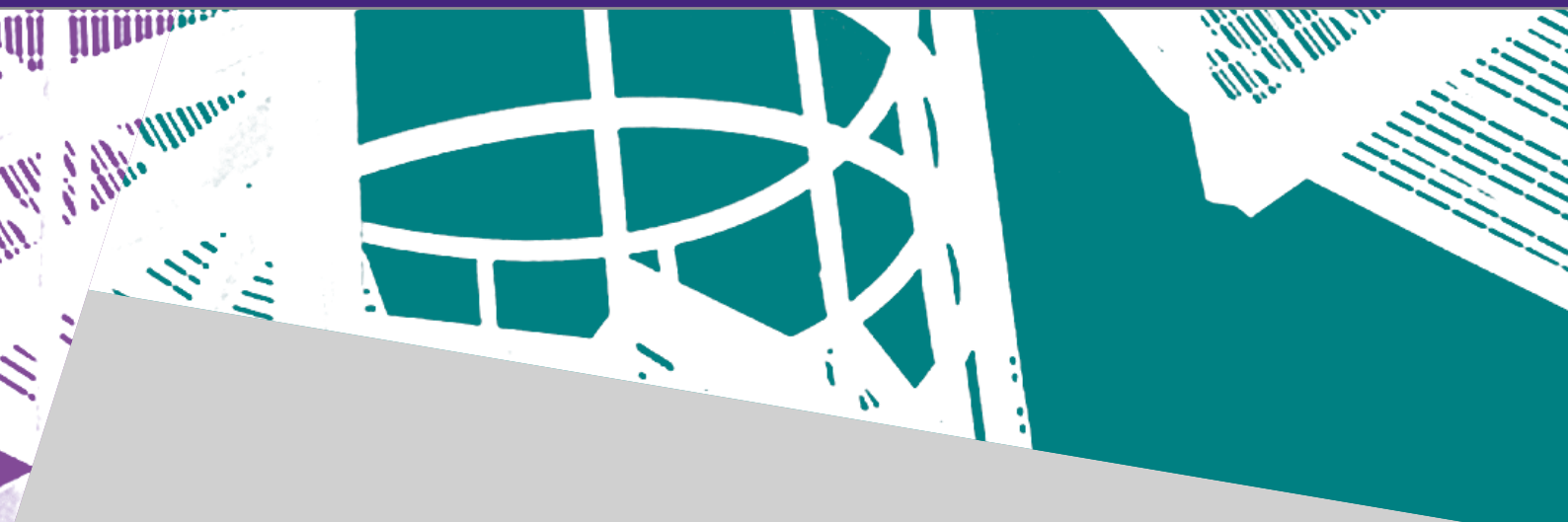
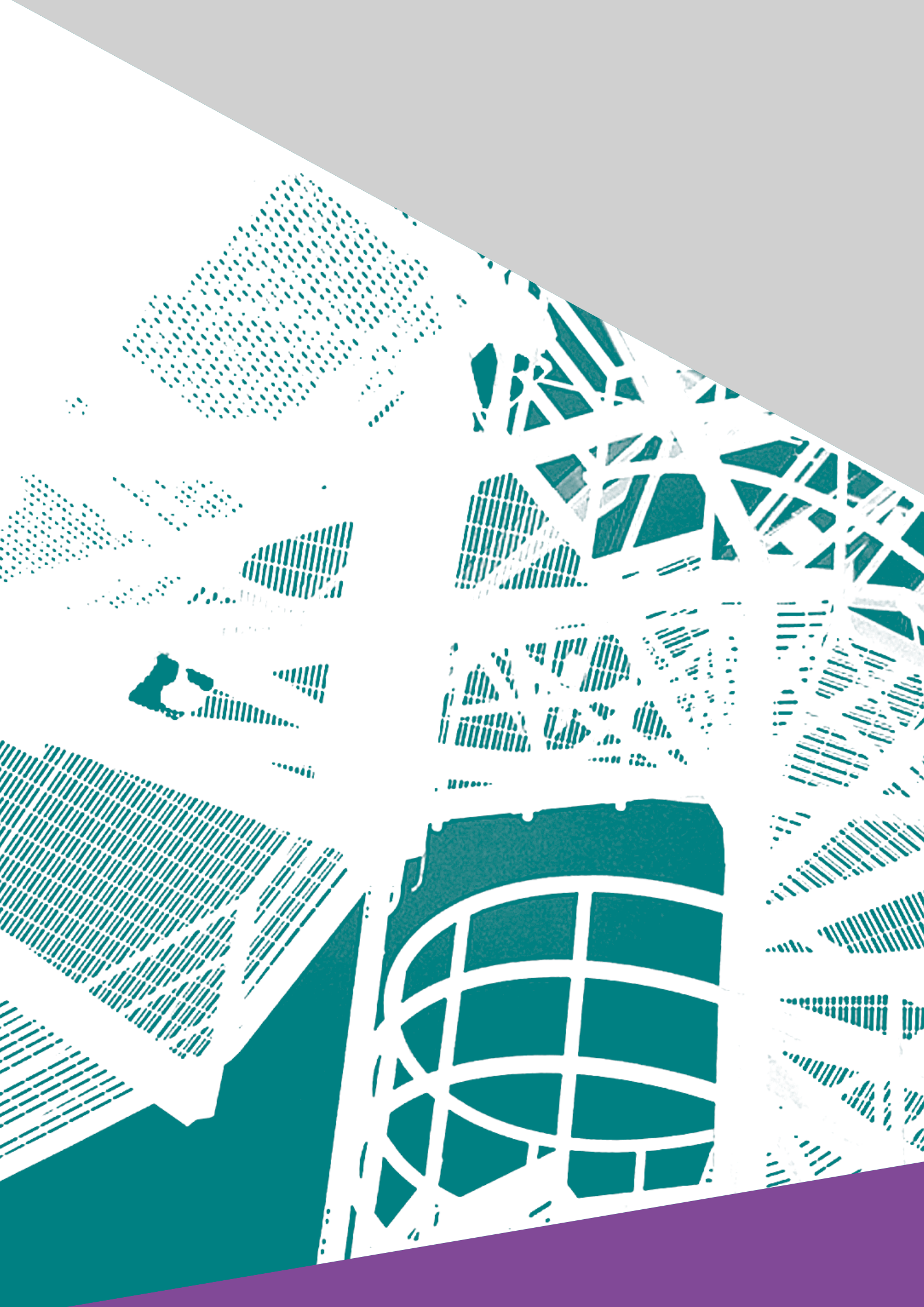


