

Modern Energy

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Renewables scrutinised as oil price falls

The collapse in the cost of hydrocarbons undermines those who advocate alternative energy sources, reports *Christopher Adams*

It hardly looks the ideal backdrop for a deal on climate change. In a few action-filled weeks as global leaders prepare for crunch talks in Paris in December, the price of oil has collapsed to fresh six-year lows. The plunge in crude prices from \$115 a barrel last summer to less than \$50, has shone a harsh spotlight on cleaner forms of energy. The worry is that, as oil and natural gas become cheaper sources for transport and heating fuels across the globe, the shift could undermine the case for investing in renewables and slow the development of more environmentally friendly energy sources that could replace fossil fuels. It is not just renewables that could be affected by oil's slide. Efforts to replicate the US's shale revolution elsewhere by using new technology to extract "unconventional" oil and gas reserves may struggle, too. Meanwhile, oil companies are scrambling to slash costs and improve efficiency. As a result, the price collapse could lead to a wave of innovation. According to a study by Bloomberg New Energy Finance, the global power generation mix will change radically by 2040, from a system comprising two-thirds fossil fuels to one where 56 per



Motorists make merry: falling crude prices could threaten push for renewables — Brian Snyder/Reuters

cent of energy comes from sources creating zero carbon emissions. Renewables, the report says, will command just under 60 per cent of 9,786 gigawatts of new generating capacity to be installed in the next 25 years, and two-thirds of \$12.2tn investment. "Economics — rather than policy — will increasingly drive the uptake of renewable technologies," it says. As project costs come down, wind power — already the cheapest form of new generation capacity in Europe — will be the least costly option "almost

Efforts to replicate America's shale revolution elsewhere may struggle

universally", while solar power is projected to boom, accounting for almost a third of global investment. So far, despite cheaper gas, there is little evidence of a reversal in this trend. In recent months, several companies have made eye-catching investments in solar and wind power. US private equity group KKR has swooped on Gestamp, a Spanish solar developer. Germany's Siemens won an order for wind turbines from Denmark's Dong Energy worth up to \$1.2bn and US renewables juggernaut SunEdison agreed to buy the Vivint

solar-installation group. Some investments, though, have stalled. Plans by Canadian gold miner Iamgold to build a solar plant at a mine in Burkina Faso in west Africa have been put on hold, after the savings from switching to solar panels from power generators run on heavy fuel oil became less obvious. For some small island nations and large parts of Africa, where unreliable electricity supplies mean high dependence on diesel and other fuel oil

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YPF

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Argentina seeks to join ranks of shale fracking trailblazers

Vaca Muerta The country pins its energy hopes on unconventional sources, says *Benedict Mander*

As Miguel Galuccio inspects the pores in a chunk of rock sitting on his office table, the chief executive of YPF, Argentina’s renationalised energy company, launches into an enthusiastic explanation of the finer points of hydraulic fracturing, more commonly known as “fracking”.

“This is Vaca Muerta,” he says, contemplating the sample of rock that was taken from 3,000m below the earth’s surface from the shale formation of the same name in the south of Argentina, whose name translates as “Dead Cow” in English. The area ranks as one of the largest reserves of unconventional energy in the world.

“The great challenge is how to generate conductivity in this rock,” explains the petroleum engineer, waxing lyrical about how his company’s focus on technology – traditionally the preserve of oil service companies – is one of the keys to unlocking Vaca Muerta’s enormous potential.

Despite the fall in global oil prices, which has called the viability of many shale projects into question, Argentina has been pushing ahead enthusiastically with the development of its shale resources – and YPF has been leading the charge. Argentina has joined a handful of countries producing commercial volumes of crude oil from shale, together with the US, Canada and China.

Not only are Argentina’s shale reserves some of the world’s largest – in shale gas it is second only to China, while its shale oil reserves are the fourth biggest – they are also considered to be some of the best in terms of their geological quality.

Further, they are located far away from large urban areas in a country with

no serious security risks and a reasonably well-educated workforce, while much infrastructure is already in place. Also, opposition from environmental groups is unlikely to pose a serious obstacle to development, unlike in Europe and parts of US.

“The Vaca Muerta play could well be the best oil and gas shale opportunity outside of the US and Canada presently,” says Deborah Resley, manager for Latin America at IHS Energy, a consultancy.

“The recoverable resources are there, but there has to be a further reduction in well costs. Nobody has a magic bullet on efficiencies in Vaca Muerta exploitation yet,” she adds, pointing out that Argentina is not yet able to provide locally all the services and supplies needed to extract the resources economically.

YPF says it has cut the cost for basic “vertical” wells below \$7m, down from more than \$11m in 2011. But that is still well short of the \$4m-\$5m target, while in the US they cost as little as \$2m-\$3m.

Indeed, it remains unclear whether Argentina’s shale can be developed profitably – but it is early days. A concerted effort only came after the state seized majority control of YPF from Spain’s Repsol in 2012.

