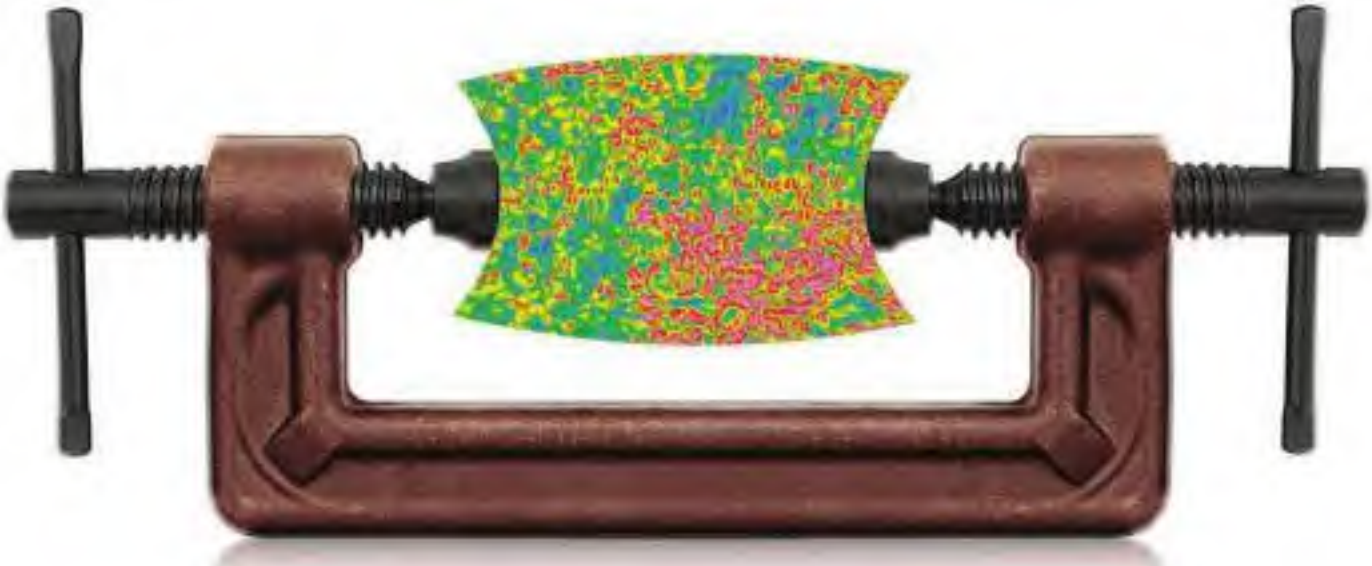

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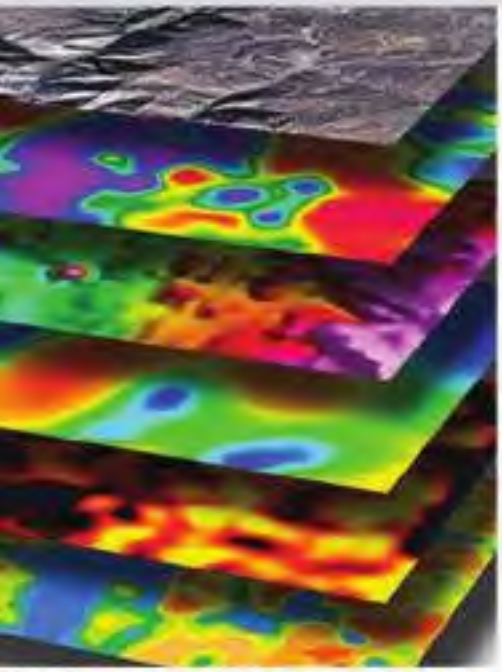

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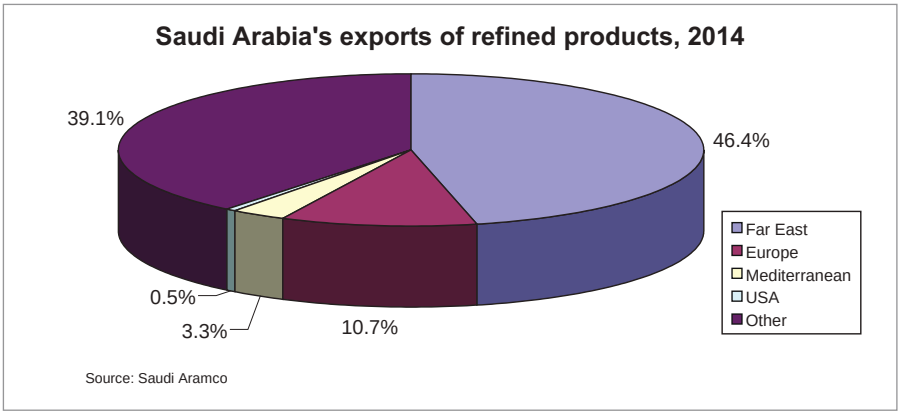
Saudi Aramco: downstream takes centre stage

Saudi Aramco pushes ahead with its many downstream projects, with the aim of becoming the leading global chemicals player and adding value to the Kingdom's hydrocarbons resources.

IN THE NEXT 25 years, crude oil is expected to constitute a full third of all energy consumption — with most of it going downstream to the transportation sectors and petrochemicals, according to Saudi Arabia's recently released *2014 Annual Review*. Based on its belief in the long-term sustainability of oil demand, Saudi Aramco says it is determined to maintain its capital investment plans in its global downstream system.

In 2014, the company further integrated its refining, chemicals, power generation and marketing businesses and pushed ahead on several projects. While many other petroleum companies are scaling back, Saudi Aramco is building additional refining capacity and growing its global chemicals, trading and marketing businesses.



Growing global presence

Expanding its downstream activities should significantly increase its global presence, creating competitive advantages through increased scale. A core element of its downstream strategy is integrating chemicals production with its refining assets at home and across key international geographies. Successfully expanding its refining and chemicals businesses will have an impact beyond generating additional revenue as it will increase economic diversification and job creation in the Kingdom as well as help to meet domestic demand for refined products.

Saudi Aramco says it is also taking integration to a new level: researchers are investigating the possibility of creating chemicals directly from crude oil, creating efficiencies that could eliminate the need for intensive traditional refining steps to perform that process.

Principal products manufactured at in-Kingdom refineries (mn bbl)

2013	LPG	Naphtha	Gasoline	Jet Fuel/ Kerosene	Diesel	Fuel Oil	Asphalt & Misc.	Total
Ras Tanura	5.486	14.586	43.187	7.017	76.846	32.857	8.037	188.017
Yanbu'	3.019	(1.834)	17.003	(0.543)	33.729	34.393	—	85.767
Riyadh	1.822	—	11.225	2.932	21.694	0.047	6.703	44.423
Jiddah	0.775	2.843	3.446	(0.02)	4.001	3.681	4.864	19.590
Total Domestic	11.103	15.595	74.861	9.386	136.27	70.977	19.604	337.796

Saudi Aramco share (mn bbl)

2013	LPG	Naphtha	Gasoline	Jet Fuel/ Kerosene	Diesel	Fuel Oil	Asphalt & Misc.	Total
AMREF	(0.755)	—	20.226	9.402	12.922	15.472	—	57.267
SASREF	1.292	10.972	1.777	9.113	10.768	12.294	—	46.216
Petro Rabigh	0.615	7.089	5.593	4.186	11.274	12.278	—	41.035
SATORP	0.029	1.382	0.568	1.173	3.783	4.340	—	11.275
Total JV	1.181	19.443	28.164	23.874	38.747	44.384	—	155.793
Grand Total	**12.284**	**35.038**	**103.025**	**33.26**	**175.017**	**115.361**	**19.604**	**493.589**

More refining capacity

Saudi Aramco has significantly boosted its refining capacity. In a short period it will have built 1.2mn bpd of refining capacity in Saudi Arabia: the Saudi Aramco Total Refining and Petrochemical Company (SATORP) joint venture (2014), the Yanbu Aramco Sinopec Refining Company (YASREF) joint venture (2014) and Jazan (2017). These are major milestone projects in its goal to increase its participated refining capacity worldwide to between 8mn and 10mn bpd, primarily in the Far East, Middle East and in other high-demand growth markets, says the report.

SATORP, a joint venture with France's Total in Jubail, is one of the largest, most complex refineries in the world, capable of converting 400,000 bpd of Arabian heavy crude oil into low-sulfur gasoline, diesel and jet fuel. As well as producing some of the world's cleanest naphtha and gasoline, the complex also produces more than 1mn tons per year of paraxylene, benzene, and high-purity propylene.

Last year, SATORP's crude oil throughput reached the facility's full design capacity of 400,000 bpd. This new venture represents a major step in achieving the company's vision of being among the world's top three refiners and a world-leading manufacturer of chemicals.

Meanwhile, the latest 400,000 bpd refinery, YASREF, located in Yanbu Industrial

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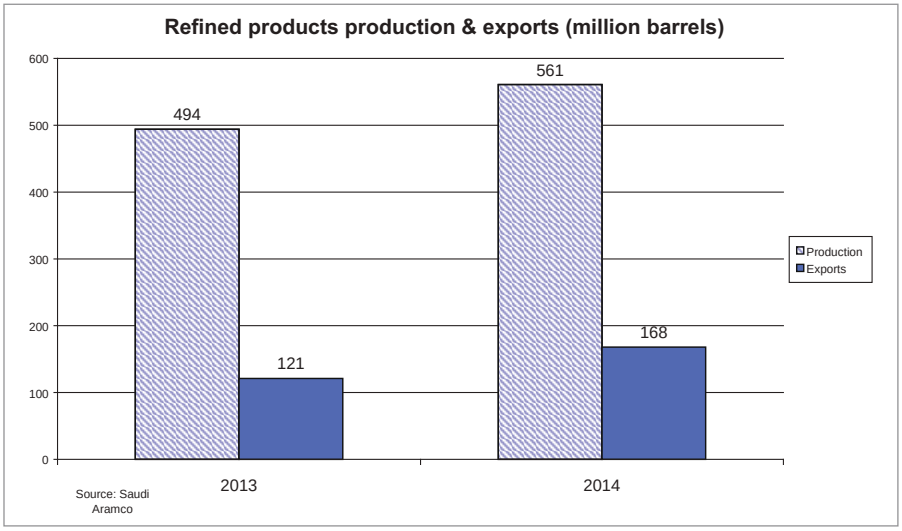

City, began commissioning in late 2014 and delivered its first shipment of clean diesel fuel in mid-January 2015. A joint venture with Asia's largest refiner, Sinopec, YASREF processes Arabian heavy crude oil from the Manifa field. The refinery uses proprietary technologies in the production of premium transportation fuels such as gasoline and ultra-low-sulfur diesel. The plant also produces liquefied petroleum gases (LPG) as well as other products including benzene, sulfur, and petroleum coke for export. Africa and Europe are its target markets.

Jazan refinery and terminal

In 2014, Saudi Aramco began a project to build a wholly owned and operated refinery and terminal in Jazan in the Kingdom's southwest, which will become an integral part of its refining and distribution network. The complex, which also includes an industrial city, will help meet the Kingdom's energy demand and also export high-value fuels to international markets.

The Jazan refinery, scheduled to begin commissioning in 2017, will have the capacity to process more than 400,000 bpd of crude oil to produce gasoline, ultra low-sulfur diesel, benzene and paraxylene.

A further benefit, the refinery will be incorporated into the world's largest integrated gasification combined cycle complex, allowing the refinery's own operations to generate 4,000 megawatts of electricity — enough to cover the refinery's needs, enable the development of industries within the Jazan Economic City and provide power for area communities.

Sadara joint venture

The Sadara joint venture with The Dow Chemical Company is on schedule for an initial start-up in the third quarter of 2015 and all process units on-stream within one year of start-up. Sadara is on track to be the first chemical complex in the GCC to use naphtha as part of its feedstock. This advance will lead to new specialty chemicals plants and businesses in the Kingdom and open up a new range of downstream opportunities, says the report.

Currently being constructed in Jubail Industrial City, Sadara will be the world's largest integrated chemicals complex built in a single phase, with capacity to produce more than 3mn tons of diversified chemicals and plastics per year, says the report.

Total refining capacity, 2014 (thousand bpd)	
Wholly owned domestic	1,006
Domestic joint ventures	1,905
International joint ventures	2,464
Worldwide	5,375
Saudi Aramco share	3,104

Source: Saudi Aramco

Fourteen of Sadara's 26 world-scale manufacturing plants are new to the Kingdom. Their differentiated product slates are the building blocks used in high performance flexible packaging, hygiene and medical applications, chemicals and additives for the oil and gas industry, chemicals and membranes for water treatment, soaps, detergents, cosmetics and other personal care products, as well as adhesives, brake fluids, and car seats for the automotive industry.

Rabigh Phase II

Rabigh Refining and Petrochemical Company (Petro Rabigh) is another example of integrating chemicals production with refining. Rabigh Phase II will add specialty ethylene- and propylene-based products by de-bottlenecking the existing steam cracker.

In addition, the project will enable the conversion of 4,000 kilotons per year of naphtha into higher-value aromatic products. This naphtha, which otherwise would have been exported, will be processed at the Rabigh Phase II facilities to provide feedstock for downstream units that manufacture specialty petrochemicals or delivered as feedstock for third-party projects.

Construction is scheduled to be completed in 2015 and start-up forecast for the first half of 2016.

Integrated with Petro Rabigh is the Rabigh PlusTech Park where manufacturers will convert chemicals into consumer products, generating new industries and helping drive job creation. Saudi Aramco began marketing Petro Rabigh products through its fully owned trading subsidiary, Aramco Trading Company in April 2014.

Asian offices

To strengthen ties with business partners in the Asia and Pacific regions, Saudi Aramco established its regional headquarters in Beijing, China, and operates integrated country offices in Japan, South Korea and Singapore, which provide marketing and portfolio management services and other business support. China is the hub for chemical products sales and plays an important role in driving new business in the region and in Saudi Arabia. Japan is a centre for supplies and inspection, while South Korea focuses on supporting the Korean market and engineering, procurement, and construction projects. Southeast Asia, a key market and potential investment destination, is covered by the Singapore office.

Saudi Aramco, through an affiliate, has a 14.96 per cent interest in Showa Shell, one of Japan's largest refiners.

In 2014, the Aramco Overseas Company (AOC) subsidiary announced its largest overseas investment to date, when it agreed to purchase the Hanjin Group's entire stake in S-OIL, South Korea's third-largest refiner. This exemplifies Saudi Aramco's downstream strategy to integrate its overseas assets into a unified global network of refining, chemicals, lubes, distribution and retail systems.

Meanwhile, in China, the Fujian Refining & Petrochemical Company (FREP) is a joint venture with Fujian Petrochemical Company Limited, ExxonMobil, China Petroleum and Petrochemical Company Limited (Sinopec) and the Fujian provincial government. In 2014, FREP increased its existing steam cracker and refinery capacity, raising production of polyethylene, polypropylene, and butadiene. New ethylene oxide and ethylene glycol units were on-stream in February 2015.

In China's Fujian Province and the eastern part of Guangdong Province, Saudi Aramco has integrated operations from production to customer through its marketing venture, Sinopec Sen Mei (Fujian) Petroleum Co. Ltd. (SSPC), which sells wholesale and retail motor gasoline, diesel, and illuminating kerosene.

While in December 2014, the company signed a Memorandum of Understanding with PT Pertamina, the state-owned oil and gas company of Indonesia, to study the feasibility of upgrading three refineries in Indonesia. ■

This article is based on extracts from Saudi Aramco's 2014 Annual Review, which can be downloaded from the website at www.saudiaramco.com

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Promoting effective data management

Antoine Milan, executive partner Chemicals & Petroleum - Global Business Services, IBM Middle East and Africa, discusses strategies for the effective use and management of data.

DATA MANAGEMENT IS a well-recognised imperative in the oil and gas industry. We believe effective data management comes down to achieving two objectives. First, developing the ability to identify and respond to incidents or issues faster, and making timely and good decisions to fix those issues. Second, developing deep insights into asset performance to make appropriate adjustments, in order to operate those assets at their optimum capacity.

Effective data management addresses both of these objectives at four levers: relevant data collection ; trustworthy data quality; efficient access to data; and amenability to analytics. If all four levers are functioning optimally, a well-oiled data machinery is in place that constantly churns and delivers intelligent information to the operational workforce.