OIL&GAS^{UK} MARKET INSIGHT DECEMBER 2017





1. Introduction

Welcome to Oil & Gas UK's *Market Insight* which provides an overview of the current business environment, while informing on the latest operational trends and performance on the UK Continental Shelf (UKCS). Our *Market Insight* will be published every six months, with each edition featuring a different focus area. This edition puts a spotlight on the work the industry and the Oil and Gas Authority (OGA) are doing to achieve success in the wells area.

Figure 1: UK Offshore Oil and Gas Industry Dashboard¹

	2015				2016				2017		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Oil Price (\$/bbl)	54.0	61.7	50.4	43.5	33.9	45.6	45.8	49.1	53.6	49.6	52.1
Gas Price (p/th)	47.9	44.6	41.5	36.7	30.4	31.4	31.0	45.7	48.2	38.0	41.5
Total Production (Million boe)	144.4	157.8	134.1	159.8	162.4	155.2	148.3	157.8	163.0	158.9	141.1
Liquids Production (Million boe)	83.4	93.7	80.5	94.0	98.2	94.4	88.0	90.0	94.3	93.4	88.9
Gas Production (Million boe)	61.1	64.1	53.6	65.8	64.2	60.8	60.4	67.8	68.7	65.6	52.2
Total Expenditure (£ Billion)	21.9				17.4				17		
Operational Expenditure (£ Billion)	8.3				7				7.7		
Capital Expenditure (£ Billion)	11.6				8.3				6.9		
Exploration and Appraisal Expenditure (£ Billion)	0.8				0.7				0.6		
Decommissioning Spend (£ Billion)	1.2				1.4				1.8		
Total Well Count	36	44	54	21	26	25	26	32	29	24	31
Exploration Wells	2	5	6	0	1	5	3	5	2	3	9
Appraisal Wells	7	2	3	1	0	2	3	3	0	1	6
Development Wells	27	37	45	20	25	18	20	24	27	20	16
Total Process Hydrocarbon Releases	15	18	25	25	22	11	13	7	18	19	16
Carbon Intensity (kTCO ₂ per Million boe)	22				21				N/A		