By contrast, the US began developing some of its biggest shale fields, such as Bakken, more than 30 years ago. Only a few hundred wells have been drilled in Argentina, while tens of thousands have been drilled in the big US shale plays.

So far, most of the wells have been drilled in one small section of Vaca Muerta, which is roughly the size of Belgium. But a dozen pilot projects under way across a wider area will shed light on what Ms Resley describes as “a very heterogeneous reservoir”.



High hopes: YPF drills for oil at Loma Campana in Patagonia
Juan Matromata/Getty

YPF has cut the cost for basic ‘vertical’ wells below \$7m, down from more than \$11m in 2011

Daniel Gerold, an energy consultant in Buenos Aires, says: “The first thing we need to do is prove that Vaca Muerta is economically viable. The second thing we need is more companies investing, with their different technologies and approaches, and exploring Vaca Muerta to see what kind of results we can get.”

Argentina is a long way from securing the \$20bn in annual investment that officials want in order to achieve energy independence within the next 10 years.

Only Chevron has committed serious levels of investment after partnering with YPF in 2012, by injecting more than \$3bn into their jointly owned Loma Campana concession, which has emerged as Argentina’s second biggest producing field.

Other oil companies with a foothold in Vaca Muerta include Petronas, Dow Chemicals, Wintershall, Total, Shell and ExxonMobil.

One of the biggest obstacles to foreign investment has been the complicated economic scenario, with companies’ room for manoeuvre severely limited by strict currency and trade controls

Funding follows state control

When Argentina seized a majority stake in YPF from Spain’s Repsol in 2012, few were expecting such positive results so quickly.

Under the leadership of Miguel Galuccio, an engineer who was handpicked by President Cristina Fernández from a senior position at Schlumberger, investment at Argentina’s biggest company jumped from \$2bn to \$6bn.

That has reversed a trend of declining oil and gas production that has left Argentina – previously self-sufficient in energy – with a large deficit.

Investors have taken note. Big names such as George Soros have taken stakes in the national oil champion. Increasing production has boosted profits, and YPF’s share price had tripled by last year, although it has since sagged with falling global oil prices. YPF has succeeded in raising more than \$2bn on the capital markets despite Argentina’s sovereign debt being in default, preventing many companies from borrowing abroad. **BM**



which complicate the process of importing equipment and repatriating profits. Another serious barrier is the inability to borrow cheaply in Argentina, which last year defaulted on its sovereign debt for a second time this century.

That could all start to change if a new, more business-friendly administration takes power after presidential elections in October, as is expected. Even so, there are concerns that a new government could phase out generous subsidies on Argentina’s oil and gas prices, which are the highest in the world and are benefiting energy companies, says Ms Resley of IHS.

But encouraging shale development has become a central plank of the country’s energy strategy.

Analysts at Cefeidas, a risk consultancy in Buenos Aires, wrote in a recent report on shale: “Regardless of which administration takes the reins at the end of this year, shale will be firmly on their political agenda.

“With sufficient levels of investment and the right technological capabilities, the shale industry could take off within the next decade,” the report concludes.

Extraction of US oil and gas aided by deep capital markets

Shale reserves

Business dynamism and infrastructure, as well as geology, has fuelled the US boom, says *Ed Crooks*

From Argentina to Britain to China, countries with suitable reserves have been attempting to emulate the shale revolution of the US, even though they lack the conditions that made it possible for that industry to flourish.

Progress so far has been slow, and the fall in oil prices to below \$50 per barrel has dealt a further blow to these ambitions. However, there are indications that shale production could be made to work outside the US.

The reason why the shale revolution began in the US was not that it has a uniquely favourable geology. The US has only the world’s second-largest shale oil and fourth-largest shale gas resources, according to reports by the US Energy Information Administration (EIA) in 2013. (And those rankings exclude Middle Eastern countries such as Saudi Arabia, which could have large resource bases but were not assessed by the EIA.)

Instead, the shale industry flourished in the US because of a uniquely favourable ecosystem. Important aspects of this include: mineral rights that gave landowners an incentive to welcome drilling; a long history of exploration that created a deep base of geological knowledge; a network of universities and companies that trained some of the world’s best geologists and engineers; equipment and infrastructure built up through years of investment; and incentives and research support that encouraged the development of unconventional resources for decades.

Above all, though, the US industry succeeded because of its dynamic entrepreneurial business culture. There were countless companies trying different approaches to extract resources from

shale at commercially viable rates, before George Mitchell, fracking pioneer, succeeded in the 1990s.

This entrepreneurship was supported by deep and liquid capital markets, so funding was available every step of the way, from the first speculative ideas to the tens of billions of dollars needed to scale up production.

No other country in the world has all these conditions in place. Without such advantages, attempts at shale development outside the US have typically faced much higher costs. A single well outside the US can cost \$15m-\$25m according to Melissa Stark of consultancy Accenture. That compares with \$5m or less in the best US shale areas.