We find three emerging challenges that we believe will shape data management initiatives within the industry:

- The unprecedented amount of data growth. We see more sensors on the seabed, wellheads and equipment, more fibre optics inside the wells and pipelines and more seismic data being collected. Efficiently storing and accessing this data and providing it to end users remain key challenges.
- Second, the industry workforce is becoming highly global, mobile and collaborative. Employees are demanding the ability to access data anytime, anywhere and from any device, which heightens the challenge of data security.
- Third, decision-makers are increasingly asking "I have so much data, but what can I do with it all?" Typically, the answer is analytics, but converting all of that big data into on-demand, easily-accessible insights can be a daunting proposition.

To overcome these challenges, the industry needs to embrace a few basic principles. This includes fostering a data-driven organisational culture led by executives; creating and applying solid data governance; and adopting a holistic approach to data architecture that ensures efficient data storage and seamless data flow across their enterprise. These principles may seem obvious, but based on our experience these are the ones that trip up most organisations.

We believe that before embarking on any serious data management initiative, organisations must first analyse how data management supports their business strategy and what data the company really needs to manage. This requires close involvement and stewardship from the business. We still see in many organisations such initiatives driven by IT, when in fact this should be accomplished through strong collaboration between the business and IT. It is only when the business truly believes that they own the data and are responsible for its quality and correct usage that we start seeing success.

Second, any data management initiative should be backed by an unambiguous business case that explains how data management will deliver value to the business, to avoid the risk of being shot down when there is international organisational change or when external market pressures occur.

Third, data management programmes should be led and delivered by the 'right' team. We often see a tendency to relegate the implementation task to IT teams with minimal involvement from the business when in fact representation from business users, IT/IM and architecture community is needed.

Last is a committed executive governance that enforces accountability, ensures efficient resource allocation and clears the obstacles in the way of implementation teams.

We believe that the selection of the 'right' data platform and architecture is important to such initiatives, but, ultimately, the execution and the correct methodology are key.

Middle East companies are investing significantly in improving their operational efficiency and believe that effective data management is key to unlocking that efficiency. Many companies in the region have long-standing operations and hence have significant amounts of data stored in the enterprise. The ongoing field expansion in the region will generate even more data given that new production facilities will be more automated. The challenge, of course, is accessing all the data and unlocking the valuable insights trapped within.

Antoine Milan, executive partner Chemicals & Petroleum - Global Business Services, IBM Middle East & Africa

IBM's Watson is a perfect example of how industries, including Oil & Gas, are tackling the challenges of Big Data. For example, in the world's first research collaboration to leverage cognitive technologies to transform the oil and gas industry, IBM and Repsol are jointly developing two prototype cognitive applications specifically designed to augment Repsol's strategic decision-making in the optimisation of oil reservoir production and in the acquisition of new oil fields. IBM researchers and developers have also collaborated with experts from Statoil on developing a solution that will use industry frameworks combined with advanced analytics to enable real-time monitoring of environmental data, and early detection of and response to operational events surrounding offshore installations. IBM is further working with partners such as SAP, Apple, Twitter, Facebook, and many others to further advance analytics for enterprise customers. ■

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Recruitment suffers in the downturn

Hiring plans are being impacted as companies implement cost saving measures, according to the Hays Oil & Gas Index.

THE HAYS OIL & Gas Index, which charts the number of jobs posted on key oil and gas job portals across the world, dropped from 1.16 to 0.95 in Q1 2015, a fall of 28 per cent from December 2014 and a 42 per cent fall year-on-year.

The Index for the first quarter traditionally sees a bounce back as hiring restarts after the holiday season slowdown in the previous quarter. However, due to the downturn in the oil and gas market, Q1 2015 bucks the trend.

The effect of the downturn is now being fully realised, as operating and service companies across all oil and gas regions implement strategies and cost measures to ensure they remain profitable.

"A return to higher oil prices has yet to transpire and the industry is starting to adjust to the new lower price regime," said John Farguna, Managing Director of Hays Oil & Gas. "Cost saving measures will impact hiring plans, however, decisions made today will shape the future labour force, so it is important for employers to hire strategically to avoid creating a future skills gap. There are still pockets of reasonably strong activity: Asia and the Middle East both show an increase in hiring activity compared to the previous quarter, albeit below Q1 2014."

The Index was established in 2010 when it was set at 1; all subsequent months have been compared to this benchmark.

Trends by region

According to the Index, in North America the full effect of the oil price decline is starting to take hold and projects with unfavourable economics are being cut or delayed. On the positive side, LNG projects on the Gulf Coast are still hiring the talent required to drive towards operational status.

In South America, OPEC's decision not to cut production has hit parts of the region hard, especially Venezuela. This coupled with the continuing fall-out of investigations into Petrobras have hindered the region's job market growth. The continuing energy reforms in Mexico and the announcement of Round One tendering scheduled later this year should have a positive effect on the Index in Q3, says Hays.

Recruitment is being impacted by the downturn (photo: Shell)

In Europe, the cost of producing North Sea oil and the slow up-take of fracking and shale exploration in the region have taken their toll on the job market, while in the CIS Western sanctions, coupled with the fall in oil prices have resulted in the CIS Job Index dropping to the lowest levels in six years. Russia has turned its attention to Asia, particularly China, both for financial investment and the talent needed to complete projects.

> "The effect of the downturn is now being fully realised"

In the Middle East, businesses such as Saudi Aramco are hiring western expats with specific unconventional experience and for infrastructure projects, which has helped stabilise the Index. The job market is expected to remain relatively strong throughout Q2 and Q3.

In Africa the rising cost of production coupled with the decline in oil prices on the other are causing employers to freeze hiring activity. As health fears subside the Job Index is expected to bounce back throughout the year, although it is unlikely to reach the peaks of previous years in 2015.

In Asia, the first quarter has been stronger than other regions. The expertise and proven track record in the design and construction of offshore production facilities is potentially the reason the region has seen growth. Companies with projects in construction have already committed the finances required. Therefore, Hays expects there will be a time lag before any potential changes to hiring plans are realised.

In Australia LNG projects are moving out of design and construction phases and into operational status, resulting in a reduction in demand for new talent and reflected in the Index, which has reported four consecutive quarters of decline since its slight recovery in May 2014. ■

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Flow assurance in Middle East wet gas fields

Lars Anders Ruden, Emerson Process Management, describes how new metering technologies are addressing the challenges in the region's wet gas fields.

WET GAS FIELDS today are an important provider of the world's gas needs, with the Middle East being no exception. From the Khuff reservoir and giant Shah field, offshore Abu Dhabi, through to Qatar's Al Khaleej gas project and - in North Africa - Morocco's Meskala field, wet gas fields are increasingly prominent in the region.

Yet, such fields also represent some of the world's most challenging environments for oil and gas production measurement and flow control, with the detection of formation water and water coning crucial to hydrate, scale and corrosion prevention and the reliable supply of gas from reservoir to refinery.

There are a number of specific challenges:

Firstly, there are the fast changing operating conditions in many Middle Eastern fields. New technologies have enabled processing facilities to handle more liquid, meaning that wet gas fields are becoming 'wetter', more water and condensate are being produced, and fluid composition is continuing to change.

The result is that the operating range has broadened and yet the requirements for accurate measurements over the full lifetime of the field have remained the same - putting even more pressure on multiphase and wet gas meters. A changing fluid composition is also of particular concern to multiphase meters in high GVF (Gas Volume Fraction) applications, as small changes can potentially have a big impact on measurements.

The need to measure water salinity has also become increasingly important. Salinity is today a key operational parameter for reservoir management and flow assurance, providing the reservoir engineer with information on whether formation water is entering the flow, and whether injection rates of scale and corrosion inhibitors need to be changed.

Allocation for operators is also critical, from both an operational and financial standpoint. The production testing of wells is important in maximising the recovery of hydrocarbons from the reservoir and - from a financial vantage point - the best economic option for a subsea field is often to tie in the field to existing processing infrastructure, often with a different ownership structure.

Here, production needs to be measured for fiscal allocation purposes, where daily production reports are produced and royalties calculated for different parties. In both cases, subsea wet gas meters are vital in meeting operator needs and allocation reporting criteria.

Finally, there are challenges specific to the Middle East, such as brownfields, crowded infrastructures and sometimes ageing facilities, through to fluctuating H2S concentrations (such as the Shah field) that make it difficult to accurately measure flow rates.

> "More and more is being expected of wet gas meters today"

Wet gas fields are increasingly prominent in the Middle East

At a time of low oil prices, it is crucial that flow assurance and control is guaranteed and that the presence of undetected formation water and water coning is identified immediately. More and more is being expected of wet gas meters today. Yet are they rising to the challenge?

Savings wells, offshore Egypt

Emerson's traditional wet gas meter - the Roxar subsea Wetgas Meter - has three main measurements: differential pressure, pressure and temperature, and microwave resonance.

The differential pressure is measured over a cone and is used to obtain mass flow rates; the pressure and temperature are used to calculate the gas/condensate split of the hydrocarbons and to convert flow rates from actual to standard conditions; and the microwave resonance is used for water fraction measurement and is performed at the top of the cone area, where the velocity is at its highest.

This creates a predictable and homogeneous environment and allows for extreme sensitivity to changes in water and salinity levels. The result is that operators are able to use real-time and accurate data from the meter to avoid water breakthrough, identify water-producing zones, and fine-tune choke and valve settings for maximum recovery.

One typical Middle East installation was on the subsea West Delta Deep Marine (WDDM) concession and the Simian/Sienna, Sapphire and Scarab/Saffron fields, offshore Egypt in the Mediterranean Sea. Specific production characteristics from the

fields' wells include high gas rate wells with low water gas ratios (0.3-10 bbl/MMScfd) and water depths of between 400 and 1,400 metres.

In order to accurately measure all produced fluids on a well-by-well basis for enhanced recovery, allocation and history matching purposes, the operator Burullus opted for Roxar subsea Wetgas meters, with more than 45 currently in operation.

Within a five-week initial time period, Burullus managed to avoid two water breakthroughs, identified the water-producing zone, and fine-tuned choke and valve settings for maximum recovery through use of the meter's readings.

By providing early warnings of the water produced, the wet gas meters installed on the field have helped Burullus and its partners save three wells from water breakthrough in a similar manner. Moving forward, Burullus plans to create a dynamic simulation model of the reservoir, continually updated with production data.

Recent technology developments

There have also been a number of recent technological developments behind the subsea wet gas meter to improve flow control and flow assurance.

For example, developments in the microwave electronics have made a significant impact on measurement uncertainty. The growth in digital frequency measurements has allowed for improved stability and time resolution and more accurate and sensitive wet gas measurements where the microwave system is able to clearly differentiate between very small amounts of water content.

A new multivariate analysis function has also been introduced giving true PVT (Pressure, Volume, Temperature) independency on water fractions, especially in high GVF flows.

It is this combination of the new microwave system with multivariate analysis that allows for an improved uncertainty specification of ±0.01per cent abs WVF (Water Volume Fraction) at GVF (Gas Void Fraction) 99-100 per cent and the detection of changes in the water content of the flowing well at as little as 0.2 ppm (parts per million). Such sensitivity has never been reached before and represents significantly less than a droplet of water.

It is the meter's multivariate analysis functionality and true three-phase measurement that has led to real-time, accurate hydrocarbon measurement for operators' fiscal allocation obligations.

> "The wet gas meters installed on the field have helped save three wells from water breakthrough"

Salinity measurement

There have also been significant developments in salinity measurement via a new ceramic microwave-based sensor that is currently being progressed.

The new sensor developed by Emerson is a dielectric cavity resonator mounted flush in the wall of the meter body, with one end facing the flow. The sensor is extremely sensitive to saline water on the sensor surface and is also highly predictable when faced with increasing salinities and water levels.

The result is a powerful tool for the early detection of formation water breakthrough and the optimisation of injection rates for MEG, scale and corrosion inhibitors.

Extending the operating range

Finally, another key development in wet gas metering is the extension of the operating range.

While the main focus of the new wet gas metering developments is in the 98–100 per cent GVF range, where improved measurement uncertainty is being seen, progress is also taking place in the lower GVF range.

The Roxar subsea Wetgas Meter

As the liquid and water content increase in the wet gas flow, the medium absorbs more and more of the microwave energy, limiting the operating range of the microwave resonance measurements.

By introducing new microwave electronics that allow for transmission-based measurements in addition to resonance, Emerson has overcome this limitation and introduced a new three-pin microwave probe to allow for water fraction measurements, even in the case of a high loss medium (high liquid and water content) flowing through the meter.

Finally, the meter is ideally suited for the changing operating conditions and varying fluid compositions seen in gas and gas condensate fields. Measurement speeds at 20 times per second enable immediate actions to be taken to protect subsea system integrity and maintain flow assurance and control.

An integral element of flow assurance and control strategies

More and more Middle Eastern operators today are looking to wet gas metering and effective water detection as an integral part of their future flow assurance, production optimisation and hydrocarbon allocation strategies.

Now, they have the wet gas metering technologies to achieve this, delivering risk-based flow assurance strategies, flow control, and increased production. ■

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Keeping it clean – effective **filtration solutions**

Stephen Hiner, chief engineer, Gas Turbine Inlet Systems, CLARCOR Industrial Air, discusses some of the company's new filtration solutions for gas turbines in harsh operating environments.

TO OPERATE EFFICIENTLY, gas turbines require the cleanest possible air, yet, at the same time, consume vast amounts of it. Any contaminants within this air stream will affect operating efficiency, fuel consumption and downtime. Any downtime on a gas turbine operating in the oil and gas sector is a highly expensive occurrence. Costly replacement parts and manpower expenditures are dwarfed by the huge cost of lost production. In recent years, operators have become far more aware of the cost of downtime. Therefore, ensuring rotating machinery operates efficiently and reliably, without any interruption, is essential.

Proper air filtration is critical to the overall performance and reliability of gas turbines. Significant gains in efficiency, with greatly reduced maintenance costs – both of filters and the engine itself – can be made by selecting the correct air filter solution.

Climatic challenges

The climatic conditions in the Middle East add further challenges. These include high volumes of sand and dust that require filters to have a long life or be self-cleaning. In addition, since no filter is 100 per cent efficient in that it will always let some dust through, proportionately more dust will get through in a much dustier environment, leading to a higher rate of compressor fouling and greater need for downtime to off-line wash. A more efficient filter is required in the Middle East to maintain a similar level of compressor degradation rate compared to other regions. Preventing that additional downtime is very important to operators, particularly in these times of tight margins caused by the slump in oil prices. On an LNG train, that cost can run to millions of dollars a day to shut down the turbine just to wash it.

> "The climatic conditions in the Middle East add further challenges"

Another challenge is salt. Many gas turbines are located in coastal or offshore regions where salt, mist and fog can be a problem. Sodium in salt will combine with sulphur in the fuel within the hot section of the turbine to cause Type I and Type II accelerated corrosion. This is a particular concern in the Middle East where much of the fuel used can be sour fuel that has a high sulphur content. The mean time between failures in these conditions is highly dependent on this corrosion level, which is directly related to the protection that is provided to prevent salt entering the gas turbine inlet.

7FA, GA USA, 4500 fired hours with traditional filters shows fouled compressor; off-line wash required

7FA, GA USA, 4500 fired hours with altair® ODSV E10 filters shows clean compressor; no wash required

Salt can be present in, and freely change between, dry particulate or liquid form, depending upon the relative humidity. In the Middle East, airborne salt will most often be in dry particulate form and, therefore, will be filtered by traditional dust filters. However, when the humidity is very high, such as during the frequent fogs in many Middle East coastal locations, this salt can turn to liquid and then migrate through the filter and the engine of the turbine. This can then leave a sticky salt on the compressor blades, which make them more likely to foul with fine particulate that has passed through the filters and, more importantly, accelerates corrosion.