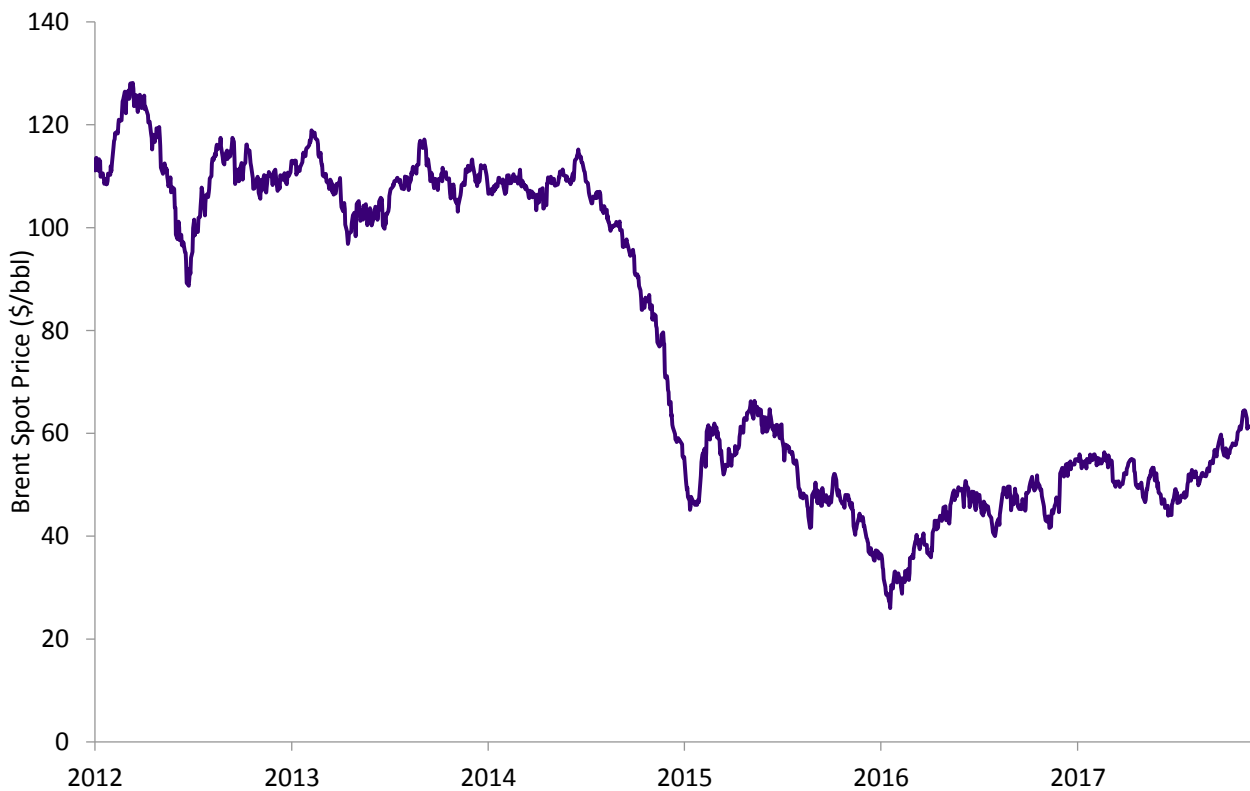
¹ The components of production and expenditure may not sum to the total due to rounding.

2. Business Environment

Brent oil spot price surpasses \$60/bbl, but caution remains in the longer-term futures markets

Recent political instability in Iraq and Saudi Arabia provided the final push needed for the Brent oil price to exceed the \$60 per barrel (bbl) mark this November for the first time since June 2015. After the sharp price fall between May 2014 and January 2016, where price reached a low of \$27/bbl, prices recovered to settle consistently in the \$45-\$55/bbl range over the 18 months before the \$60/bbl benchmark was finally exceeded. The Brent price has remained above \$60/bbl throughout November despite market sceptics suggesting that it would encourage further production increases in the US, leading to another market decline.