That makes the economics of non-US shale look marginal, even with oil above \$100 a barrel. After the fall to \$50 and below, developments such as opening new shale areas are likely to be shelved.

“Some players may be able to make it work, but not at oil prices in the \$40s,” says Jason Bordoff of Columbia University’s Center on Global Energy Policy. “All higher-cost areas are going to be severely challenged at these prices.”

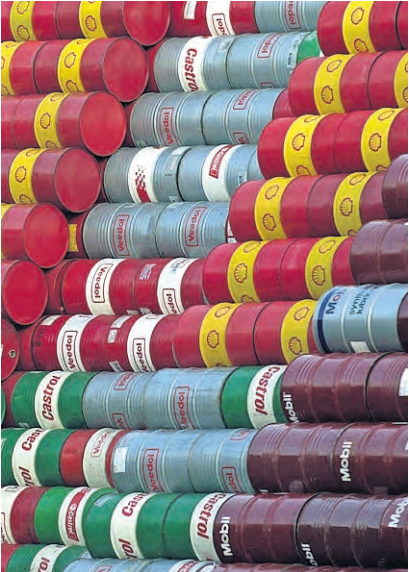
Shale exploration in Europe was faltering before the oil price decline, and

There is nothing like the freewheeling, fragmented industry of the US

many of its flickers of activity have since been snuffed out. In June, ConocoPhillips became the last large international oil company to pull out of shale in Poland, once seen as one of the most promising European countries.

The UK is another country with potential resources, but progress has been slow, hampered by objections from local authorities and communities. No wells have been fully fracked there since 2011.

Russia has the world’s largest shale oil resources, according to the EIA, and was



Empty: oil barrels awaiting reuse

starting to make progress in the Bazhenov formation in Siberia. However, the brakes have been applied by US sanctions imposed because of the conflict in Ukraine. American companies are prohibited from working with the Russians on shale or other technological developments. But Gazprom, the state-controlled gas and oil group, recently announced plans to begin commercial drilling of the Bazhenov from late 2018.

Ms Stark says that this leaves Argentina, Saudi Arabia and China as the most likely prospects, each with a large resource base and strong national oil companies.

In Argentina, where costs are much lower than in other shale regions, foreign companies are still working. And in Saudi Arabia, the national oil company Saudi Aramco reported in May that it was close to starting deliveries of shale gas for industrial projects in the north of the kingdom, even though the lack of water makes large-scale production difficult. It expects to go from 20m-50m cubic feet of shale gas production a day, to 500m cu ft a day in 2018.

The most striking success in non-US shale has come in China. At the Fuling field in the Sichuan basin in the southwest, Sinopec, one of the large state-controlled oil groups, has increased production faster than expected, reaching 460m cu ft a day last June.

In none of these three countries will one find anything like the freewheeling, fragmented oil industry of the US. Their industries are characterised by strong, state-controlled national oil companies and heavy government involvement. They may well develop a US-style ecosystem in time, but that remains to be seen.

Inspection drones take off as flying robots replace rig workers

Technology

Unmanned aerial vehicles offer the prospect of cheaper, quicker and safer inspectors, says *Anjli Raval*

Drones have been dropping missiles on military targets for years, but their commercial use in the energy sector is just getting under way.

The world’s biggest oil and gas companies are turning to unmanned aerial vehicles rather than people, for inspecting and monitoring offshore rigs, pipelines, storage tanks, flare stacks and other infrastructure.

“It’s far safer, quicker and more cost-effective than incumbent techniques,” says Chris Blackford, co-founder and chief operations officer at Sky Futures. His drone inspection company, headquartered in London, specialises in the oil and gas industry.

Conventional techniques, particularly miles out at sea, involve abseiling workers who must brave poor weather conditions and dangle from wires to inspect and log the deterioration of physical infrastructure. Companies such as Sky Futures use remotely operated drones equipped with high-definition video and thermal cameras to carry out much of the same work.

“The inspection data we can collect in five days takes rope-access technicians about eight weeks,” says Mr Blackford, who counts BP, Royal Dutch Shell, BG Group and Statoil among its client base.

The use of robots instead of people means that operational shutdowns occur less frequently, helicopters are not required and neither must vessels stand by in case of emergencies.

Mr Blackford, a British Army veteran, says: “For companies that are rushing to cut costs but do not want to compromise on safety, this is a big attraction.” His idea for the business sprang from his experience in combat operations in Iraq and Afghanistan.

The steep fall in oil price over the past

year has no doubt focused minds, and Sky Futures’ business is booming. Energy companies have been on a cost-cutting mission: slashing investment budgets; reducing headcounts; and trying to rein in spending on everything from information technology to the cost of servicing contractors.