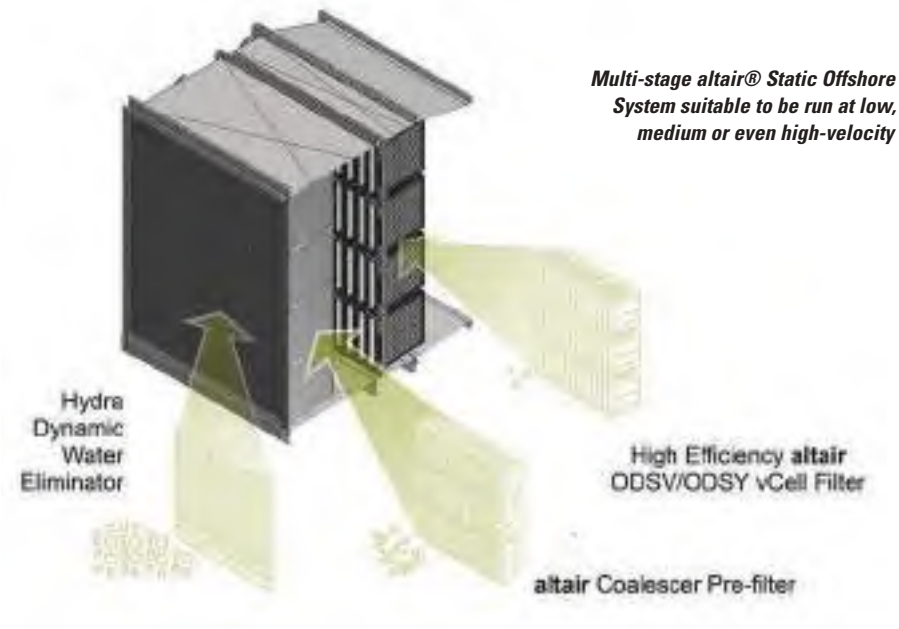
A filter that effectively overcomes all of these challenges in a single stage currently does not exist. For instance, with a tunnel of air going into the gas turbine, normally there are two, three or four stages of filtration. The initial stage is often some form of weather protector. The second stage is typically a low efficiency pre-filter or self-cleaning pulse filter, which is used to increase the life of the final stage filter. The final stage filter is most often the high-efficiency filter, with EPA grades of efficiency now fairly common. In coastal conditions, to manage moisture, protect against the migration of wet salt and prevent liquid bypass, the final filter should have hydrophobic properties.

Some suppliers are introducing new, high-efficiency technology such as ePTFE membrane filters, which have been developed for environments such as HVAC and the pharmaceutical sector. But these have shown themselves to be unsuitable for the harsh environments and demanding operating conditions of the oil and gas sector, where hydrocarbon contaminants and moisture can lead to unexpectedly high pressure losses and unplanned turbine shutdowns. What is required are very robust filters that will last for years despite harsh conditions.

Traditional glass-fibre media that have been utilised within the industry for many years provide efficiency, continuous performance and hydrophobic properties equivalent to, and, in many instances, better than, ePTFE membrane without being sensitive to moisture, mist, fog and hydrocarbon fouling, which PTFE membrane is. CLARCOR Industrial Air has supplied over 75,000 gas turbine filters with this traditional media over the past decade.

New products

CLARCOR Industrial Air's new gas turbine inlet air filtration product specifically designed for oil and gas applications, the altair® Static Offshore System utilises new generation extended, 24-inch deep vCells to provide a system that can be run at low, medium or even high face velocities, while maintaining best-in-class particulate and dry and wet salt efficiency as well as hydrophobic properties to manage moisture.



Multi-stage altair® Static Offshore System suitable to be run at low, medium or even high-velocity

> "One filtration solution does not fit all"

The company's range of 'ODS' class filters covers efficiency ratings from E10 to E12. Extensive field trials show significant reductions in gas turbine degradation between compressor washes, leading to increased overall generated output and increased time between offline washes, bringing significant operational benefits. Trials with this new altair system in high-moisture, high-salt coastal sites also show negligible corrosion of turbine blades after 20,000 fired hours – a marked contrast to conventional filters on the same sites. Prior to implementing the new system, tests showed blades corroded beyond repair after the same fired hours.

The most efficient altair ODSY vCell filter has a filtration efficiency grade of E12 per EN 1822:2009, equal to a minimum 99.5 per cent of MPPS. It has an extended filtration surface area that ensures low pressure loss and supports extended filter life. Clean pressure loss at the rated flow of 5,300 m³/h is just 260 Pa. This filter offers significant improvements over a traditional high velocity offshore system with wet and dry salt removal efficiency typically up to 10,000 times greater. In addition to use in new units, these filters can be directly retrofitted into existing gas turbine fleets that utilise traditional high velocity systems where operators can achieve the same pressure loss performance while still maintaining a high velocity system.

altair® ODS range of extended depth vCell filters offers best-in-class salt and moisture removal with filtration levels up to EPA 12

altair ODS class vCells are used in gas turbine installations around the world. For example, in the North Sea an operator moved from using standard high velocity filters in its system, where it had to shut down and wash the compressor every four weeks to fitting ODSX vCell filters in the same high velocity system, where this maintenance cycle was then increased to eight months; a vast improvement.

Varying requirements

The variance in the requirements and operating conditions of each gas turbine installation means that one filtration solution does not fit all. In many oil and gas installations, a mixture of dust, salt and moisture leaves turbines vulnerable to degradation that will reduce efficiency and availability while increasing risk of failure. The cost of an ideal gas turbine inlet filtration solution needs to be assessed against all lifetime operational and maintenance costs as well as lost production from increased downtime. In many oil and gas applications, the latest altair filtration technology gives excellent return on investment. ■

Pumping oil from subsea platforms

Danfoss High Pressure Pumps has a missing link for the subsea oil and gas industry: a pump that can operate 3,000 metres under the sea. Consequently it has been appointed leading pump supplier by Statoil.

BY CREATING SUBSEA platforms instead of floating fabrication, the oil business can reduce the impact on the environment and save money, as subsea operation is cheaper than constructing and maintaining floating platforms, says Danfoss High Pressure Pumps. The company offers a pump that can operate 3000 metres under the sea.

The challenge in undersea drilling is transferring all that precious oil and gas from point A to point B without losing it and polluting the ocean. Engineers are sinking a surface platform to the bottom of the sea to create a subsea platform, connecting it to an oil tanker, which transports the oil and gas to the shore for further processing. The subsea platform can be operated remotely onshore, which is considered much safer in harsh climates.

The pump is the heart of the Subsea Hydraulic Power Unit (SHPU) because without it no gas or oil will come through the pipes. The SHPU combines electrical and hydraulic system expertise and can be operated in several ways – for example, as a repair unit for subsea hydraulic supply failures such as leakage or blockage that may result in production stoppage, or as a building block in infrastructure developments.

According to a recent article by Statoil, the industry needs to lower costs to enable more subsea developments and increase the use of subsea processing technology. By standardising tie-in technology and module sizes, it will be easier to combine different types of technology and modules to adapt developments to project needs. Right now the industry is calling for a LEGO-approach, whereby standard parts are brought together like building blocks for projects before they go below sea level.

> “The pump will play a vital role in subsea oil and gas drilling processes in the future”

The subsea platform is connected to an oil tanker, which transports the oil and gas to the shore

“The pump from High Pressure Pumps has been on the bottom of the sea for six years without maintenance and services,” said Damian Farrell, sales & support manager Oil & Gas in High Pressure Pumps. “It has been a breakthrough for the pump industry. It did not take long before other oil and gas companies called us to hear more about the pump and the test results. Statoil has now appointed us as its new subsea pump supplier. It has further tested the pump, which has been rated 100 per cent suitable for subsea platforms.

“Our pump is the missing link for the subsea oil and gas industry which they have been interested in finding for many years, and we are delighted to support the oil and gas industry with savings and increased safety.” ■

New electro-hydraulic system for drilling technologies

ITALIAN MANUFACTURER HANSA-TMP has introduced a new integrated electro-hydraulic system for offshore drilling platforms and onshore machines. The innovative system allows the application to reach top performances in hazardous areas and meets the latest regulatory requirements on fuel and energy saving. Incorporated in the system are stainless steel rotary couplings with hydraulic ports (up to 16) and electric contacts (up to 30). This provides a seal between the stationary supply passage and the rotating part to permit the flow of the fluid or electricity into and/or out of the rotating part. The working temperature range is -30°C to +50°C.

The proportional stainless steel valves are certified explosion proof and have corrosion protection, while user friendly software is embedded in the electronic control unit to provide precise control power on the movements of the rigs.

The pumps featured on the HANSA-TMP new system are as follows:

- load sensing and/or torque limiting variable displacement open loop axial piston pumps (displ. 28-200 cm3/rev and 350-400 bar) with extremely fast reaction from maximum to minimum displacement in only 80ms;
- high pressure split flow fix displacement open loop axial piston pumps for special fluids (rated pressure 560 bar);
- stainless steel single and double acting hand pumps available with oil tank to guarantee the highest level of safety for the operators.

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Building on Middle East success

Aubin Group, specialists in chemical solutions and materials technology, has enjoyed over 100 per cent growth in export earnings in the last three years, and received a Queen's Award for Enterprise in 2015 in recognition of its success in international trade. The Aberdeen-based company continues to expand in the Middle East, which represents its largest overseas market. *Oil Review* spoke to Ray Stirton, Aubin Group's Dubai-based general manager.

How did Aubin first get involved in the Middle East?
We are often asked how a small Aberdeen-based company has come to have such an extensive Middle East involvement. We found that the challenging North Sea market was dominated by the supermajor services companies, which sourced their technology and chemicals through their existing supply chains. So we turned our attention to the Middle East, where market entry barriers for service companies were much lower and they lacked the access to the chemicals technology that we can provide. We began supplying several small companies, and over the following 25 years we have maintained many of these relationships and, as they've grown, we've grown. We provide the pressure pumping service companies with their chemical technology and occasionally develop products specifically for them, enabling them to compete against the supermajors.

You have experienced particularly strong growth in your sales to the Middle East. What is the secret of your success?
I don't believe that there is any secret to success, just a strong desire to understand our customers' challenges and ensure we are fully aligned towards meeting these. Aubin established a reputation for innovation and delivering differentiating chemical technology to our customers many years ago; however it is also vital this should be combined with local support infrastructure. Therefore the vast majority of our products required in the Middle East are now manufactured and stocked in the UAE, and we have recently established a stocking facility in Saudi Arabia in cooperation with Rawabi Trading. In 2014, we opened a new office in Dubai - Aubin Energy DMCC - from where we provide technical and commercial support to our customers. It is this commitment to our customers in the Middle East that helped Aubin win a Queen's Award for International Trade. Our ability to demonstrate an understanding of the region and to forge strong partnerships have also been key to our success.

How are you looking to further develop your business in the region?
We continue to develop our product ranges and have introduced new fluid loss, dispersant and high temperature cementing additives and stimulation acid inhibitors with significantly improved safety characteristics. This process of continuously improving the existing product range and introducing new technologies demanded by the market is fundamental to our continued success.

Our strategy is to commit additional resources to increase our manufacturing and technical capability in the region, with new facilities anticipated in the next 12 months. We will also continue to recruit personnel; although we are only a small team in Dubai, we receive a range of business and technical support from our UK headquarters. Our ability to communicate in five languages, including Arabic, is a tremendous asset.

Across the region we can identify significant opportunities for growth. The drop in the oil price has not resulted in any significant fall-off in activity in this region; Saudi Arabia remains a buoyant market for us, and this is supported by growth in Qatar, Kuwait and the UAE. Our objective is to deliver growth by diversifying into areas where we can bring differentiating technical solutions.

Ray Stirton, general manager, Aubin Energy DMCC

> "Aubin established a reputation for innovation and delivering differentiating chemical technology"

Aubin is a leading developer of chemical solutions for the oil and gas industry

> “These are very exciting times for Aubin, particularly in the Middle East”

An example of this is the relatively recent introduction of our range of EVO-Pigs and Gels to the Middle East market. These products have been designed to perform a variety of functions including pigging of pipelines which may have internal obstructions, or which may lack a launcher or receiver. They thereby form a critical part of the asset integrity plan to mitigate corrosion and help to extend the lifetime of pipelines which would otherwise be difficult to clean with conventional technology.

These are very exciting times for Aubin, particularly in the Middle East, which has always welcomed the introduction of our technology. This market has represented a significant part of Aubin’s business for many years, currently accounting for 45 per cent of the group’s sales. We look forward to continuing to invest and increase our commitment to our customers in the region.

What chemical solutions are in demand in the Middle East and where do you see strong growth potential?

The reduced oil price environment has directly influenced customers’ product demand requirements. Opportunities to introduce new technology which improves overall cost efficiency are gaining momentum, although sadly this is not the case with all operators. Our industry can be notoriously conservative, but in higher cost plays such as deep water, HPHT and unconventional resources, which are all present in the region, we are sensing an increased interest and willingness to embrace new solutions. This opens doors for a relatively small company such as ours; we are being received at a high level and receiving a welcome response.

Chemical EOR incorporates a wide variety of approaches including polymer floods, water shut-offs and microbial injection. Increasing these treatments’ overall efficiency either by improving sweep efficiency or the operational temperature at which these treatments can be applied is a current focus for improvement. Aubin has recently joined an industry task group to review microbial EOR and identify factors which would enable this technique to deliver increased value.

Aubin has a strong commitment to R&D; are there any particular areas you are currently focusing on?

Aubin has a very diverse product portfolio and hold patents in a wide variety of areas and applications. We encourage our talented team of chemists to routinely make time to develop new ideas and explore where our technology could be applied, and we like to create a stimulating environment where these new ideas are welcomed and explored. This is vital to ensure our continued development through innovation.

Improving the environmental compliance of chemicals has been a main R&D driver for several years and this is reflected in our range of new products.

Our OSB-01 demulsifier is CEFAS rated for application in the North Sea and has been developed to completely resolve the stubborn remaining emulsions that normally cannot be broken offshore and are returned onshore for secondary treatment. Total resolution of the mud slops enables the recovery of the hydrocarbons, disposal of water and saves cost of shipping and secondary treatment.

In the next few months we are field trialling a range of foamer chemicals designed to lift water and water/hydrocarbon fluids in liquid loaded wells. Reducing the hydrostatic head to encourage flow in these wells optimises production and extends well lifetime.

Our most recent EVO-Pig has been developed to withstand temperatures in excess of 95^{O}C – and is therefore suitable for the Middle East – whilst still retaining its complete functionality to negotiate restrictions down to 50 per cent of its initial diameter and ability to return to its original size. The initial field trial is planned for the third quarter of this year. ■

Effective water management **solutions**

Dow Chemical has a solid presence in the Middle East's oil, gas and petrochemicals sector – and oilfield water management is a fast expanding area of its business, as Adriano Gentilucci, commercial director, Dow Oil, Gas & Mining, explains.

"WATER IS A significant by-product of the oil and gas industry, because for every barrel of oil produced globally, an average of three barrels of water is co-produced. This needs to be treated and processed, posing both challenges and opportunities," says Gentilucci.

Water quality is critical to improve the recovery and minimise the environmental impact of hydrocarbon production.

"Water has always been reused in the oil and gas industry, as once separated from the crude it is often reinjected into the formation to maintain the reservoir pressure, and is treated mainly for the purpose of avoiding formation damage," says Gentilucci. "But today companies are increasingly looking at ways to utilise this water in a more efficient way by adopting techniques such as Smart Water in improved oil recovery, whereby water is reinjected to ensure maximum recovery of the Original Oil in Place (OOIP).

"These techniques require very sophisticated technologies such as deep water separation technology and the addition of various chemicals. That's where we are entering the game, working with oil operators and oil service companies to help develop the techniques required to recover more oil, and achieve more efficient utilisation of water.

"Dow Chemical is the largest producer of surfactants for example, such as those which can change the wetability of the rock from oil wet to water wet, so oil can be released more easily from the tight formation," he continues. "And we are leading the industry with our Dow ultra filtration models and fine particle filter models, which achieve the required level of salt removal."

With a broad portfolio of ion exchange resins, reverse osmosis membranes, ultra-filtration membranes and electrode-ionization products, Dow spearheads the development of sustainable technologies that integrate water and energy requirements to help oil and gas customers optimise all phases of their water usage. Dow also offers the oil and gas industry a broad portfolio of innovative microbial control technologies to help maximise production quantity and quality, combat microbial formation damage and enhance site safety. An optimised biocides programme can help control microbial growth and microbially influenced corrosion, reduce well and reservoir souring, and improve production and resource recovery safely and sustainably in a variety of hydrocarbon operations.

Adriano Gentilucci, commercial director, Dow Oil, Gas & Mining

> "By exploiting the synergies between our various business units, we can provide the full spectrum of solutions"

"By exploiting the synergies between our various business units, we can provide the full spectrum of solutions to address the unique water resource management needs of the hydrocarbon exploration and production industry. It is this that gives us the edge over our competitors," comments Gentilucci.

Positive reception

The Middle East has been particularly receptive to these technologies, Gentilucci adds, firstly because of the scarcity of water, which means that water re-use is a priority, and secondly because many oilfields have reached a late stage of maturity and are therefore producing high levels of water.