Figure 2: Brent Spot Price



Source: Energy Information Administration

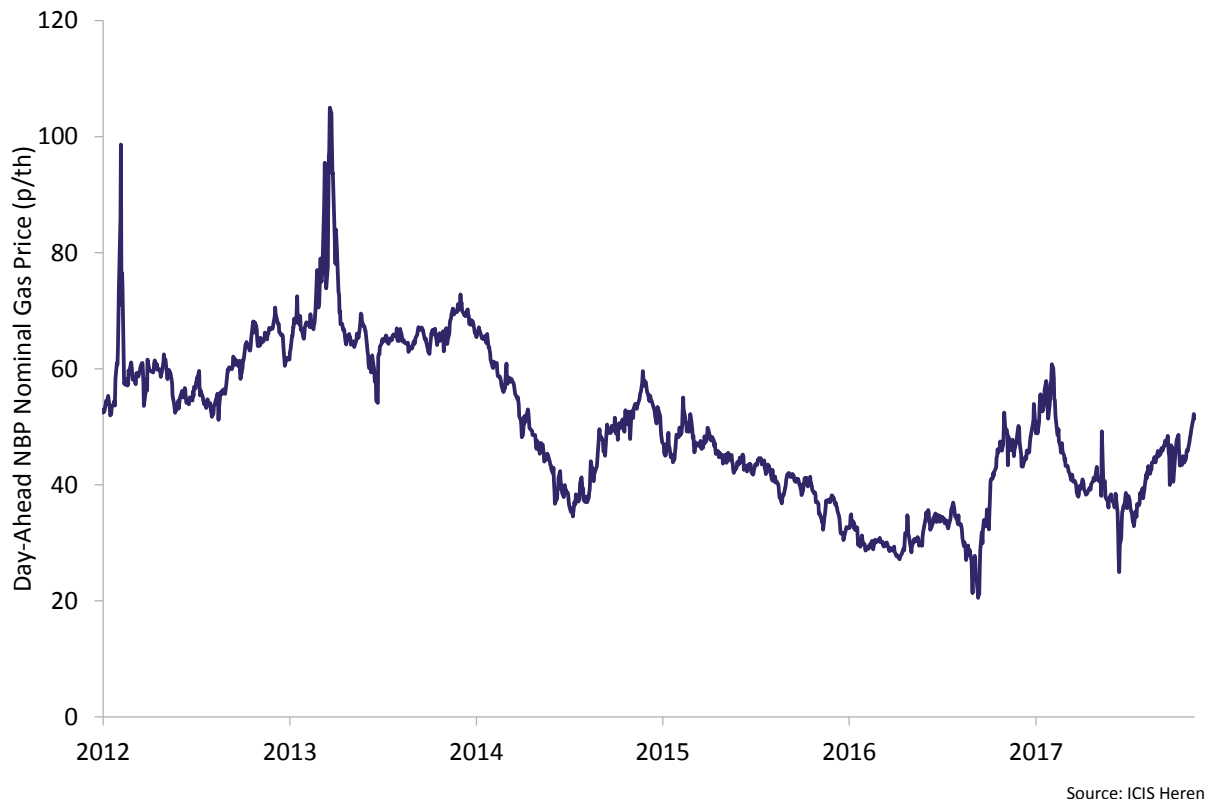
Although the Brent spot price has increased steadily over the second half of 2017, the market has moved into a position where spot prices exceed future delivery prices. With the futures curve now sloping gently downwards², near-month futures are selling at a premium to those expiring further out. This gives a temporary edge to companies selling their product on the spot market compared to those who sell their production over the longer-term in the futures market.

² At the time of writing futures contracts, as published by the Intercontinental Exchange, are trading at: \$64.1/bbl for January 2018 delivery; \$60.6/bbl for December 2018 delivery; and \$58.4/bbl for December 2019 delivery.

Gas price exceeds 50 p/th for the first time since early February as winter approaches

Through the first three quarters of 2017, the average national balancing point (NBP) day-ahead gas price was around 35 per cent higher compared to the same period in 2016. The price for winter 2017-18 remains subject to weather conditions, gas storage availability and the price of competing fuels such as coal. However, with the current day-ahead price in mid-November already more than 50 pence/therm (p/th), it is anticipated that peak winter prices will be higher this year than the last.