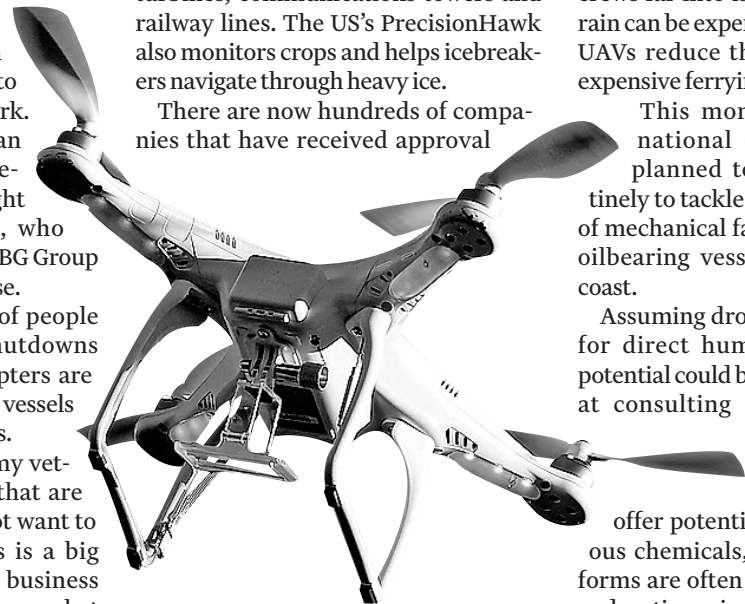
“When oil prices were at \$100 a barrel and companies were making a lot more money, it didn’t really matter how long you took to do these inspections or how many people you used,” says Mr Blackford. “Demand for our services has doubled this year from 2014 levels, and is expected to treble next year,” he adds.

In terms of markets for expansion, the company is focusing on Asia and the US, getting the nod from federal regulators – the Gulf of Mexico has a third of the world’s 10,000 rigs.

Companies such as Sky Futures are considered data companies rather than drone providers. They are building information databanks that can measure defects and corrosion and can send more regular, accurate updates to companies that span the energy sphere, from oil and gas exploration to renewables and utilities.

Other companies include Cyberhawk Innovations of Scotland. Its services extend to the inspection of wind turbines, communications towers and railway lines. The US’s PrecisionHawk also monitors crops and helps icebreakers navigate through heavy ice.

There are now hundreds of companies that have received approval



At work : drones have an increasing part to play in the oil industry

from the US federal government to operate drones for commercial purposes, from aerial photography to pizza delivery.

When regulators issue a complete set of rules regarding drones in the next year, it could act as a catalyst for more businesses to enter the field.

Several large companies have already taken the plunge. A landmark in the progress of civil operations by unmanned airborne systems occurred in 2013, when ConocoPhillips, an oil group, launched a surveillance drone from a ship off Alaska to test its navigation and sensors and help streamline the approval process for future flights in US airspace.

Conoco said at the time that drones could be used to monitor ice floes and whale movements, providing information on threats and environmental risks while drilling in Arctic seas.

Over the past year, oil groups Royal Dutch Shell and Apache have also dabbled in the technology. BP too plans to deploy drones to inspect pipelines in remote areas of Alaska.

Analysts say oil and gas companies will emerge as prime users of drones, given that exploration and production tend to take place offshore or in sparsely populated areas. Sending inspection crews far into isolated or difficult terrain can be expensive and dangerous, so UAVs reduce the need for risky and expensive ferrying of staff by helicopter.

This month NNPC, Nigeria’s national oil company, said it planned to deploy drones routinely to tackle theft as well as the risk of mechanical failure across its fleet of oilbearing vessels working along its coast.

Assuming drones can prove a match for direct human inspection, their potential could be immense say analysts at consulting company Accenture.

“Pipelines span thousands of miles, manufacturing facilities offer potential exposure to hazardous chemicals, and production platforms are often remote, in deep water and arctic environments. The complexities, risks and scales involved are immense.”

Modern Energy

Denmark considers wind a less volatile option

Renewables As the UK wrangles on subsidies, Danish support for renewables remains high, writes *David Waller*

When oil soared to almost \$150 a barrel in 2008, the drive to develop new ways to generate renewable energy seemed unstoppable. Seven years on, with oil prices about a third of that level, the arguments for going green appear more nuanced.

Now, the focus of governments hit by persistent economic downturn is to reduce the cost of subsidising renewable energy.

There are fears the drop in the oil price will destroy hopes of further rapid growth in the renewables, but they are not shared by Henrik Stiesdal. The Danish wind energy pioneer, a former chief technology officer at Siemens Wind Power, says: “The key is stability. You can talk about the low oil price, but you can look at it in a different way. What about the high volatility? How will that affect renewables,” he asks.

“The oil price is falling now, but you know that falls tend to be linked to hikes, so you have the chilling thought that prices will rise again. People who take a long-term view see volatility and therefore uncertainty, but you know what you get with renewables – there is very little volatility.”

Initially driven by co-operatives and farmers, the rise of wind power in Denmark has led to the creation of a vibrant corporate sector. In Copenhagen at least, the current glut of cheap hydrocarbons has not undermined a consensus in favour of continued state support for the green energy source.