"A few years ago I was working in Yemen where one of the oilfields was producing 95 per cent water and 5 per cent oil - you can imagine the amount of water processing that is required in an oilfield like that.

"The environmental implications of disposing of contaminated water are another challenge our technology can help to solve, given that the international operators working in the region and NOCs working in joint venture with international companies are operating under strict environmental regulations," he continues.

Dow Oil, Gas and Mining is one of Dow's most successful business units in the Middle East, says Gentilucci. "We have a presence across the value chain from exploration, with our drilling fluid chemical additives, to production, with our speciality chemicals, and above all with our leading offering in gas treatment technology; most of the region's gas plants and LNG treatment facilities use our chemistry," he says. "While gas treatment technology remains the core of our business, oilfield water management is a growing focus, offering exciting opportunities." ■

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The benefits of gas generators

HIMOINSA's new environmentally friendly gas generator sets offer a wide range of power outputs at reduced cost.

One of HIMOINSA's gas generators

SPANISH MANUFACTURER OF energy generation systems, HIMOINSA, has introduced the 'HG' series of gas generators, offering a wide range of power outputs, which can be run on natural gas, LPG or biogas engines. The company says the new generators offer reduced levels of noise, vibration and pollutants as well as lower maintenance and operation costs.

The industrial sector has become one of the main markets for gas generator sets, whether in standalone applications or parallel network configuration, thanks to the savings and independence from electricity rates they provide. Moreover, in countries with a poor power supply they help ensure businesses can continue operating during outages.

Manuel Aguilera, gas product manager at HIMOINSA says gas continues to be a fast-growing market. "There is a worldwide need for a less-polluting, cheap energy source, and natural gas will be the solution until renewables become less expensive and more manageable. We are still not able to store renewable solar or wind power for when we need it, at least not efficiently.

> "The industrial sector has become one of the main markets for gas generator sets"

Therefore, we still need other types of energy to complete the mix.

"Gas generator sets are not yet as popular as diesel despite lower overall costs and emissions. Gas is much cheaper than diesel over the long run despite the bigger initial capital outlay. The more hours you use the gas generator, the more money you save."

To promote the benefits of this technology, Aguilera says they are providing training programmes, open days and gas conventions through HIMOINSA's regional distribution network. Having been present in the Middle East for 11 years, with a branch in Dubai, the company has developed a strong distribution network that incorporates top companies with state-of-the-art know-how and service capabilities. The company's strategy is to further strengthen this network, says Aguilera.

Aguilera says the units, which were developed and tested over a two-year period, are powered by the most reliable gas engines on the market. Well-known engine brands such as PSI, Mitsubishi, Waukesha, Man and Tedom drive the gas generator sets. The engines are picked for their low emissions and optional catalyst systems that comply with the local regulations of each country. Engines are chosen which require lower maintenance, guaranteeing an uninterrupted power supply at an optimal cost: oil change intervals of up to 2,000 hours are just one example, says the company.

The gas generators are plug&play, ready to connect to customers' existing installations and will use natural gas, wellhead gas, LPG, syngas or biogas. As a vertical manufacturer, HIMOINSA produces and controls each component of the genset to ensure optimal configuration and full warranty coverage. These gas gensets can be used in applications where a continuous

energy supply is needed, as well as emergency applications where they eliminate the need for additional fuel storage.

The generator sets fuelled by natural gas are divided into five series, composed of several models, at 50Hz and 60Hz, total power ranges from 8 to 1,456 kW. Natural gas is available in much of the world, is environmentally friendly, economical, safe and tends to have a low and stable price. These gas generators are also used in the oil and gas sector, whether to power wellhead operations or for auxiliary support services.

The LPG-powered gas generator range includes up to 29 models, divided into four different series, offering power from 8 kW to 750 kW of continuous power. Its versatility allows fuel storage in tanks, which facilitates use in remote locations or where natural gas or diesel is not available. Furthermore, it can be used in protected areas, where an oil spill could become a major environmental problem. As such, the aquaculture, fish farming, residential and telecommunications sectors have become major users of these types of generators.

> "HIMOINSA has also launched 18 models of biogas-powered generators"

HIMOINSA has also launched 18 models of biogas-powered generators, with power ranging from 76 to 1,000 kW. Being 100 per cent renewable and not contributing to global warming, governments are beginning to force the use of this methane gas, which is produced by decomposition in landfills and sewage treatment plants, among others. Sectors such as agriculture and livestock, and treatment plants and landfills are increasingly demanding these types of generators.

Flexible multi-fuel solutions that enable automatic switching between natural gas, LPG and/or biogas, according to the engines, are available too. Filters that allow the use of these engines in such demanding applications as oil and gas in the case of natural gas, or landfills and sewage plants in the case of biogas, can be incorporated. These engines are equipped with electronic management systems which ensure minimal emissions and an optimal response to the more demanding load impacts, of up to 100 per cent, with no significant drop in voltage or frequency.

Manuel Aguilera, gas product manager

HIMOINSA's gas generators are equipped with controllers allowing stand-alone and parallel work. Any imaginable parallel configuration can be configured and managed. Load balancing, peak shaving and load base, for example, are perfectly controlled to ensure synchronised running of multiple generator sets operating in parallel. ■

Introducing optimisation strategy from the desktop

It is difficult to change the operating culture in an oilfield, especially when profits are high. B. Bahbahani (KGOC), J. Spain (Chevron), and Mohit Bhat (Weatherford), highlight some of the challenges that were overcome while implementing a digital oilfield (DOF) concept for production optimisation at Joint Operations (JO) in Kuwait.

IN THIS CASE, the operations are in the onshore Partitioned Zone, an area between Kuwait and Saudi Arabia. JO had an existing monitoring centre in the field; however, data was not available in real time on engineers' desktops.

JO wanted to implement real-time optimisation, which would provide engineers with a tool at their desktop to monitor and optimise their wells in real time. In 2011 JO adopted DOF, and real-time monitoring from user desktops was implemented for more than 800 wells — more than 75 per cent of the wells in Wafra field. The implementation took nearly two years, with modifications and new wells being installed on a continuous basis.

Figure 1 is a graphical representation of wells that have been made available in SCADA as of 2015.

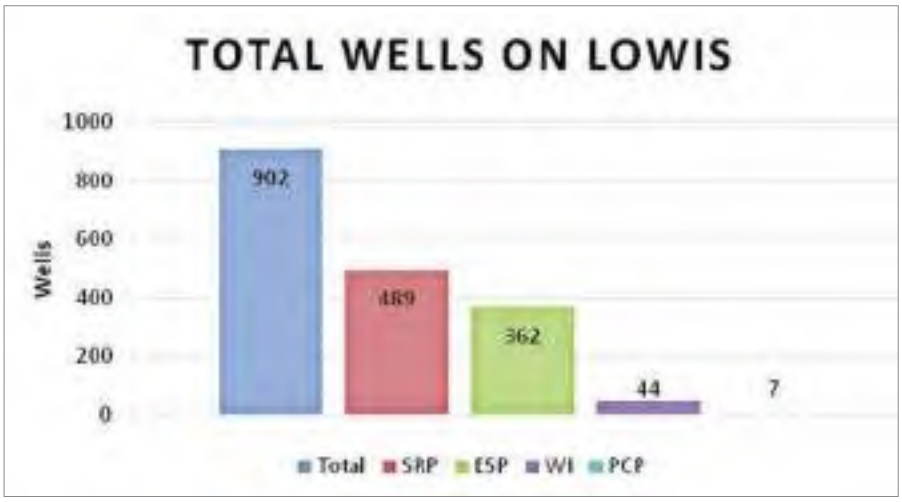

Figure 1. Wells on SCADA for real-time monitoring and optimisation (SRP = Sucker Rod Pump; PCP = Progressive Cavity Pump; WI = Water Injection; ESP = Electrical Submersible Pump).

Change handler

Any change requires key drivers and a major or minor reorganisation, both from a technical and organisational perspective. Technical challenges pertaining to data availability, field communication, and data validation are being addressed over the deployment life cycle. However, the long-term goal is to effect organisational change from the way things are being done to what is proposed. This article focuses on the organisational change desired.

The primary focus was to introduce employees to the concept of DOF. Because of the nature of the industry and remote operations, the take-up of information technology in the oil industry has been slow. Several strategies have been considered to gain greater acceptance and usage of the DOF, some of which have yielded short-term gains. The goal was to gradually generate interest and gain results in steps rather than to go for an immediate effect that might not last. To generate interest, daily monitoring reports were sent to users from the software, followed by providing adhoc information, group and one-on-one training, creating a sense of urgency and adopting a top-down management approach.

Generation of interest

Kotter[1] states that there are eight common reasons why transformation efforts fail, the foremost being an inability to create a sense of urgency within the organisation. The best way to create a sense of urgency is by having role models who can lead the change. Of foremost importance, the role models have to be infused with the benefits of change.

Organisational culture

Culture may help to integrate a subsystem and process in an organisation, and it lets the organisation effectively coordinate its actions (Champoux, 2010[2]). It is often difficult to change an existing cultural equilibrium. (Although various tools were available at the user desktop, the old fashioned way of doing business always prevailed). To change the equilibrium, a force or a disturbance is required to move it in the right direction.

> "Any change requires key drivers and a major or minor reorganisation"

According to the Nadler and Tushman congruence model (Hayes 2007[3]) shown in Figure 2, change involves realigning internal elements such as day-to-day activities for an organisation — both formal and informal duties — based on external influences and strategy.

At JO, the following strategies were considered to effect the paradigm shift.

Power users

As mentioned earlier, champions or leaders are critical to the communication of a vision.

Therefore, the JO field management thought it was necessary to create a powerful guiding coalition: a group of power users for the production optimisation software. Senior engineers for each reservoir team were initially identified as these power users. Because they were busy with day-to-day activities and were already accustomed to working in established patterns and with specific reports, the senior engineers delegated that responsibility to their juniors. The younger generation of employees were more enthusiastic about the technological change; however, they were assigned to other tasks and had to be actively encouraged to spend more effort on learning the software.

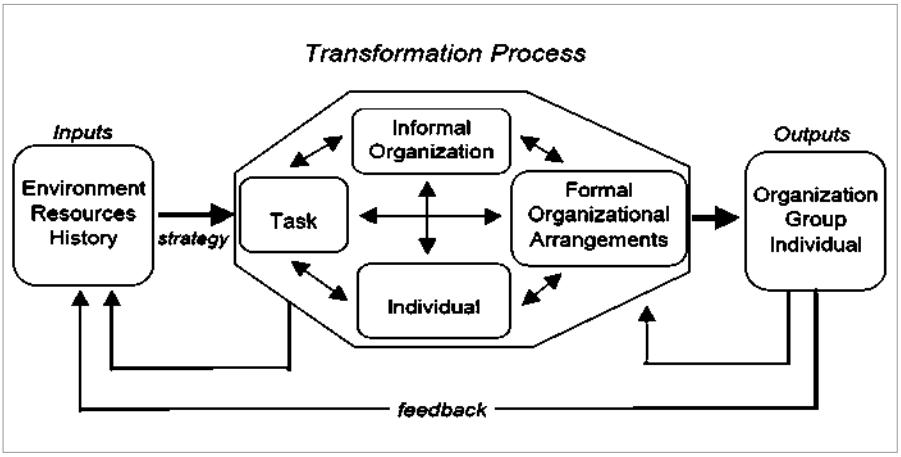

Figure 2. Nadler and Tushman's congruence model (Hayes 2007)

Basic awareness

JO initiated a programme starting from the basics of automation and culminating at the newly acquired DOF technology. Group training sessions were subsequently followed by one-on-one training sessions from the user desktop. This raised the idea within JO of identifying an external optimisation expert already familiar with the software. His purpose was to work with the individual senior engineers, third-party pump contractor, and applications engineers to optimise wells.

A top-down management stance

At a time when only a handful of users were showing keen interest in real-time monitoring, management felt it necessary to go for a top-down approach to enforce greater and more frequent use of the software. Therefore, these sets of reports were created:

- Tracking software users on a monthly basis
- Tracking user requests and following up with users to find out if and how they are using the software
- Reports to individual reservoir engineers on the status of their wells and gaining feedback on whether that was helpful.

Users of the software application were tracked over a period of six months, starting from early 2013, after which time a report was submitted to management (Figure 3). Subsequently, there was a greater than 100 per cent increase in frequency of software usage over the next six month period. In addition, the number of users increased by more than 25 per cent. This approach has been the most effective means of increasing usage because it forced users to log on to the software to be tracked. Once the users logged on, they overcame the basic inertia of launching an application and became more interested in the system.

> "The younger employees were more enthusiastic about the technological change"

Recognition and rewards

The local software sales team decided to go further to generate interest via a recognition and reward mechanism. A monthly competition was held in which users submitted innovative approaches to using this software for effective well management. The user with the best idea for that month received a certificate and was recognised among peers for his or her knowledge of the software. This increased the usage and popularity among a large user base.

External influences

After the implementation phase and a year of user training and support, JO recognised a need to hire a full-time optimisation expert who could help the users optimise their wells. The goal was to reduce user learning time, assist in optimising the wells, and co-ordinate with different teams, contractors, and vendors to understand and change well behavior. The expert was tasked with addressing the well issues identified by the software and generating potential scenarios for addressing the issues. The scenarios were backed by diagnostic and analysis reports from software and by redesign tools. The optimisation task was not an individual effort. It brought about a collaborative working style between the optimisation expert and the application engineer, field crew, and the individual reservoir engineer representing the well owner. The reservoir engineer's feedback on selecting the right optimisation strategy was the final decision before proposing the changes to the management.

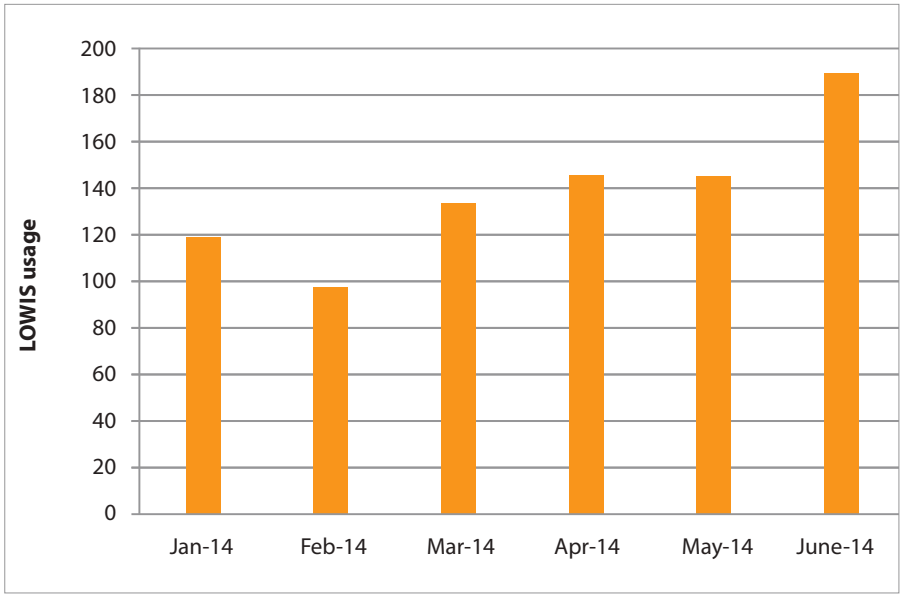

Figure 3. Tracking software usage based on user login

External experts would not be effective without internal planning and project management by the individual responsible for software optimisation at JO. Analysis was done in steps. The first involved identifying a set of wells from a subcentre. Wells belonging to a certain artificial-lift type (rod lift) were selected. Analysis was conducted by taking a look at the shape of dynacards for a few days and matching this with a set of library cards that existed on the software. Based on the card area, production rate, motor loading, and diagnostic and analysis reports, scenarios were developed to pump more fluid from the well. Based on the reservoir engineer's plan and management decision, the stroke per minute (SPM) could be increased and monitored for one month before making the change permanent.

This approach generated the much desired interest among the reservoir engineers. The engineers started awareness campaigns and presented to their peers the optimisation capabilities with use of the software. This kind of enthusiasm is making a revolutionary change in day-to-day operations.