Figure 3: Day-Ahead NBP Gas Price

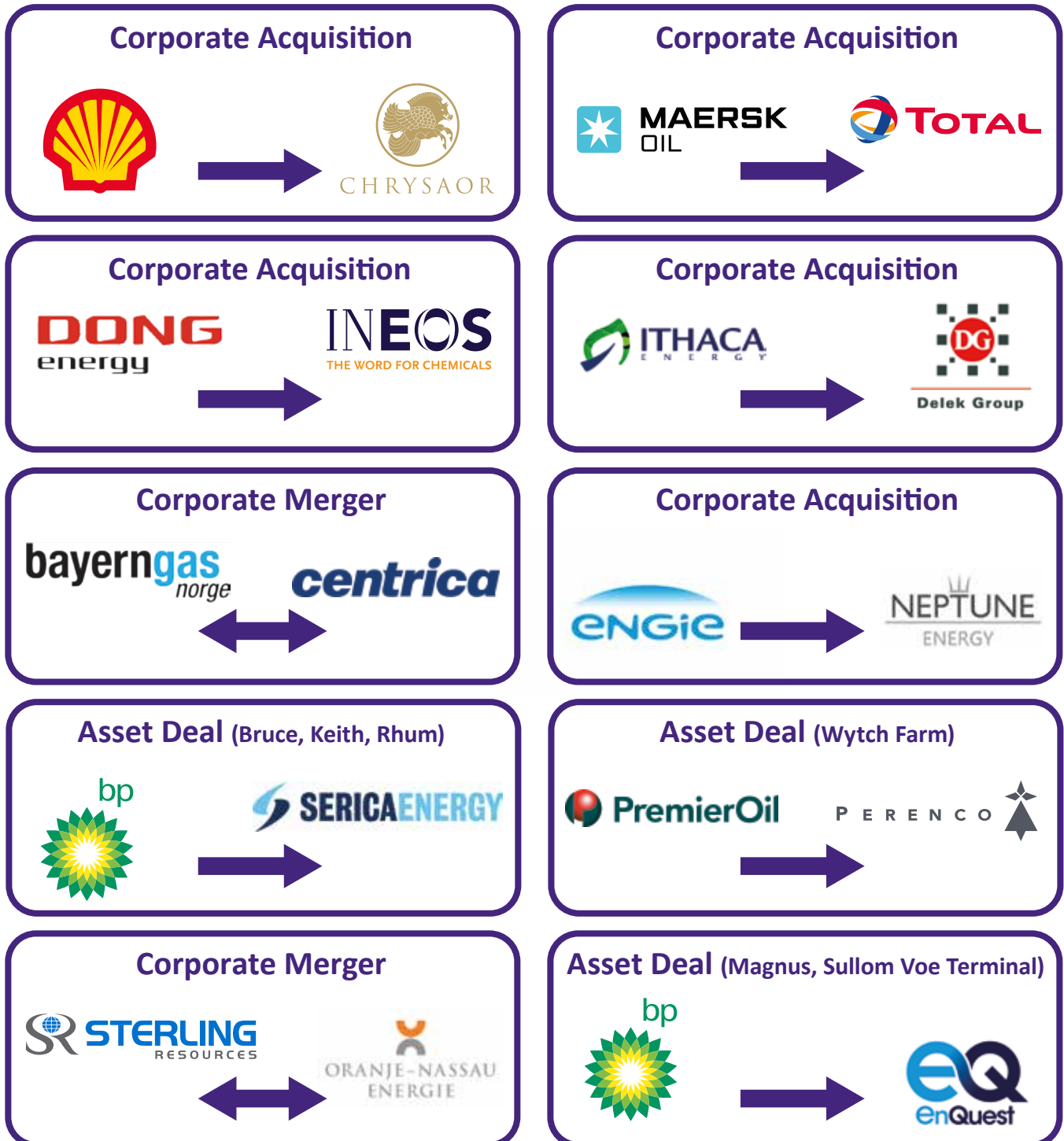


After successive years with very little seasonal swing, gas prices have now entered a winter upturn that is looking more pronounced in 2017 than in recent years. Traditionally, higher winter gas demand resulted in the UK becoming a much bigger producer from the UKCS and net-importer from the continent than it is during the summer months, therefore driving up prices. However, the UKCS now meets a smaller proportion of domestic gas demand than it once did, and diverse sources of gas are more widely available through liquefied natural gas cargoes, interconnectors with Europe and domestic gas storage. This has led to the price differential between summer and winter months narrowing over the last decade. Reduced storage capacity following the closure of Centrica's Rough storage facility and forecasts of a colder winter than in recent years, appear to be the leading causes for the return to seasonal swing for traded gas prices this winter.