Dong, the country’s leading energy company, has emerged as a leading force in the global wind power market. Jakob Askou Bøss, senior vice-president, says: “In the 1970s, all our energy came from oil from the Middle East, so when the oil crisis hit, it demonstrated how vulnerable we were.”



Breezing ahead: ships pass marine turbines near Copenhagen
Dreamstime

Since then, a remarkable political consensus has developed around the strategic desirability of building Denmark’s wind power fleet, says Mr Bøss. As a result, arrays of wind turbines now produce about 40 per cent of the nation’s power and are expected to deliver 50 per cent by 2020. On a particularly windy winter’s day last year, the sector even managed to meet 105 per cent of quotidian power needs.

This consensus “has created a stable

and consistent political framework, which is important for investor security”, according to the Danish Energy Agency.

A combination of economic self-interest and environmental altruism continues to underpin the investment appeal of the sector, even though financial subsidies have gradually been cut.

This persisting political consensus began to form in the 1970s, when environmentalists and farmers established

In 2014, close to 10 per cent of the UK’s electricity came from onshore and offshore wind

the sector. Although the industry is now dominated by large corporations focused on offshore wind farms, the early mass involvement means that “hundreds of thousands of Danes became co-owners in a country of just 5m people”, according to Mr Stiesdal.

Denmark initially introduced a scheme where the purchase of equipment was subsidised by 30 per cent, before switching to a feed-in tariff with a guaranteed energy price. Mr Stiesdal

explains: “This turned out to be too lucrative, so after some years they restructured the scheme so you received support for only part of the life of the turbine.

“But the key word in this is stability. They say renewables are too expensive, but onshore wind is the cheapest form of energy in Denmark. It wasn’t originally like that and isn’t yet with offshore wind, but competition has driven down the price.”

Conversely, across the North Sea, the decline in the cost of carbon-based fuel stock and a clear election victory for the Conservative party has led to concerns among green energy advocates of a reversal of support for renewables.

Last month, Amber Rudd, the UK’s energy and climate change secretary, announced plans to reduce guaranteed prices (or feed-in tariffs) for small solar, wind and hydroelectric power installations from next year.

The Conservatives, no longer reliant on their former Liberal Democrat coalition partners, had already signalled their intent to end new subsidies for onshore wind.

Greenpeace has attacked these policy changes, saying: “The cheapest form of low carbon electricity is onshore wind, followed by solar, both of which the government is doing its utmost to sabotage.”

Ms Rudd’s department has defended the curtailment in financial support for further onshore projects, insisting her policies balance the interests of developers and the public properly.

Beyond the war of words, the UK continues to invest heavily in expanding its fleet of offshore wind turbine arrays, even as the debate about support for renewables becomes more fractious.

Last month, Ms Rudd granted consent for world’s biggest offshore wind farm on the Dogger Bank in the North Sea. That decision takes the total number of approved projects in the North Sea zone to 4.8 gigawatts, almost equal to all the offshore wind capacity currently in operation in the UK.

In 2014, close to 10 per cent of the UK’s electricity came from onshore and offshore wind. Onshore turbines accounted for 5.5 per cent, while offshore arrays delivered 4 per cent of grid supplies.

Renewables scrutinised as oil price falls

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for generators, a leap to renewables now appears less likely.

The longer term effects, should prices stay low, are harder to read.

Ben Warren, a financier with consultancy EY, says renewables have been “largely isolated” from oil prices because the power they produce is sold under long-term contracts at fixed costs. Moreover, he says, capital, operating and financing costs have fallen sharply in the past several years.

For example, a UK government auction this year for a pot of renewable subsidies worth nearly £4bn showed how competitive wind and solar have become – two solar panel projects showed they could produce electricity for nearly 60 per cent less than the government had set as a maximum benchmark for that form of power.

The greater threat to the sector’s prospects could come from a scaling back of government backing, he says. “The risk is primarily a political one. If the government in question doesn’t see renewables as making an affordable contribution to the energy mix over the longer term, then there is a risk subsidies will be reduced or withdrawn,” he adds.

Indeed, that is what has happened in the UK following the victory of the Conservative party in the UK general election in May, which freed it from coalition government.

According to Simon Virley of KPMG, Britain’s decision to cut subsidies for solar and biomass, coupled with a clear signal from the government that it intends to curb spending on deployment are “bound to presage a period of reassessment by investors of their investment plans.”

Elsewhere, however, diversification into alternative energy sources is becoming urgent. Saudi Arabia, for example, uses more than a quarter of its oil production to meet its domestic energy needs. A growing economy



means this will only increase – and efforts are being made to speed up solar’s development.

In the kingdom, more than \$200m has been raised to fund expansion at a California-based producer of wafer thin silicon photovoltaic (PV) modules for commercial and residential rooftops to convert solar energy directly into electrical power.