Way forward

The changes effected need to be sustained, and call for a higher level of optimisation at the asset level. The system developed warrants a dedicated field technician to provide information at wellsite to affirm well behaviour and provide data validation by collecting parameter data at the site. Ongoing activities, including adding new wells and enhancing the system, need to be carried out. ■

References

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2 *Champoux, J.E. 2010. Organizational Behavior, 4e. GB: Routledge Ltd.*

3 *Hayes, J. 2007. The Theory and Practice of Change Management, 3e. London: Palgrave Macmillan*

New product release

YOKOGAWA ELECTRIC CORPORATION has released an enhanced version of the STARDOM™ network-based control system featuring enhancements that reduce communication costs and ensure highly reliable monitoring and control. These enhancements meet a variety of needs in upstream oil and gas development and production.

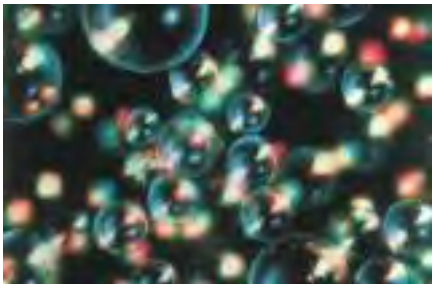
STARDOM network-based control systems consist of FCN/FCJ autonomous controllers and either a VDS or FAST/TOOLS SCADA server. FCN/FCJ controllers are ideal for the monitoring of oil and gas field installations, pipelines, and other widely distributed facilities that rely on satellites and other types of communications platforms for the transmission of data. The new version features unsolicited response support; expanded support of standards for gas well applications; and strengthened security measures.

3M showcases wide range of solutions at OTC

3M SHOWCASED A wide range of ingenious solutions for the oil and gas industry at OTC in May, where its LifeLab offered visitors the opportunity to take part in hands-on experiments using 3M technologies and materials.

3M produces more than 10,000 products for use at all points in the oil and gas industry, focusing on the three key areas of protecting people and the environment; extending the life of critical assets; and improving productivity. These range from everyday essentials, such as respirators, abrasives and electrical connectors, to advanced materials for preventing corrosion and reducing the density of downhole cements.

Safety products featured strongly at the show. Examples of personal protection equipment included the new E-A-Rfit dual - ear validation system, which measures the effectiveness of earmuffs and earplugs from inside the ear, to ensure customised hearing protection. Visitors to the stand were shown how to safely descend from height in an emergency situation using 3M's personal rescue device, which offers controlled descent technology. The device, used widely in the USA and Canada, has recently been



3M's glass bubbles are used as a density reducing agent

introduced into Saudi Arabia.

Fire protection and suppression products showcased included the powerful NOVEC 1230 fire protection fluid, for which there is a growing market in the Middle East. The electrically non-conductive liquid evaporates 50 times quicker than water, thus minimising damage to assets and contents, and the vapour alone can extinguish fire.

3M prides itself on its culture of creative collaboration, continually creating, reinventing and adapting products and technologies in response to customer demand. A good example of this is the company's FIP 1-Step Firestop Foam, which was originally developed for the nuclear industry and modified for use in the oil and gas sector in collaboration with the industry. A demonstration showed how it expands to form a protective seal around cables; if the cables run through a wall, the foam can prevent the fire spreading from one side to another.

Visitors to the stand were also able to see how 3M's glass bubbles can make cement float. These engineered hollow glass spheres are used as a density reducing agent for oil and gas drilling fluids and drilling cements, and with their high strength to density ratio are ideal for downhole temperatures and pressures. They can for example lower the density of drilling muds to minimise formation damage, and keep risers and umbilicals buoyant to minimise pressure on the rig.

Other solutions on display included corrosion-resistant ceramic sand control screen systems, which improve on the wire-wrap principle using the unique properties of advanced ceramics; and abrasive solutions including the 3M Cubitron™ grinding wheel. This uses the company's proprietary precision-shaped grain and requires less pressure than conventional grinding wheels.

Ensuring the safe operation of the offshore jackup fleet

TODAY'S OFFSHORE BUSINESS environment is changing drastically, with many oil majors reviewing and improving their integrity standards, in order to identify and safeguard against potential failure modes and effects that could lead to an undesired event.

The recent jackup accident in Abkatun-Pol-Chuc shallow water oil field Mexico at the beginning of May is the latest causality resulting in lives lost, many injured and a unit that will be a challenge to recover. This incident serves as a timely reminder of the risks that need to be addressed when working offshore.

There is concern about the fact that more than half of the global jackup fleet is more than 25 years old. Failure detection is an essential element, to alert operators to any deviation of normal operation/function before a failure actually occurs.

Likewise, ensuring the aging structure remains within the original design is important for rig owners and operators, who need to be sure that it can conduct specific operations within its original design capability in an acceptably safe manner.

The maintenance history of the unit and the area of operation are key factors in estimating whether a jackup unit has the capacity to extend its life beyond the normal period of working and can continue performing its intended function.

With the support of DNV GL Jackup &

MP Bijali, DNV GL regional offshore class manager for Middle East and India

Mark Hayward, manager, DNV GL Jackup & Geotechnical Centre – London

Geotechnical section in London, Dubai Jackup Service Centre is offering services to assist rig owners and oil majors to carry out assessments to meet contract requirements through a life extension study.

"Our team, with its vast experience in jackups, can undertake detailed studies to satisfy client and operator requirements," said MP Bijali, DNV GL regional offshore class manager for Middle East and India. "In addition, the Jackup & Geotechnical Centre in London holds analytical models of most jackup designs, and an extensive location history for many units operating throughout the world."

A systematic approach to Health & Safety

Nick Nooren, general manager, Middle East, India & Africa Hub, Lloyd's Register Energy, outlines how, in some countries, organisations are being made accountable for their own safety standards, while the regulator assumes a supervisory rather than a policing role.

DUE TO THE nature of its occupational and financial risks, the oil and gas industry has long been heavily regulated and governed by a variety of legislative frameworks and international standards. Traditionally, prescriptive legislation – with the associated list of requirements – has been imposed on operators to ensure that occupational health and safety best practise is embedded across the company's entire operation, both onshore and offshore.

A culture of complacency and lack of operational transparency can creep in which prioritises 'checking the box' to comply with the law and limit legal liability, rather than following a systematic approach to identifying health and safety risks and creating solutions to manage them.

Some regions have resisted a transition to goal-based regulatory regimes because prescriptive regimes are simpler to implement, monitor, verify and prove compliance in the courtroom. But, as operators delve into more hostile or lesser-known environments to search for the remaining stores of oil and gas, prescriptive regimes are being found to be less adaptable to new technologies and the changing levels of operational risk. Moreover, they can stifle the innovation required to adapt.

In the UK, the North Sea Piper Alpha explosion in 1988 precipitated a migration away from this type of regulatory framework to a more risk-based approach in which organisations were asked to set and meet key safety goals, adherence to which is then monitored by the regulator.

The transition to a 'goal-based' approach placed the major responsibility on the operator or licensee to undertake a comprehensive risk assessment and ensure they have reduced the risks to 'as low as reasonably practicable' (ALARP). By holding organisations accountable while giving them more freedom to self-regulate and create practical solutions based on their experience, the goal-based regulatory regime has created a more cooperative environment in which the regulator assumes a supervisory rather than a policing role.

Following the Deepwater Horizon oil spill, a major comparative analysis of major industrial accidents was conducted (photo: Ideum)

> "Today, we see this goal-based approach being followed in other countries"

Today, we see this goal-based approach being followed in other countries; regulators are continuing to develop policies and standards while moving away from micromanaging each asset's operational environment aspect in favour of taking a supervisory, supportive role that provides guidance and performance monitoring. This trend has put a stronger emphasis on implementing occupational health and safety management systems, developing process safety and ensuring asset integrity.

Effective management systems

While not as visible as the asset, management systems play a key role in ensuring that occupational health and safety is maintained through a risk-based approach. They emphasise the development of a comprehensive risk assessment and standard operating procedures, which help to ensure the safe execution of high-risk activities. In response to the Deepwater Horizon oil spill in the Gulf of Mexico in 2010, which caused the largest marine oil spill in history, the Canadian National Energy Board commissioned the Arctic Review – a comparative analysis of several major industrial accidents – to study the role that management systems played in major accidents, and to determine if there were any related trends or relevant lessons for incident prevention.

The assessment found that, while most organisations involved in the accidents had developed management systems, those systems were often not effectively implemented or reviewed on a regular basis to ensure their continued adequacy and effectiveness. Most importantly, meaningful hazard identification and risk assessment processes were often not followed.

What this revealed was there were no new types of accidents, just old causes of accidents repeating themselves.

The report placed great importance on the role of corporate leadership in the prevention of major accidents. Managing process safety effectively, ensuring a competent workforce at all levels of the

organisation, providing timely and accurate information for strategic decision-making, and promoting an understanding of the consequence of change in the operational environment are key leadership attributes that raise performance and ensure that occupational health and safety is given equal priority with any production goals.

Another trend highlighted by the report is the importance of integrating information related to process safety and corporate culture when reporting health and safety performance. This encourages the industry transition away from a focus on personal injury data as a safety measurement tool. Deepwater Horizon is a prime illustration of how that can lead management astray; in the days before the accident, the rig's low personal injury data gave a false indication of the asset's process-safety performance and the overall health of the safety culture.

Internationally recognised management systems are comprised of programmes designed to achieve a reduction of risk to ALARP for the public, workers, contractors, asset, production and the environment.

To get a more complete picture of overall safety performance, regulators and organisations alike are being encouraged to look beyond 'lagging' indicators such as lost time injury rates to consider indicators for both high frequency, low consequence events (such as worker injuries) and low frequency, high consequence incidents (such as blowouts and fatalities). This ensures that active and latent threats to process safety, such as asset integrity, human factors, organisational deficiencies, and safety culture, are identified and managed by the operator to maintain the greatest margin of safety.

Ensuring structural and asset integrity

The structural integrity of oil and gas installations and their supporting assets underpins the safety of all workers and the surrounding environment. In recent years, regulators and stakeholders have made more effort to embed best practice into the operation and maintenance of facilities. Operating an asset in an extremely corrosive environment, where it is exposed to high temperatures and pressures and adverse weather conditions requires a strict system of inspection, analysis verification and repair, if the level of risk is to be controlled to ALARP levels.

In the UK, the creation of the 'Safety Case Regulation' and 'Design and Construction Regulation' ensured that asset-integrity strategies became part of the legislative framework that governs the operation of offshore installations.

Between 2004 and 2007, the Health and Safety Executive (HSE) – a UK government body – conducted a focused programme of asset-integrity inspections under the heading of 'Key Programme 3' (KP3). KP3 found that the offshore industry did not have reliable KPIs in place to focus attention on asset-integrity measurement and provide reasonable levels of assurance that strategies to manage major hazards stayed effective as conditions changes. The discovery initiated a global effort to embed asset-management strategies into existing management systems and planned maintenance routines.

Maintaining hardware to be safe, reliable and efficient is not only essential to manage the risk of the major accident hazards the industry faces, it is also vital in creating a physical environment that people can be proud to work in, a key feature of an incident-free workplace.

Competence and human factors

In the past 20 years, there have been substantial improvements in the quality of assets and management systems that support and promote quality, safety, energy efficiency and the environment. Assets are now safer by design. It is generally accepted by the modern safety expert that at least 80-90 per cent of major accidents across all asset-intensive industries are caused by human factors, or human error.

Most safety practitioners now accept the next incremental advance in workplace safety will come from a better understanding of the influence that workers have on the operational efficiency of an asset.

A positive safety culture is essential in the demanding environment of oil and gas installations (photo: DHL)

Managing human factors on installations is as crucial to the safe operation of an asset as ensuring the right infrastructure and management systems are in place. A positive safety culture is essential, particularly in an environment where you have long, demanding shifts, difficult working conditions and a very high potential for fatigue.

In addition, with the ever-increasing global demand for energy creating a huge employment market, the oil and gas industry must manage a constant influx of new, sometimes novice, employees.

Most installations employ very comprehensive training and skills-evaluation programmes to ensure all workers (including contractors) are competent to perform their assigned task and are very familiar with the safe working procedures relevant to their activities. Most installations employ a "zero-tolerance" policy for non-compliance and workers can be dismissed for the breach of a safety standard.

Understanding the influence of the human element is complex and we are only beginning to recognise the influence of the workforce on the efficient – and therefore safe – operation of onshore and offshore assets. But there are clear trends emerging. For one, emphasis is shifting away from a reliance on the deployment of company 'safety police' in favour of employee-engagement tools such as incentives, which give workers a stake in the process.

There is also much greater recognition of the importance of clearly defined roles and responsibilities with regard to safe practice. With global labour demands giving rise to the number of sub-contractors working at any given facility, it is vital that all parties understand their safety-related roles and responsibilities, and share common ways to measure success. ■

Baker Hughes introduces industry's first fully integrated ultra deepwater production system

OILFIELD SERVICES COMPANY Baker Hughes has launched Hammerhead, the industry's first fully integrated wellhead-to-reservoir ultra deepwater completion and production system. Developed to withstand extreme environments, such as the Gulf of Mexico's Lower Tertiary trend, the Hammerhead system is designed to enable reliable long-term, high-rate production. The system will close an important technology gap to help operators realize full-field economic payback from their ultra deepwater assets, the firm said.

Aggressive reservoir stimulation capabilities, coupled with a 30,000 bpd flow capacity, will enable maximum production rates

"We expect the Hammerhead system to improve recovery factors by two per cent in the Lower Tertiary through enhanced reservoir stimulation, higher drawdown capability and long-term optimised production," said Richard Ward, president, global products and services at Baker Hughes. "Using a standard well in a lower tertiary field as an example, a two per cent improvement could translate to more than US$4bn at prices of US$50 per barrel over the life of the well."

The Hammerhead system includes an upper completion, a lower completion, an isolation assembly and intelligent production capabilities, and is fully compatible with subsea boosting. Designed and tested for conditions in well depths up to 10,060 metres and water depths up to 3050 metres, including temperatures up to 150 C and pressures up to 25,000 psi, based upon the test conditions, the system could provide reliable operations during well life cycles of more than 20 years.

Aggressive reservoir stimulation capabilities, coupled with a 30,000 bpd flow capacity, will enable maximum production rates. The Hammerhead system's industry-leading 15,000 psi differential pressure will help increase reservoir drainage. Remote surveillance and control capabilities will allow operators to optimise production, while proactive flow assurance will enable optimal sustained production rates will help to limit interruption for increased recovery.

GE Oil & Gas and Enpro Subsea collaborate to offer best-in-class fluid well intervention services

GE OIL & Gas and Enpro Subsea have signed an agreement to jointly market and provide fluid intervention services that offer oil and gas operators a cost-effective way to improve production rates in producing wells.

The volume of hydrocarbons extracted from offshore fields with subsea wells is typically far lower than offshore fields with platform wells. One reason for this is the prohibitive cost of performing interventions on subsea wells. During well interventions, wells are 'cleaned' on the inside, which helps alleviate well production issues caused by scale and other conditions which develop over time.

Enpro Subsea's Integrated Subsea Sampling and Injection solution is a small, lightweight system that enables multiple well campaigns from a single vessel. The equipment can be operated subsea by an ROV which can be deployed at multiple injection locations.

Nick Dunn, global leader, Subsea Services at GE Oil & Gas, said, "The initial responses from customers are very encouraging. They value the combination of Enpro Subsea's best-in-class liquid intervention technology with GE's subsea equipment expertise and global footprint and capabilities."

Also the liquid intervention offering is a cost-effective way to deliver services such as scale removal, which can have a significant positive impact on well production rate.

The companies have signed a MoU to jointly market, sell and operate technology and services related to fluid intervention. The non-exclusive partnership is already in operation in key strategic regions, including West Africa.

Ian Donald, managing director of Enpro Subsea, added that Enpro is excited to be working with GE Oil & Gas in key strategic regions. "Our combined expertise in subsea production optimisation together with GE's extensive regional presence enables us to jointly provide and support world-class liquid intervention products and services," he noted.

Next-gen of APC from AspenTech delivers robust business benefits

THE NEW GENERATION of AspenTech's Advanced Process Control (APC) can control plant operation and enable companies to enjoy greater return on investment (RoI) while reducing the burden on APC practitioners. The new Aspen DMC3 software is a control technology that also features APC.

In the past, model predictive approaches like APC depended on good models. That left two problems. The first being the need for a simple way to keep APC models aligned with the plant as it evolves. The second is to modify the optimiser, so it is resilient to unanticipated events acting on the plant.

Now the major advancements in APC technology have enabled users to solve these problems and shape the behaviour of the controller to keep accruing benefits. With APC technology, explorers have a way to continually assess the system performance and intervene when necessary to re-align the model with the plant. With these innovations, the new Aspen DMC3 software addresses long-standing APC challenges.