UKCS deal flow to continue as transferable tax history could unlock further asset trades

The value of UK upstream merger and acquisition (M&A) deals announced this year has already surpassed \$8 billion (total UK traded value only). After a string of high profile deals announced during the first half of the year, M&A activity has shown no sign of slowing during the second half of the year. Big corporate deals have continued with Maersk Oil accepting a takeover deal from Total in August, as did asset transfers, with BP agreeing to sell its interest in the Bruce, Keith and Rhum fields to Serica Energy in November.

Figure 4: UK Upstream Mergers and Acquisitions³



³ Figure 4 shows all UK upstream M&A deals with an estimated UK traded value of at least \$100 million. Please note that many of the deals are yet to be formally completed.

Autumn Budget 2017 Update

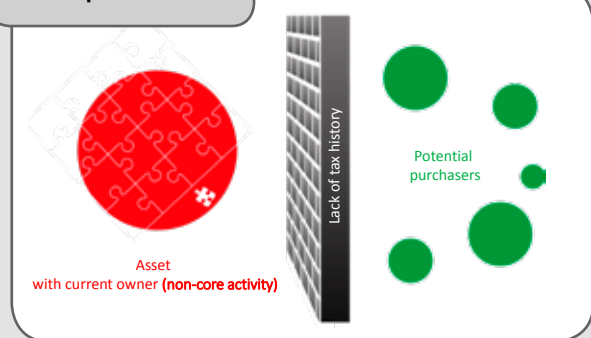
In the Autumn 2017 Budget on 22 November, the Chancellor of the Exchequer announced an agreement to allow the tax history of an asset to transfer with its sale. The measure is intended to be effective by November 2018. It will help bridge a value gap that has arisen over time between buyers and sellers of assets, as well as help attract further new entrants to the UKCS that wish to specialise in extending the productive life of the basin. This will in turn attract fresh investment in new production, creating much-needed projects for the UK supply chain. It is also expected to generate around £70 million of value to the Exchequer over the next five years through additional production tax revenues and the deferral of decommissioning activity. Experience shows such deals have been catalysts for new capital investment and new operating models. Analysis shows that assets gaining a new operator from 2011-16 benefitted on average from field life extensions of nearly five years.

The implementation of transferable tax history builds on the positive headline rate tax changes that have lowered the rate of tax on UK fields from 62-81 per cent in 2013 to 30-40 per cent today. The UK now has a fiscal regime that ranks in the top quartile globally in terms of post-tax returns to investors. This can positively differentiate the UK from other basins competing for capital.

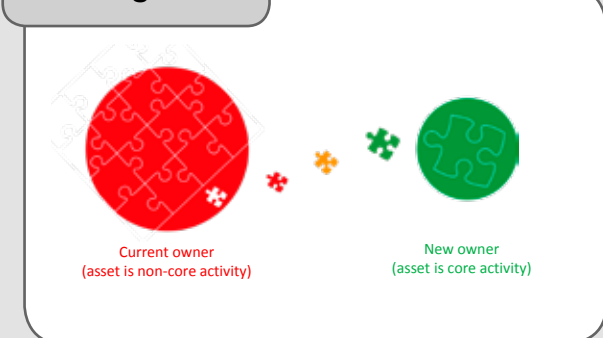
The Treasury also announced a technical consultation on petroleum revenue tax deductions for decommissioning and is providing clarification on how tariff income is treated within the Ring-Fenced Corporation Tax Regime.