The bigger impact from oil’s slide is likely to be felt by fossil fuel producers themselves. Some believe that it could jeopardise prospects for developing shale outside the US.

Melissa Stark, global managing director for new energy at Accenture, says that shale development in countries including Australia and Mexico will be most affected by falling crude prices.

In Mexico, companies will need prices above \$80 to make shale profitable in the first instance. “Lower oil prices will also make development chal-

lenging in Europe,” says Ms Stark.

She estimates large-scale development of shale outside the US is at least five years away. Uncertainties over the extent of recoverable resources and the fiscal terms on offer, as well as questions surrounding geology, land access, drilling technology and the availability of skilled workers need to be resolved.

In such an environment, Argentina, China and Saudi Arabia, all with strong state-backed national oil companies, could be better placed to extract shale commercially. YPF of Argentina has signed a \$1.2bn deal with Chevron, the US oil major, to develop Vaca Muerta, the biggest shale field outside the US.

The fall in the price of crude is expected to keep many investments on hold, however.

Meanwhile, the world’s biggest oil and gas groups will further tighten their grip on capital spending, deferring multibillion-dollar projects in the hope that they can benefit fully from falling costs through the supply chain.

According to Wood Mackenzie, the energy consultancy, about \$200bn of spending on proposed oil and gas projects has already been shelved.

Accenture’s Arthur Hanna suggests the sector’s largest groups will look for greater efficiency savings, extending co-operation on shared procurement to areas such as finance and back office functions. Such efforts could lead to technological innovation.

“Virtual warehouses” for tracking stock have the potential to save millions of dollars by giving oil groups swifter access to spare parts and equipment.

Offshore, engineering advances could extend the ability of oilfield operators to perform maintenance without the need for costly on-site human intervention. Digital technologies, from radio-frequency identification to drones and robots, can further help reduce costs and improve labour efficiency, says Mr Hanna.

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Saudi Arabia looks beyond oil to exploit its sunshine

Renewables The kingdom seeks to supplement grid supplies with green power, writes *Anjli Raval*

Saudi Arabia, the world’s biggest oil exporter, is keen to start harvesting electricity from another resource it has in abundance: sunshine.

A robust patent portfolio attracted Riyadh Valley Company, the investment arm of Saudi Arabia’s King Saud University, to the solar start-up Solexel, which makes wafer-thin silicon photovoltaic (PV) panels that convert solar energy into electrical power.

Compared with conventional modules, those of Solexel are cheaper and lighter, can better withstand heat and operate well in dusty conditions, says Abdelhakim Hammach, managing director at Riyadh Valley. In theory, this is the very technology Saudi Arabia has been waiting for to jump-start its solar sector.

“We need to enable as much technology transfer and know-how into the kingdom as possible,” says Mr Hammach, whose company was created to deploy funds into alternative energy investments.

The move is a small step in the right direction, but there is a long road ahead

for a global oil powerhouse which is so heavily dependent on its most precious resource for its domestic energy needs.