The Aspen DMC3 software addresses long-standing APC challenges

APC, even under complex and highly-dynamic conditions, can maximise product yield, reduce energy consumption, increase capacity, improve product quality and consistency, reduce product giveaway, increase responsiveness, improve process safety and reduce environmental emissions, says the company. Benefits of implementing advanced control can range from two per cent to six per cent of operating profits and the technology helps to reduce operation condition variability to allow plants to be operated to optimum capacity and operation conditions.

Signage for an efficient turnaround

An example of Brady signage

FIELD OPERATORS IN the physical plant often face a labyrinth of pipes and instruments relying solely on past training and experience to know where they need to be. To easily navigate the ever evolving COG physical plant, Brady has developed durable signage solutions for a more efficient turnaround.

With great signage, plant operability, maintainability and reliability can be improved. Durable Brady signage can be used in a number of ways to support field operators. Gauges and fluid containers can be marked to show allowable ranges or levels, lubrication points can be identified and equipment labelled with a barcode linking to maintenance history or supplier information to easily re-order parts. Checklists and procedures can be attached to the equipment itself to optimise compliance, and pipe contents, flow direction, source and destination information can be displayed where they are needed. Durable Brady signs can resist UV exposure, weathering, extreme temperatures and chemicals and can be printed on-site using a Brady printer and pre-defined templates.

Email: emea_request@bradycorp.com to receive a copy of Brady's white paper Equipment visuals for process operations.

Trelleborg mobile unit for flexible coating applications

TRELLEBORG HAS LAUNCHED a new mobile production unit (MPU), a portable coating facility that will enable on-site coating of thermal insulation, passive fire and corrosion protection.

The mobile unit will contain Trelleborg's thermal insulation – Vikotherm R2 and Firestop, a jetfire resistant material. This increases project flexibility and reduces the costs and lead times associated with transporting parts to a specialist coating facility.

Trond Kristensen, thermal insulation business manager for Trelleborg's offshore operation based in Norway, said, "The requirement for local content is growing and large parts of projects are now being completed within the same country. In response to this trend, we knew it was important to increase our flexibility to enable the coating process to take place locally too."

The high performance rubber-based composite applied by Vikotherm R2 insulates and protects jumpers, manifolds, risers, pipelines, flow lines, equipment and other subsea structures. Designed to last a minimum of 30 years, the material is maintenance-free, avoiding future replacements or rectifications, and is resistant to both seawater and impact, claims Trelleborg.

The MPU unit contains an extruder and a rotating spindle with the possibility for side extrusion of Vikotherm R2 directly to straight pipes of up to 12 metres. The extruder is also used to produce 25 mm thick Vikotherm R2 profiles for coating of complex geometries such as bends, valves and flanges. In addition, there are a number of vulcanisation containers for up to 20 metre pipes or structures. Finally, the MPU concept includes a conventional coating machine for coating of straight pipes for passive fire and corrosion protection.

The MPU will provide advanced corrosion protection against all corrosive agents commonly encountered in the offshore sector. It also features state-of-the-art firestop technology to withstand all types of fire, including jet fire, and offers blast and impact resistance. Similarly, the unit features a complete workshop, including a first aid kit and all consumables needed for on-site installation.

Allison Transmission celebrates centenary

GENAVCO, THE DUBAI-BASED supplier of construction industrial and quarrying equipment, extends congratulations to Allison Transmision Holdings Inc on its centenary this year. Genavco has done business with the company since 1967 and is the company's distributor for the UAE, having the only accredited service training centre with full time trainers for Allison equipment in the Middle East.

Allison Transmission Holdings Inc, the world's largest manufacturer of fully automatic commercial-duty transmissions and a leader in hybrid-propulsion systems, was founded in 1915 by James A. Allison, a co-founder of the Indianapolis Motor Speedway and part owner of several racing teams, who established a precision machine shop and experimental firm called the Allison Experimental Co to support his racing endeavours.

"Our company was founded on the values of innovation, quality and reliability," said Lawrence E Dewey, chairman, president and CEO of Allison Transmission. "I'm very proud to say those remain our driving values today."

With approximately 2,000 employees and a market presence in more than 80 countries, including manufacturing facilities, in the USA, Hungary and India, the company now has an annual revenue of US$2bn.

Genavco comments, "You have contributed a lot to our market by offering premium products, quality service and outstanding support. We appreciate the opportunity we have had to do business together with you over the years, and we offer our best wishes for your continued success."

Suraj continues to expand

SURAJ LIMITED, A LEADING manufacturer and exporter of stainless steel seamless pipes, tubes and 'U' tubes, continues to grow its presence in the global market, servicing more than 70 countries throughout the world.

An ISO-9001, 14000, BS OHS 18001 certified company, Gujarat-based Suraj supplies its pipes, tubes and 'U' tubes in various sizes, specifications and grades and also to customer requirements. The company specialises in heat exchangers, heating elements, surface condensers, evaporaters, digestors, instrumentation tubing and fluid piping. Its products are used in various applications including refineries, oil and gas, petrochemicals, food, pharmaceuticals, fertilisers and ship building.

Suraj also holds various quality certificates and supplies its products under all national and international third-party inspection authorities. SURAJ also has its own testing laboratories.

Email: suraj@surajgroup.com, or see the website at www.surajgroup.com.

Suraj is a leading supplier of pipes and tubes

Sabin Metal appoints new president

JONATHAN SABIN HAS been named president at the Sabin Metal Group of Companies, the largest independently owned, secondary precious metals refining organisation in North America. He takes over from his father, Andrew Sabin, now the company's chairman. Sabin has been with the organisation for the past 15 years, overseeing precious metals recovery/refining, managing sampling and assaying processing, and serving in numerous administrative capacities.

Jonathan Sabin, president, Sabin Metal Group of Companies

Headquartered in East Hampton, NY, Sabin Metal recovers and refines precious metals from a variety of processes and industries including hydrocarbon, chemical, petrochemical, pharmaceutical, fuel cell, mining, electronic materials, and nitric acid processes. Its recovery/refining facilities and sales/service offices are located in strategic countries across the globe.

The organisation is now entering its eighth decade serving a worldwide customer base, recently establishing a sales/service office in Dubai to service its Middle East and Africa customers.

Shedding light on your reservoir assets

John Moses, Seabed Geosolutions, says that high quality, up-to-date data is key to strategic decision making and efficient recovery of reservoir assets.

IN THE CURRENT economic climate, the oil and gas industry is under pressure. The depressed price of oil means reservoir assets must be recovered as efficiently as possible and wells drilled with pinpoint accuracy.

The enlightened players in today's economy are adding years to the life of their fields by enhancing evaluation of known hydrocarbons through geophysical data acquisition using the latest seabed techniques. These techniques are perfectly adapted to the requirements of reservoir monitoring and enhanced recovery in the often challenging environments found in working fields. The high-quality full azimuth data acquired by these methods is the basis for good decision-making on the current state of the field, but also as the field development continues into the future.

As budgets are squeezed, companies are focusing on the producing reservoirs where returns are more assured, but is the full potential being realised? Often the infrastructure associated with enhanced field development means that the geophysical data being used to make exploitation decisions is old and not of sufficient quality.

Seabed Geosolutions' advanced node system, Manta™, offers flexibility of deployment in water depths from 0-3,000 metres, with versatile survey design and full azimuth four component (4-C) technology for the most challenging environments

With a proven track record of acquiring data in transition zones and shallow waters throughout the Middle East via its parent companies, Seabed Geosolutions offers a variety of advanced, versatile and flexible ocean bottom seismic (OBS) systems with which the most up-to-date and highest quality multi-component data can be acquired over the entirety of the reservoir. Decisions to most efficiently leverage the resources in the field can then be made with greater accuracy and confidence giving improved economic performance. The ability to efficiently and safely acquire unlimited offset, azimuthal and shear wave information has opened the doors to a new age of reservoir enlightenment.

Project Databank

Compiled by Data Media Systems

OIL, GAS AND PETROCHEMICALS PROJECTS - QATAR

Project	Budget ($ US)	Status	Start Date	Completion Date
Block D Exploration	200,000,000	Shelved	2008-Q1	2015-Q3
Dolphin Energy Limited (DEL) - Export Gas Compression Facilities Upgrade	280,000,000	Construction	2012-Q2	2016-Q1
Oryx GTL - Expansion of Gas To Liquids Plant	1,500,000,000	Feasibility Study	2014-Q3	2019-Q4
Qatar Petrochemical Company (QAPCO) - Ethylene Plant Expansion - Phase 3	300,000,000	EPC ITB	2014-Q3	2016-Q4
Qatar Petroleum (QP) - Air Compressor Replacement at Mesaieed Refinery	50,000,000	Construction	2012-Q2	2016-Q4
Qatar Petroleum (QP) - Bi-directional Pipeline Between KM and KS	80,000,000	Construction	2012-Q2	2015-Q3
Qatar Petroleum (QP) - Bul Hanine Redevelopment (Offshore)	11,000,000,000	FEED ITB	2014-Q2	2028-Q1
Qatar Petroleum (QP) - EPS Qatar - Expandable Polystyrene (EPS) Plant	500,000,000	Design	2013-Q4	2017-Q4
Qatar Petroleum (QP) - Vapour Recovery System at Multi Product Berth	50,000,000	FEED	2012-Q3	2017-Q2
Qatar Petroleum (QP) - Wellhead Scada & Cathodic Protection (Dukhan Field)	200,000,000	Construction	2012-Q2	2016-Q4
Qatar Petroleum (QP) / Qatar Petrochemical Company (QAPCO) - Al Sejeel Petrochemical Complex - Aromatics Plant	1,000,000,000	Shelved	2012-Q4	2018-Q4
Qatar Petroleum (QP) / Shell - Al Karaana Petrochemical Complex - (Overview)	6,000,000,000	Shelved	2004-Q2	2018-Q4
Qatar Petroleum (QP) / Shell - Al Karaana Petrochemical Complex - Package 1	3,000,000,000	Shelved	2013-Q1	2018-Q4
Qatar Petroleum (QP) / Shell - Al Karaana Petrochemical Complex - Package 2	3,000,000,000	Shelved	2013-Q1	2018-Q4
Qatar Petroleum - Al Shaheen Offshore Field Development Plan	500,000,000	FEED	2014-Q1	2016-Q4
RasGas - Qatar Barzan Gas Field Development Project (Overview)	10,300,000,000	Construction	2007-Q4	2021-Q4
RasGas - Qatar Barzan Gas Field Development Project - Offshore - Phase 1	800,100,000	Construction	2007-Q1	2014-Q3
RasGas - Qatar Barzan Gas Field Development Project - Offshore - Phase 2	700,000,000	Feasibility Study	2014-Q3	2019-Q4
RasGas - Qatar Barzan Gas Field Development Project - Offshore - Phase 3	300,000,000	Feasibility Study	2013-Q3	2023-Q4
RasGas - Qatar Barzan Gas Field Development Project - Onshore - Phase 1	1,700,000,000	Construction	2007-Q1	2015-Q4
RasGas - Qatar Barzan Gas Field Development Project - Onshore - Phase 2	2,000,000,000	Feasibility Study	2014-Q3	2019-Q4
Shell - Pearl GTL Scheme - Onshore & Offshore Facilities	20,000,000,000	Construction	2014-Q4	2019-Q3

Project Focus

Compiled by Data Media Systems

Project Focus

Compiled by Data Media Systems

Project Summary

Project Name	Shell - Pearl GTL Scheme - Onshore & Offshore Facilities, Qatar	**Status**	Construction
Name of Client	Qatar Shell GTL Ltd	**Start Date**	Q4-2014
Budget ($ US)	20,000,000,000	**End Date**	Q3-2019
Facility Type	Natural Gas Liquefaction (NGL)	**Location**	Qatar

Project Background

Located in Ras Laffan Industrial City, Pearl GTL is the world's largest source of GTL products, capable of producing 140,000 barrels a day (b/d) of GTL products. The new phase of the project will allow Qatar Shell to continue to enhance local development.

Project Status

May 2015	Planned maintenance phase of turn-around for Train 1 was concluded at the end of April. Next phase for Train 2 to be conducted in 2016.
Apr 2015	The plant is still undergoing maintenance phase and is due to wrap up by the end of the month.
Mar 2015	Pearl GTL is entering planned maintenance phase that will see plant production halved for the next two months, closing one of its two trains before resuming full operation at the end of April.
Dec 2014	Qatar Kentz' contract will include project management, engineering and specialist studies, procurement and logistics, construction and commissioning management, and the execution of construction works.
Dec 2014	Qatar Development Bank and Qatar Shell signs individual agreements with five Qatari SMEs (small/medium enterprises) into Pearl GTL supply chain. These are Mozon Industries; KEPCO; Pioneer Metal Company W.L.L.; Prince's Lights; and Rumaillah Motors W.L.L

Contractors

Contract Type	Pre-Qualified	Bidders	Awarded
EPC	• Qatar Kentz	• Qatar Kentz	• Qatar Kentz
Sub-Contractors	• KBR (Kellogg Brown & Root) • JGC Corp. • Rumaillah Motors W.L.L. • KEPCO Group (Al Kannari Engineering Projects Company) • Mozon Industries • Pioneer Metal Co. W.L.L.	• KBR (Kellogg Brown & Root) • JGC Corp. • Rumaillah Motors W.L.L. • KEPCO Group (Al Kannari Engineering Projects Company) • Mozon Industries • Pioneer Metal Co. W.L.L.	• KBR (Kellogg Brown & Root) • JGC Corp. • Rumaillah Motors W.L.L. • KEPCO Group (Al Kannari Engineering Projects Company) • Mozon Industries • Pioneer Metal Co. W.L.L.

Project Schedules

4Q-2014	Engineering & Procurement
2Q-2015	Construction
3Q-2019	Completed

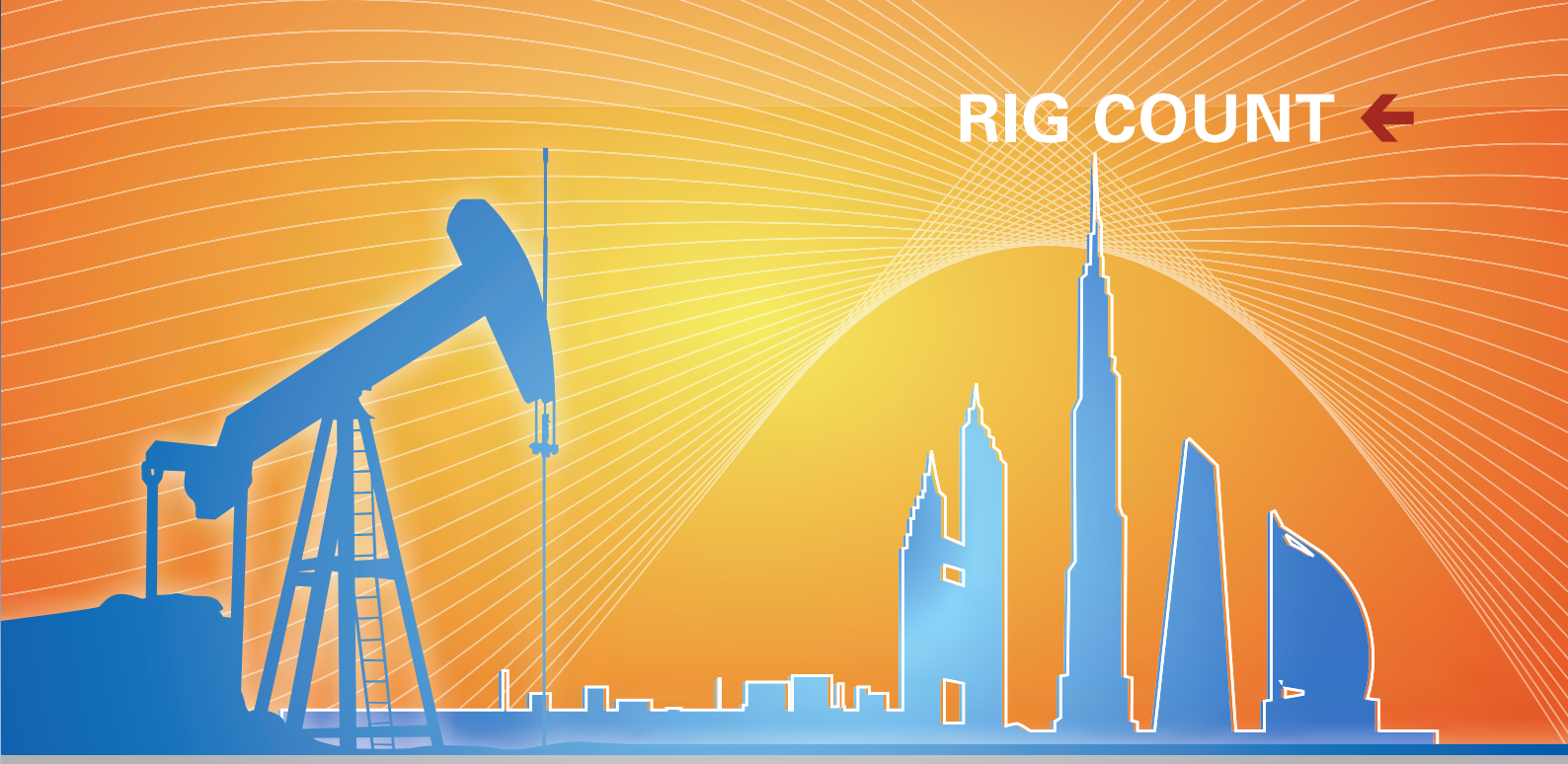
Project Scope

Offshore scope:

- Twenty-two development wells
- Two unmanned wellhead platforms in about 30 metres of water
- Two 30-inch pipelines running about 60 km to shore

Onshore scope facilities:

- Gas-processing facilities treat the sour, rich wellhead gas to remove contaminants such as metals and sulphur and further extract natural gas liquids
- Ethane for petrochemical processes
- Liquefied petroleum gas (LPG) for domestic heating and cooking
- Condensates as a feedstock for refineries



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	24	12	36	0	23	13	36	25	11	36
DUBAI	0	2	2	0	0	2	2	0	2	2
IRAQ	53	0	53	-1	54	0	54	61	0	61
JORDAN	0	0	0	0	0	0	0	0	0	0
KUWAIT	50	0	50	-3	53	0	53	45	0	45
OMAN	64	0	64	3	61	0	61	57	0	57
PAKISTAN	22	0	22	1	21	0	21	19	0	19
QATAR	3	9	12	4	3	5	8	2	7	9
SAUDI ARABIA	100	26	126	1	99	26	125	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	1	0	1	0	1	0	1	3	0	3
TOTAL	317	49	366	5	315	46	361	309	38	347
North Africa										
ALGERIA	56	0	56	2	54	0	54	49	0	49
EGYPT	35	5	40	-1	36	5	41	46	6	52
LIBYA	2	2	4	-2	3	3	6	4	3	7
TUNISIA	1	1	2	-1	3	0	3	3	0	3
TOTAL	94	8	102	-2	96	8	104	102	9	111

Source: Baker Hughes

هذا المشروع، أعلى مستوى لإنتاج النفط تم الحفاظ عليه على مدار ٢٢ عاما، وكان يبلغ ١٣٨٠٠ برميل يوميا، ونقوم حاليا بإنتاج ستة أضعاف ما كنا ننتجه من النفط في ٢٠١٠».
وقد مكنت أيضا المبادرة، التي تكلفت ٦٠٠ مليون دولار أمريكي، خمسة عشر حقلا أخرى حول نمر من إعادة فتح الآبار، حيث إن إعادة استخدام المياه المنتجة أدت إلى تخفيف الضغط على محطة الإنتاج الرئيسية، كما أنها أتاحت أيضا فرصا جديدة للتطوير المحتمل، مع تخصيص ما يصل إلى ٨ ملايين برميل كاحتياطي إضافي خلال حفر الآبار، بالإضافة إلى تحديثات أخرى في هيكل الحقل.

ارتفاع معدل الإنتاج

إن المحصلة النهائية لما سبق هي أن عمان استطاعت أن تحقق نمواً في إجمالي إنتاجها من النفط والغاز في السنوات الأخيرة، وذلك على الرغم من محدودية الاحتياطي، وأية تحديات نشأت عن الحقول الناضجة أو الحقول ذات المتطلبات الفنية الأعلى. وقال الدكتور محمد بن حمد الرمحي، وزير النفط والغاز العماني، في يناير/كانون الثاني، إنه من المتوقع أن يرتفع إجمالي إنتاج عمان من السوائل؛ أي مجموع إنتاج شركة تنمية نفط عمان وإنتاج المنتجين الآخرين الأصغر حجما، بما يقرب من ٢٠ ألف برميل يوميا في ٢٠١٥. وقد وصل إجمالي الإنتاج إلى ٩٤٢ ألف برميل يوميا في ٢٠١٣، طبقا للاستعراض الإحصائي للطاقة في العالم، الصادر عن شركة بي بي في ٢٠١٤، وهو رقم يشمل النفط الخام بالإضافة إلى السوائل الأخرى، بما في ذلك سوائل الغاز الطبيعي. ولم تصدر الحكومة - بعد - أية أرقام رسمية بخصوص العام السابق، ومع ذلك، فقد وصل مجموع صادرات عمان من النفط الخام والمتكثفات في ٢٠١٣ إلى ما يقدر بـ ٨٣٣٤٠٠ برميل يوميا، ومن المؤكد أن شركة تنمية نفط عمان تساهم بحصتها العادلة من هذه الكمية. وقد أعلن راؤول ريستوتشي، العضو المنتدب للشركة، أن الشركة قامت خلال أول شهرين من هذا العام برفع إنتاجها من النفط الخام عن المتوسط السنوي المخطط لعام ٢٠١٥. وذكر أن المتوسط المخطط له هو ٥٧٠ ألف برميل يوميا. وقد صرح بذلك على الرغم من رفضه الإفصاح في الوقت الحاضر عن أرقام الإنتاج الفعلية الحالية. ونفس القصة تحدث في قطاع الغاز أيضا، حيث يعتبر احتياطي الغاز، البالغ حوالي ٠,٩ تريليون متر مكعب (٣٣,٥ تريليون قدم مكعب)، يعتبر أيضا محدودا بالمقارنة مع بعض دول الخليج الأخرى. وعلى نحو مماثل، لم يوقف ذلك سلطنة عمان عن تحقيق تقدم هائل في استخلاص الغاز، من خلال مشاريع مثل المصنع الرئيسي لتصدير الغاز الطبيعي المسال. ففي عام ٢٠١٣، سجل إجمالي إنتاج الغاز الطبيعي في سلطنة عمان ٣٠,٩ مليار متر مكعب، طبقا للاستعراض الإحصائي لـ بي. أي ضعف ما تم إنتاجه خلال العقد السابق، ومحققا في الغالب زيادة مطردة بالمقارنة مع العام الماضي.

خفض التكاليف

ومع كل ما سبق، فإن المسألة ليست برمتها مروراً في اتجاه واحد، فعلى الرغم مما تحققه شركة تنمية نفط عمان من نجاح في هذا المجال، فإنها مثل غيرها من اللاعبين الآخرين في القطاع، تعمل حاليا على التكيف مع بيئة جديدة يسودها انخفاض في أسعار النفط، وهو ما يعني تركيزا متجددا على تقليص التكاليف. وينبغي على الشركة، دون أي نية لتقليص خططها الطموح في مجال التنقيب والإنتاج، أو إيقاف نشاطها الخاص بالاستخلاص المعزز للنفط، المصحوب بتكاليف باهظة، أقول ينبغي عليها أن تسعى لإيجاد طرق أخرى لتحقيق توازن بين التكاليف والأسعار. وقد قامت الشركة مؤخرا بحمل كبار المقاولين العاملين معها على تحديد المجالات التي يمكن توفير الإنفاق فيها حتى يتسنى التعامل مع الهبوط الحاد في أسعار النفط. وطبقا لما ذكره ريستوتشي، فإن الهدف ليس هو إقناع الموردين بتخفيض الأسعار، بل هو العمل معا لتحقيق المزيد من التآزر وإنشاء المزيد من الشراكات لتحقيق اقتصاديات أفضل للمشاريع. وقد وصل إجمالي رأسمال الشركة ونفقاتها التشغيلية، في العام الماضي، إلى ما يقرب من ٦ مليارات دولار أمريكي، ولكن هذا الإجمالي شمل مجالات عالية التكلفة، مثل الغاز المضغوط في خلود، بل وحتى برنامج للتكسير الهيدروليكي، بالإضافة إلى التحول نحو التقنيات الأكثر خُضرة، أي الأكثر حفاظا على البيئة. وتتواصل الاستثمارات في منشآت جديدة هي الأحدث من نوعها، وذلك حتى يتسنى استيعاب وإدارة الثروة الهيدروكربونية، التي تمتلكها البلاد، بشكل أفضل. فقد دشنت شركة تنمية نفط عمان مؤخرا

الاستخلاص المعزز للنفط خلق فرصاً جديدة لتطوير محتمل

مركزا لموارد «الآبار الجديدة» في مقرها الرئيسي بميناء الفحل، وذلك بهدف استدامة الإنتاج وتحسين كفاءة الحفر بشكل أكبر. وعلى الرغم من أن انخفاض الأسعار يعني بوضوح انخفاض الإيرادات، فإن مسؤولي الشركة مصرون على أن تظل مشاريع المجموعة، حتى تلك التي تصاحبها متطلبات فنية أعلى، اقتصادية وعلى المسار الصحيح. وطبقا لما قاله ريستوتشي، فإنه لا توجد بالتأكيد أية خطط لإيقاف التقدم خلال هذا العام. وقد ذكر خلال حديث له في إحدى فعاليات القطاع التي أقيمت العام الماضي، أنه قد تم اختبار كافة مشاريع الشركة في مواجهة سيناريوهات قوية «لانهيار الأسعار» بمقادير أكثر خطورة من ذلك بكثير.

وقد ورد في صحيفة ديلي أوبزيرفر العمانية Oman Daily Observer أنه قال: «لا يوجد أي سعر من أسعار النفط لم نتمكن من تصوره في العالم الطبيعي مما يمكن أن يؤثر على برنامجنا».

التحديات في الأجل الطويل

وعلى الرغم مما سبق، فإن إنتاج الشركة من النفط والغاز يزداد تعقيدا وتطلبا. ومن المتوقع أن يتولد عن المشاريع المتنوعة للاستخلاص المعزز للنفط، بالأساليب الحرارية والكيميائية، والمعتمدة على الغاز القابل للاختلاط، أن يتولد عنها ثلث إنتاج المجموعة بحلول ٢٠٢٣، نظرا لأن الأساليب التقليدية أصبحت أقل فعالية. ولكن مع مواجهة بلدان أخرى ومنتجين آخرين لنفس هذه التحديات أيضا، تظهر عمان كمركز امتياز عالمي في هذا النوع من الابتكارات، كما هي الحال مثلا في مجال الاستخلاص المعزز للنفط المعتمد على الطاقة الشمسية. وهذا الأسلوب النظيف والمبتكر لزيادة إنتاج النفط يحظى بمجموعة من المزايا الواضحة، ليس فقط عبر استغلال الطاقة الشمسية الخضراء (الصديقة للبيئة)، ولكن أيضا من خلال إتاحة الغاز الطبيعي، أو غيره من الموارد، للاستخدام في مجالات أخرى، مثل توليد الطاقة، أو الاستخدامات الصناعية، أو تحلية المياه. وذكر ريستوتشي، العضو المنتدب لشركة تنمية نفط عمان، أن الاستخلاص المعزز للنفط هو عمل «يتعين القيام به» بالنظر إلى محفظة الأصول الناضجة التي تمتلكها المجموعة، وإلى مكامن النفط والغاز المعقدة بسلطنة عمان. وقامت الشركة في العام الماضي بمنح المرحلة الثانية من التوسع الذي يستهدف ٢٥٠ مليون برميل أخرى من النفط في هرويل، وهو أول مشاريعها الكاملة للحقن بالغاز القابل للاختلاط. وحيث إن إيرادات الصادرات من النفط والغاز تمثل ما يقرب من ثلثي الموازنة الحكومية، فإن المركز المحوري الذي تحتله الشركة في الاقتصاد العماني تسهل رؤيته بوضوح. فالشركة تولد، حسب تقديرها، ما يقرب من ستة دولارات للاقتصاد في مجمله، مقابل كل دولار تقوم بإنفاقه. وهي بالفعل أحد الكيانات الرائدة في توفير فرص العمل بالسلطنة، وقد تحملت مسؤولياتها المتعلقة «بالتعمين» بقدر كبير من الجدية. وقد أوكل المسؤولون الحكوميون للشركة أيضا زيادة إنتاج النفط الخام إلى ٦٠٠ ألف برميل يوميا خلال الأعوام القادمة، وذلك في مناقصة لزيادة الموارد المالية للسلطنة. ومن الأهمية بمكان أن يواصل هذا المشروع النفطي المشترك نجاحه، من أجل الحفاظ على وفرة الموارد المالية للبلاد. وهذا هو بالضبط ما تقوم به الشركة حاليا في مواجهة كافة التحديات الفنية الملقاة على عاتقها، وفي مواجهة تردي الأفق الاقتصادي فيما يتعلق بهذا القطاع.

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أقدمت عمان على الاستثمار في تقنيات الاستخلاص المعزز للنفط

أهمية الجلوس في مقعد القيادة

ربما لا تمتلك عمان أكبر حقول النفط والغاز في الشرق الأوسط، فاحتياطي النفط الخام لديها، الذي يبلغ ٥٫٥ مليار برميل، هو احتياطي ضئيل إلى حد ما بالمقارنة مع المملكة العربية السعودية وأبو ظبي، ولكنها مع ذلك تستفيد إلى أبعد الحدود مما لديها بالفعل. ويرجع ذلك في معظمه إلى الدراية الفنية، والإصرار المطلق لدى شركة تنمية نفط عمان، التي تمثل المشروع المشترك للتنقيب والإنتاج بين الحكومة العمانية وشركة شل، بالإضافة إلى مستثمرَين آخرَين يشكلان الأقلية، وهما شركة توتال الفرنسية وبرتكس البرتغالية.

وشركة تنمية نفط عمان، التي تعتبر إلى حد كبير هي المنتج الأكبر للنفط والغاز في سلطنة عمان، هي الاسم الداعم للكثير من أكبر مشاريع الطاقة وأشهرها في السلطنة. وهذه الشركة هي المسؤولة عما يقرب من ثلثي إجمالي إنتاج النفط في البلاد، وعن حوالي كل توريدات الغاز الطبيعي بها، وهي أيضا أحد المصدّرين المهمين، ولاسيما للأسواق الآسيوية. فقد حصلت الصين وحدها على ٦٠ في المائة تقريبا من صادرات عمان السائلة في ٢٠١٣، طبقا للأرقام الصادرة عن إدارة معلومات الطاقة الأمريكية. وتنتج شركة النفط الوطنية العمانية في المجمل ما يزيد على مليون برميل من النفط المكافئ في اليوم، في شكل مزيج من النفط والغاز، كل سنة. ولقد صنعت لنفسها إسما بطرق أخرى أيضا، من خلال الاستثمار في التقنيات الجديدة، وجلب المزيد من المهارات لفهم أنظمة المكامن الأكثر تعقيدا، والتي تعتبر شائعة في هذا الجزء من منطقة الخليج. وقد استطاعت بهذه الطريقة أن تطلق العنان لتوليد قيمة إضافية من الحقول الناضجة أو المتناقصة، وهو الأمر الذي أتاح لها احتلال مركز الريادة داخل منطقة الخليج وحولها.