The benefits of transferable tax history

The problem



The goal



The benefits to the Exchequer and wider stakeholders

Benefits to industry

Aids deal flow

Maximising economic recovery from the UK Continental Shelf

Benefits to the Exchequer

Delay decommissioning and cost

Increased production taxes

Benefits to the UK as a whole

Security of energy supply

Jobs on and offshore throughout the supply chain

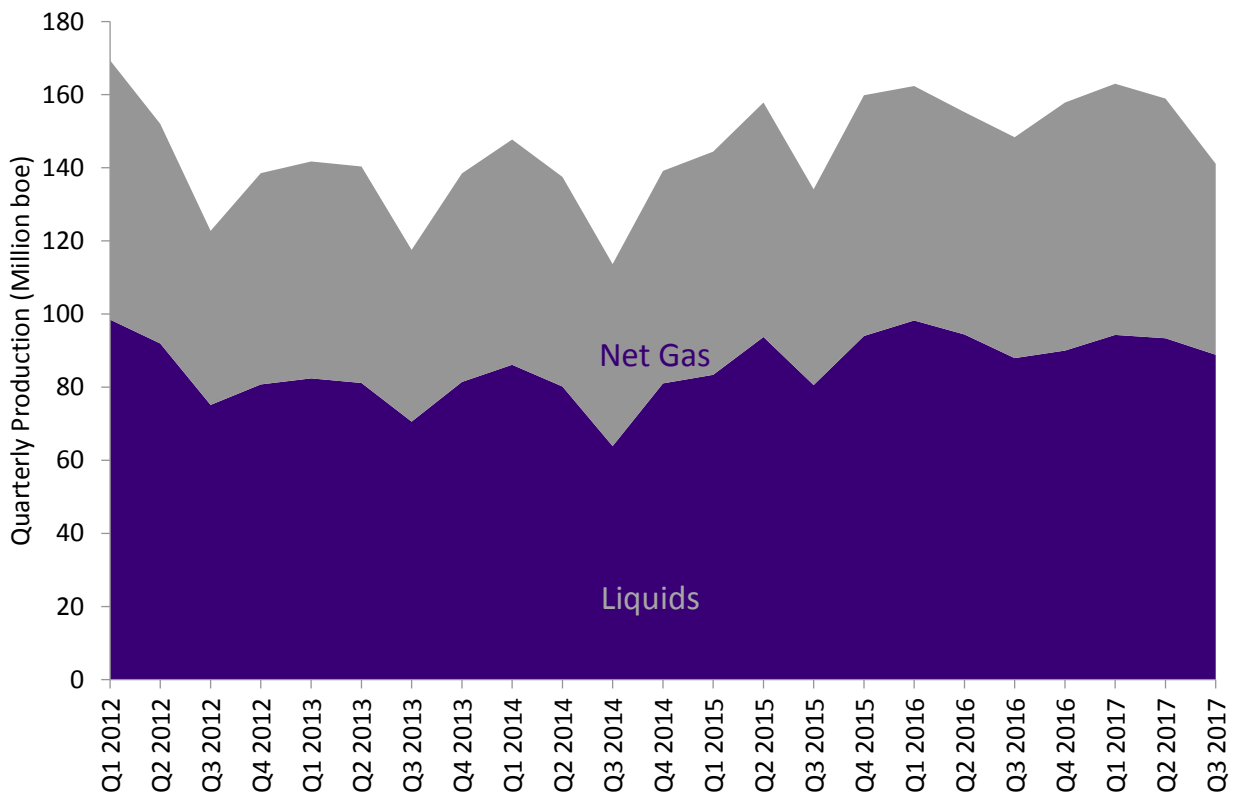
3. Operational Trends

Forecast production increase in doubt due to Forties Pipeline System Outage

The recent upward trend in production was set to continue in 2017 before the outage at the Forties Pipeline System (FPS) in the fourth quarter. Although the total impact of the unplanned shutdown is not yet clear, with the news having only broken at the time of going to print, FPS is responsible for transporting over 40 per cent of the UKCS’ liquids production with over 80 fields feeding into the pipeline.

Production this year has been supported by no less than nine greenfield start-ups over the first three quarters of the year, already one more than the eight seen during the whole of 2016. Volumes were also boosted by the significant restarts of the Schiehallion and Loyal fields, which are expected to reach plateau production of 130,000 barrels per day before the end of the year through the Glen Lyon floating, production, storage and offloading vessel. Most of this year’s start-ups were discovered more than a decade ago, with the average time from discovery to first production as long as 16 years. Advancements in technology and attractive economic conditions at the time of sanction are the primary drivers behind the investment in these fields that were once seen as uncommercial.