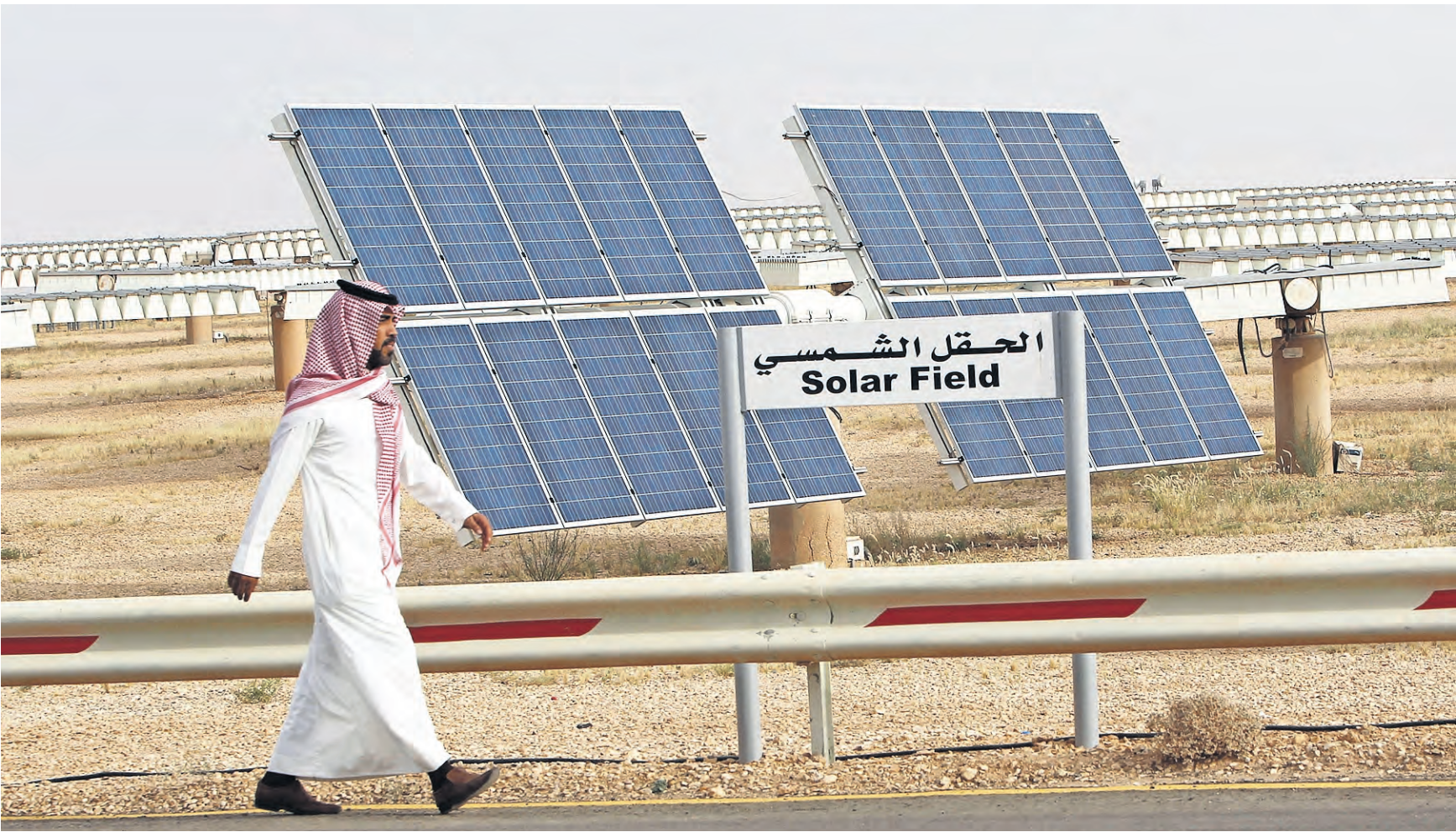
In 2012, the late King Abdullah set out grand plans for diversifying Saudi Arabia’s energy mix, a year after the Chatham House think-tank published a paper suggesting the country could become a net oil importer within 30 years if its domestic consumption remained at current levels.

Since then, there has been painfully slow progress in stimulating any significant renewable energy deployment. Plans have been tangled in government bureaucracy and have suffered from technical setbacks. The country needs panels that function well in extreme heat and dust storms. Petroleum subsidies have also weakened the economic incentive to invest in renewables.

The King Abdullah City for Atomic and Renewable Energy announced in January that the completion of its \$109bn solar project, which would create 41GW of energy capacity by 2032, will be delayed by another eight years. Prospective investors and developers are losing patience, consultants say.

Solar dawn: a Saudi man walks past panels near Riyadh

Fahad Shadeed/Reuters



The need to diversify could not be more urgent. Saudi Arabia consumes more than a quarter of its oil production, which stood at 10.6m barrels a day in June. A growing economy means this will only increase.

The population has trebled to about 30m since 1980, but energy usage has outpaced that of the UK, which has more than double the number of people, according to BP’s annual Statistical Review of World Energy.

“They are burning the oil because they have it,” says Holger Rubel, who leads Boston Consulting Group’s green energy and sustainability practices. “They have to find a business case for turning to solar.”

The oil price crash has created an imperative to concentrate on maximising export revenues rather than flushing much of output away in domestic use. Longer term, Saudi Arabia needs to maintain oil sales to retain its global political and economic influence.

Even veteran oil minister Ali al-Naimi has said the kingdom plans to become a “global power in solar”, which is “more economic than fossil fuels.”

High energy demand has led the country to consume more than a quarter of its oil production

Paddy Padmanathan, chief executive of ACWA Power International, a Riyadh-based power plant developer, hopes to replicate his solar projects elsewhere in the Gulf. “I’m impatient,” he says. “The intention is there, but it has been a huge challenge to align the different arms of the government.”

State-owned enterprises such as Saudi Electric Company and Saudi Aramco, which had plans to break ground on 10 or so big solar projects next year, still have to agree, as do ministries that manage renewables and water, and industrial regulators.

Observers say the new King Salman and his inner circle are making a bigger push, particularly ahead of this December’s Paris climate talks.

A major reason for the dawdling has been the kingdom’s wish to create its own renewable manufacturing business to compete with market-leading companies in Europe, the US and China.

Energy industry watchers, such as David Hobbs at the King Abdullah Petroleum Studies and Research Center, say the country could take advantage of big changes within the solar industry.

Solar power has become very cheap to produce. Chinese factories cranking out low-cost solar panels, more efficient technologies and a larger pool of investors to finance the sector have driven a 80 per cent drop in prices.

For Saudi Arabia, where it costs less than \$10 a barrel to produce oil, estimating the cost of replacing oil-based with renewable power is a trickier calculation. Even so, there is still a compelling case to bet on solar, says Mr Hobbs.