الاستخلاص المعزز للنفط

وفي حقيقة الأمر، لقد عوض الإنفاق السخي من جانب شركة تنمية نفط عمان، على الاستخلاص المعزز للنفط، عن أي تراجع سابق في إنتاج النفط، بل إنه عكس. بفعالية. الهبوط المستدام الذي أصاب قطاع الطاقة في عمان خلال العام الماضي. وقد انطلقت مبادرات كبرى للاستخلاص المعزز للنفط في مارمول، وقرن علم، وهرويل، بالإضافة إلى مخططات تجريبية أخرى في فهود، والخوير، ونمر، والنور، وأمين، والغبرة. وتعتبر الأعمال الأخيرة في حقل نمر «ج»، القائم في جنوب عمان، حالة في صلب الموضوع. فقد حقق هذا الحقل، الذي بدأ أول إنتاج له عام ١٩٨٧، زيادة في إنتاج النفط تقدر بستة أضعاف خلال أربعة أعوام فقط، بعد أن شهد تدنيا في الإنتاج بسبب هبوط الضغط في مكامن النفط. كذلك جاء مشروع فيضان المياه الرائد لشركة تنمية نفط عمان ليرفع إنتاج النفط من ٢٨٠٠ برميل يوميا في ٢٠١٠ إلى ١٧٦٠٠ برميل يوميا في ٢٠١٤، ما يعني أنه يمكن إنتاج ٤٣ مليون برميل من احتياطي النفط الإضافي على مدار عمر الحقل، وهو مقدار كبير بكل المقاييس. وقد حدث هذا التحول عن طريق ضخ كميات هائلة من المياه خلال الحقل، من أجل استخلاص النفط عالي اللزوجة؛ وهي طريقة تقليدية معتمدة من جانب شركة تنمية نفط عمان. ومن ناحية أخرى، ابتكرت سلطنة عمان أيضا أساليب أخرى للاستخلاص المعزز للنفط، بما في ذلك أساليب الاستخلاص الشمسية، والحرارية، والكيميائية، والمعتمدة على الغاز القابل للاختلاط. وقال جنيد محي الدين الغلام، قائد فريق نمر: «لقد تخطينا، خلال ما يكاد يقل عن ثلاث سنوات من تنفيذ

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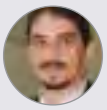

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لمازارين إنرجي: «يسرنا أن نعلن عن أول اكتشاف في ترخيص زعفران. ولا تعتبر بئر Cat-١ مجرد نجاح فحسب، لما تحتويه من إمكانيات، ولكنها أيضا ترفع احتمالات العثور على موارد في سلسلة التنقيبات الجارية بهذا الترخيص الضخم، ولا سيما بئر DGH-١، وهي بئرنا التالية في التسلسل. ونحن نتطلع إلى تطوير هذا الاكتشاف على وجه السرعة».

وتعتبر بئر Cat-١ هي البئر الأولى في حملة تهدف إلى حفر بئرين. وتبلغ مساحة ترخيص زعفران ٥١٦٨ كيلومترا مربعا، ضمن منطقة بهذا البلد الشمال إفريقي، تتسم تاريخيا بغزارة إنتاجها من النفط والغاز.

ومازارين إنرجي هي المشغل لترخيص زعفران ومعها شركتا ETAP و MEDEX بصفتهما شريكيها.

مشروع «استرجاع الغاز المتبخر عند رصيف التحميل» (JBOG)، الذي يتكلف مليار دولار أمريكي، هو الأكبر من نوعه في العالم

قطر تدشن أكبر مشروع في العالم لاسترجاع الغاز

دشنت قطر مشروع «استرجاع الغاز المتبخر عند رصيف التحميل» (JBOG)، بتكلفة مليار دولار أمريكي، وهو المشروع الأكبر على مستوى العالم، والهادف إلى تقليل اشتعال الغاز بنسبة ٩٠ بالمائة خلال عملية التحميل بمرافئ الغاز الطبيعي المسال في ميناء راس لفان. وبدلا من احتراق الغاز، سوف يعمل مشروع JBOG على جمع الوقود ونقله إلى منطقة يتم فيها ضغطه ليكون جاهزا للاستخدام مرة أخرى، سواء كغاز طبيعي مسال أو كغاز للوقود. وبمجرد أن يتم تحميل الغاز الطبيعي المسال على السفن، يتبخر ما يقرب من واحد في المائة منه (غاز متبخر) بسبب فرق درجات الحرارة بين الغاز الطبيعي المسال البارد وصهريج السفينة الدافئ. ويتعرض الغاز المتبخر للاشتعال أو الاحتراق في المرفأ، لعدم وجود أي منفذ للغاز منخفض الضغط. ومن شأن مشروع JBOG أنه يمّكن من استرجاع الغاز المتبخر.

وطبقا لما ورد عن المسؤولين القطريين، فإن المشروع يعتبر خطوة أساسية نحو المحافظة على البيئة، إذ يعادل الانخفاضُ في كمية الغاز المحترق تحقيقَ وفورات سنوية في غاز الدفيئة مقدارها ١,٦ مليون طن من ثاني أوكسيد الكربون، وهو ما يعادل الانبعاثات السنوية لغاز الدفيئة من حوالي ١٧٥٠٠٠ مركبة. وقال سعد شريدة الكعبي، رئيس مجلس إدارة «قطر غاز»: «لقد ظلت حماية البيئة تمثل دوما أحد الالتزامات الشاملة التي تحرص قطر للبترول ومشاريعها المشتركة على الوفاء بها في كل ما تقوم به. وقد تم تضمين هذا الالتزام في عدد من المبادرات، ومن بينها هذا المشروع الذي يعتبر هو الأكبر والأكثر شمولية فيما يتعلق بحماية البيئة، واستغلال الموارد الطبيعية للدولة. ويبرهن مشروع JBOG على التزام قطر بتحقيق التوازن بين التنمية الصناعية والحرص على سلامة البيئة، كما أنه يعزز دورنا الريادي والقيادي في قطاع الطاقة».

ومن المتوقع أن يوفر هذا المشروع ٨٢١ مليون متر مكعب معياري من الغاز سنويا، وهي كمية كافية لتزويد ٣٠٠ ألف منزل بالطاقة، أو لإنتاج ٧٥٠ ميجاواط من الطاقة الكهربائية. وهو يعتبر جزءا من «مشاريع المرافق المشتركة» بمدينة راس لفان الصناعية، ويخضع لإدارة شركة قطر غاز بالنيابة عن قطر للبترول وشركة راس غاز المحدودة.

وقال الشيخ خالد بن خليفة آل ثاني، الرئيس التنفيذي لشركة قطر غاز: «يعتبر مشروع JBOG أحد المشاريع البارزة لدولة قطر. وتلتزم قطر غاز بكونها مشاركا أساسيا في تحقيق رؤية قطر الوطنية ٢٠٣٠، والتي تهدف إلى تصدر قطر للعب دور دولي مهم واستباقي في تقييم أثر التغييرات المناخية، من خلال الإنتاج المسؤول للغاز الطبيعي المسال، مع حماية البيئة وصونها للأجيال المقبلة». وراس لفان هي أكبر محطة في العالم لتصدير الغاز الطبيعي المسال، وهي المرفق الوحيد الذي يمكن أن يتم فيه تحميل ما يصل إلى ست سفن للغاز الطبيعي المسال في وقت واحد. ومنذ بدء تشغيل المحطة، في أكتوبر/تشرين الأول من العام الماضي، براس لفان، وهي تسترجع الغاز من أكثر من ٥٠٠ سفينة.

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البيانات الضخمة يمكن أن ترفع إنتاج النفط بمقدار ٨٠ مليار برميل

أعربت شركة جي. إي. عن أنه بإمكان أجهزة الاستشعار الذكية وتحليلات البيانات الضخمة أن تساعد شركات النفط في استخراج ٨٠ مليار برميل إضافية من النفط حول العالم، أي ما يكاد يعادل إمدادات النفط الخام في العالم على مدار ثلاث سنوات. وقالت أشلي هاينز- جاسبار، المدير العام بشركة جي. إي. للقياس والتحكم (GE Measurement & Control)، في مؤتمر تكنولوجيا الحقول البحرية: «إن حجم الجائزة جد كبير».

وذكرت جي. إي. أنها قامت، على مدار الأعوام الثلاثة الماضية، باستثمار مليار دولار أمريكي في مركز للبرمجيات بكاليفورنيا تم تكريسه لتطوير «الإنترنت الصناعية»، التي تشكل مزيجا من إمكانيات جي. إي. في تحليل البيانات، ومن فهمها لكيفية استخدام المعدات، وهو ما يمكن ترجمته إلى نماذج طبيعية. وأشارت عملاق البرمجيات إلى أن الكثيرين في الصناعة عليهم أن يقطعوا شوطا كبيرا في استخدام البيانات الضخمة. وذكرت، على سبيل المثال، أن كل منتج من المنتجين المستقلين كان لديه وحده ٤٠ نظاما حاسوبيا لجمع البيانات من أربعة ملايين تيار مختلف، قبل أن تضغط جي. إي. كل هذه الأنظمة في نظام واحد. ومع ذلك، فقد أثار هبوط أسعار النفط الخام، خلال فترة التسعة أشهر الماضية، المزيد من النقاشات بين جي. إي. وعملائها، بخصوص استخدام التحليلات لخفض تكاليف الطاقة وزيادة الإنتاج. وأضافت جي. إي. قائلة: «لقد اجتمعت شركات النفط لتخبرنا بما ينبغي علينا بناؤه، وقد كنا نشرف على تلك الشركات من خلال تقارير تغطي فترات تتراوح بين ٦٠ إلى ٩٠ يوما».وتعكس الإنترنت الصناعية الجهود الواسعة المبذولة من جانب جي. إي. بغرض الحصول على تقنيات من مختلف قطاعات كتلتها الصناعية، بدءا من قطاع الطيران والرعاية

على قطاع النفط والغاز أن يقطع شوطا طويلا نحو تبني البيانات الضخمة

الصحية ووصولا إلى نشاط النفط والغاز وغيره من القطاعات الأخرى. ومن أمثلة ذلك، مانعات التدفق الجديدة «٢٠K» التي أنتجتها شركة جي. إي. وتقدر على تحمل الضغوط العالية ودرجات الحرارة المرتفعة، أكثر من معظم معدات حقول النفط، وهي تعتبر مقتطفاً نموذجياً يمثل الأجزاء المعدلة من وحدات جي. إي.

وذكر إيريك جيبهارت، كبير المسؤولين التقنيين بشركة جي. إي. للنفط والغاز، أن مانع التدفق ملحق به أنظمة تحكم مصممة في الأصل من أجل محطات توليد الطاقة الكهربائية، وتقنية طاقة الرياح. وعلاوة على ذلك، تستطيع جي. إي. من خلال أجهزة الاستشعار التي تم الحصول عليها من إحدى الشركات المستحوذ عليها، أن تنصت إلى أية تسريبات في صمام الطوارئ.

مازارين إنرجي تكتشف النفط في تونس

قامت شركة سي تي إف التونسية بحفر البئر إلى عمق ٣٩٥٠ مترا

أعلنت شركة مازارين إنرجي عن اكتشاف خزان للنفط الصافي في حقل بري بترخيص زعفران بوسط تونس. وفي أثناء أحد اختبارات الإنتاج، تدفقت بئر Cat-١ بمعدل ٤٣٠٠ برميل يوميا، و٣٩٥٠٠٠ متر مكعب من الغاز الطبيعي يوميا. وقد قامت شركة سي. تي. إف التونسية بحفر هذه البئر إلى عمق إجمالي يبلغ ٣٩٥٠ مترا. وطبقا لما ذكرته مازارين إنرجي، فإن الهدف الرئيسي من هذه البئر هو اختبار احتمالات وجود هيدروكربونات في تكوينات الحمراء والعطشان الأوردوفيسية. وقد ثبت من خلال التسجيل الشامل وأخذ العينات أن سمك العطاء الصافي في رمال الحمراء والعطشان يبلغ ١٩ مترا في كل منهما.

وقال إدوارد فان كيرسبيرجن، الرئيس التنفيذي

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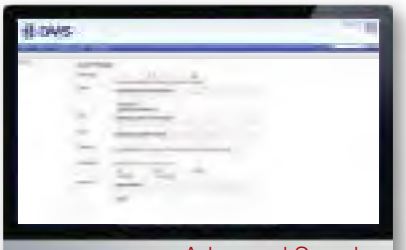

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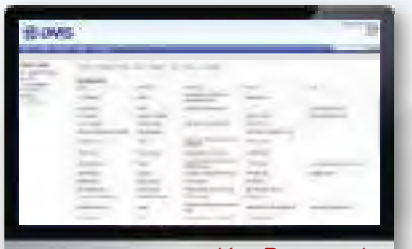
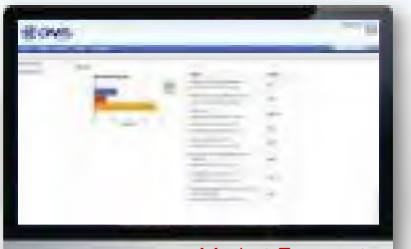
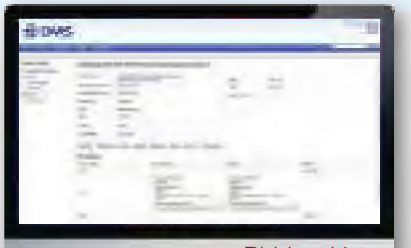


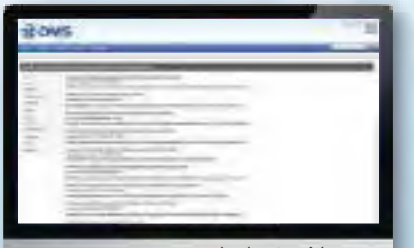
Key Personnel



Market Forecast



Bidders List



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تقنيات: الرفع الصناعي، التحكم في التدفق وقياسه.

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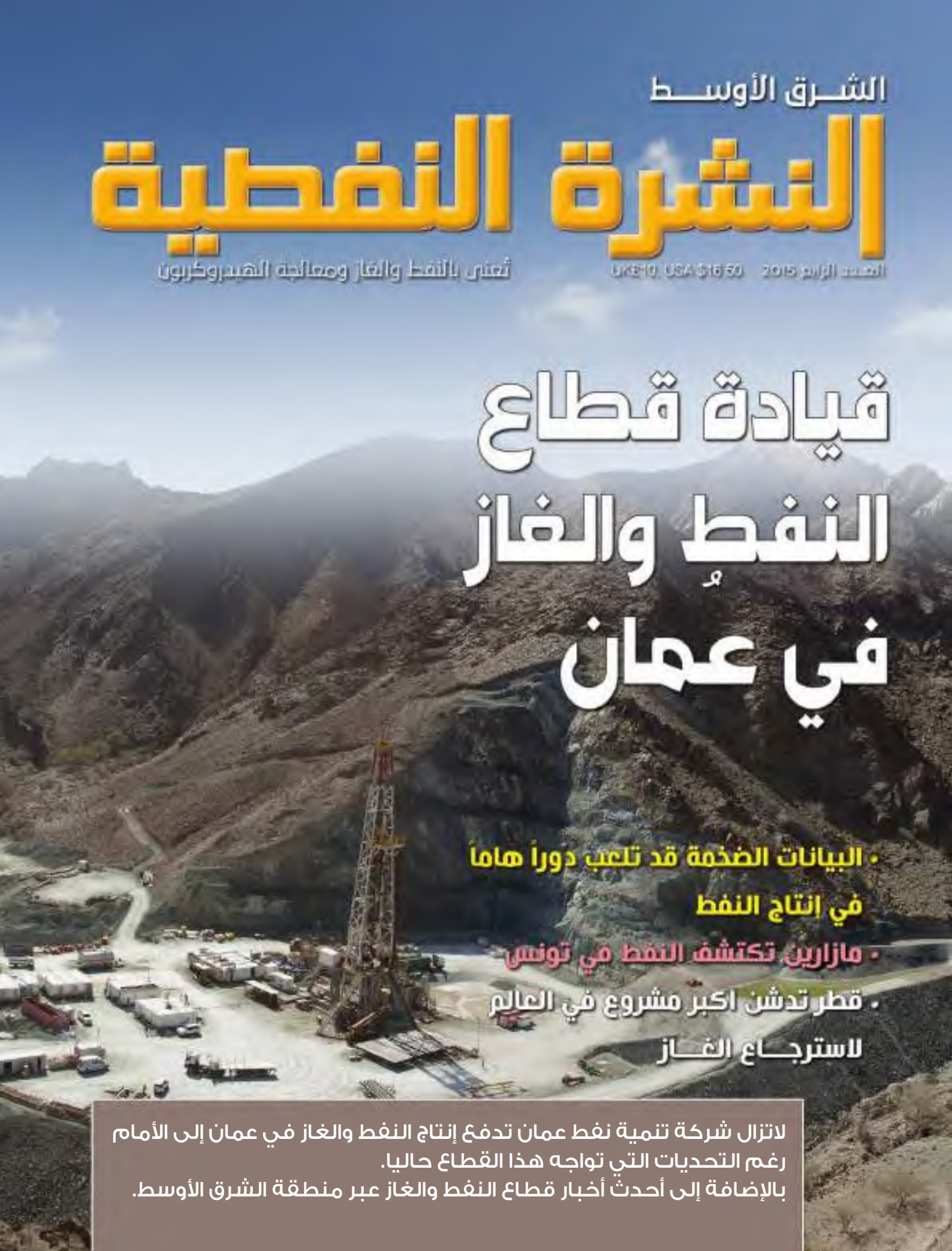

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