“The pace of innovation and the improvement in efficiency has been so fast that it would be unwise for the kingdom not to play,” he adds, given its solar potential and the political will to exploit it.

Taqnia, another state-backed firm, has joined Riyadh Valley Company in making investments in solar arrays both at home and abroad. Pilot projects to harvest electricity from the sun are taking place in Riyadh and elsewhere within Saudi Arabia.

“Costs have come down and Saudi Arabia has a better understanding of how to capture value,” Mr Hobbs explains.

Falling prices force cutbacks and delays to exploration

Capital spending

Oil companies are squeezing investment so they can maintain dividends, writes *Christopher Adams*

Even by the standards of past oil price collapses, the latest is shaping up to be momentous. And the world’s biggest oil companies have responded in unison – slashing spending, shedding jobs, and axing or deferring billions of dollars worth of projects.

The most recent set of company results reflects the damage inflicted on profits and revenues by a slide in the price of crude of 60 per cent since last summer. This drop from more than \$115 a barrel to less than \$50 has been triggered by a US supply glut, and accelerated by Opec’s November decision not to cut output.

In July, ExxonMobil, the US supermajor, reported a 52 per cent decline in second-quarter profits and its worst quarterly performance since 2009, while Chevron’s earnings plunged 90 per cent, hitting their lowest in more than a decade.

In Europe, Royal Dutch Shell took drastic cost-cutting action in July, warning of a “prolonged downturn” as it cut capital spending by 20 per cent and disclosed a 6,500 fall in staff numbers. And BP revealed that it was deferring projects in order to benefit from falling supplier costs.

Behind all the noise and numbers is a common theme: a laser-like focus on capital discipline.

Even before the oil price began to fall last year, energy groups were under pressure from shareholders to rein in spending and place greater emphasis on “value” over “volume”, after soaring cost inflation eroded returns during the boom years of crude prices at beyond \$100 a barrel.

That pressure has only increased. So, just as in past downturns such as 1986, oil companies are scrambling to shore up cash flow in order to protect dividends – for which their shares have traditionally been held by investors. The first and

easiest button to push is capital spending, or the investment that companies make in exploration and in developing resources that will meet demand years from now.

According to energy consultancy Wood Mackenzie, about \$200bn of spending on new oil and gas projects has been shelved, at least in part because of the plunge in the price of crude.

A recent Wood Mackenzie report says: “As corporate focus has switched to balancing the books, deferring discretionary spending, in particular in exploration and pre-development projects, is a quick win.”

By waiting longer before giving projects the green light, companies hope to force savings out of the service groups that carry out maintenance and repairs and supply labour, drilling rigs and other infrastructure.

Bob Dudley, BP chief executive, says savings of 20-30 per cent are being achieved. In time, such falls should enable flagship projects such as its Mad Dog extension in the Gulf of Mexico to go ahead, although final approval could be delayed until next year to allow for more cost deflation.

Wood Mackenzie points to deepwater and Canadian oil sands – among the most expensive reserves to develop – as dominating project deferrals. The delays are evidence of the way the majors are planning for the future. The bar for approving new production is no longer a \$90 a barrel “break-even” price – the level at which expected revenues would match costs. For many, it is now between \$60 and \$70. Shell’s Appomattox

project in the Gulf of Mexico, one of only two it is approving this year, has a break-even target of \$55 a barrel, the company reports.

The effect should be to free up cash, helping the majors cover their dividend payouts, even though a recovery in prices – to \$60 a barrel or more – could be some way off.

But what will it mean for supply? If investment is delayed by this discipline on spending, then the eventual replacement of naturally declining production is also deferred. Output growth should fall as a result of these cuts and a sharp decline in the number of active drilling rigs.

If so, there is little evidence yet that it is having an upward impact on prices. If anything, supplies still look plentiful. Production by members of the Organization of the Petroleum Exporting Countries (Opec) has risen this year, underpinned by record output from leading member Saudi Arabia.

US output, which many thought would have been hard hit by Riyadh’s decision not to curb production last autumn, may have plateaued but is not tumbling. The prospect of Iran’s return is also weighing on prices, after it struck a deal with the west to restrict its nuclear programme.

On the other hand, demand for oil products is recovering. One theme in the second-quarter results was the resilience of the majors’ refining operations, which ameliorates the impact of lower revenues from crude, as there was strong demand for refined gasoline and diesel fuel, especially in Europe.

This allowed Total, the French oil group which has a substantial European downstream business, to report only a 2 per cent slide in its second-quarter profits.

The boost to downstream businesses may be temporary, however. And, for now, there is unlikely to be any let-up in cutting costs.

Iain Conn, chief executive of UK-based Centrica and formerly with BP for many years, says it typically takes two years for the supply chain to react to such a sharp move in oil prices.

With Opec intent on protecting its franchise of low-cost, high-margin barrels, companies will only tighten their capital spending further.



Bob Dudley: waiting for costs to fall

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