Figure 5: Production



Source: Department for Business, Energy & Industrial Strategy

However, it must be noted that several of this year’s new starts have encountered some technical challenges and are still to reach plateau. The impressive performance of ‘base’ assets on the UKCS have sustained output, with production efficiency expected to increase for the fifth consecutive year in 2017 as continued work in this area reaps rewards.

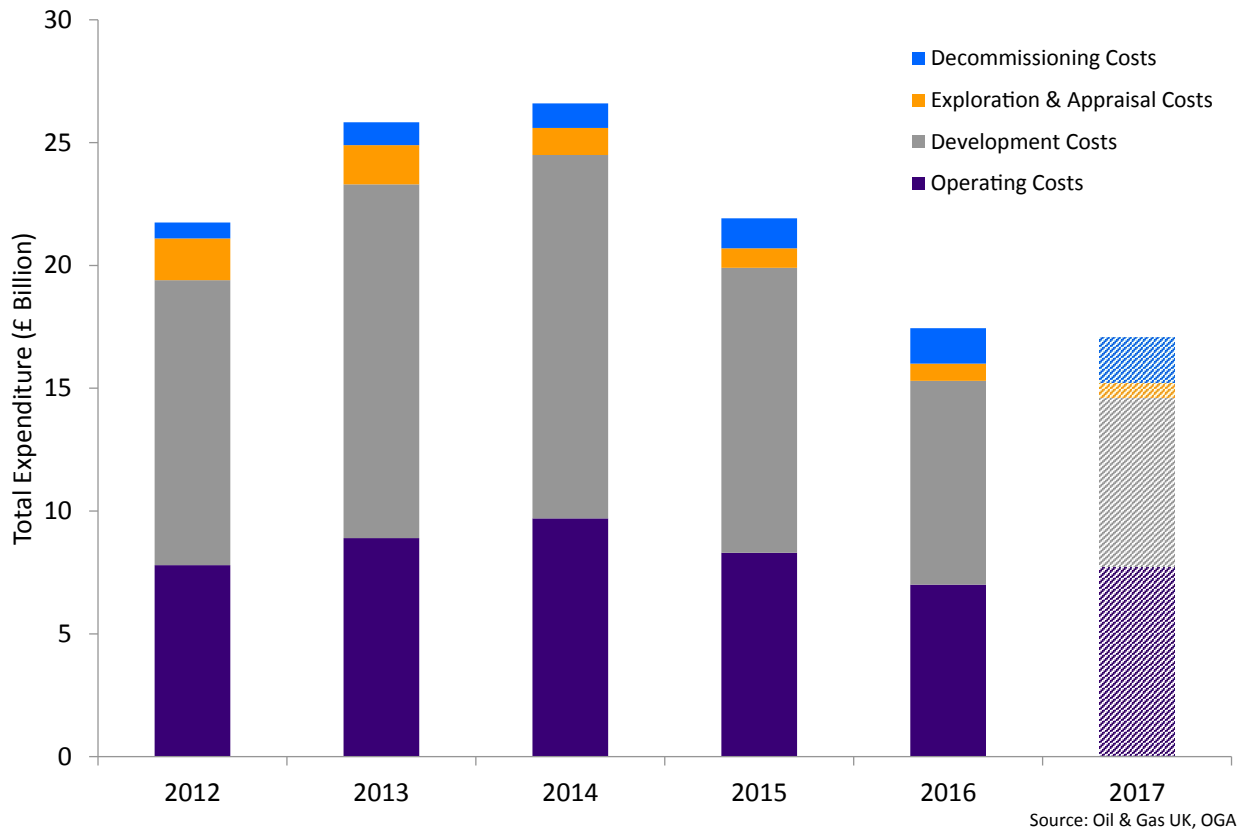
Although the 2016 start-ups of the high gas content Cygnus and Laggan-Tormore fields contributed towards gas production reaching a five-year high in the first quarter of 2017, output has fallen sharply since then. This is, in part,

because all the new start-ups this year were oil fields with limited associated gas – none are dry gas fields. However, in the third quarter, production was depressed across both liquids and gas, which suggests there has been a busier planned maintenance period this year. The increased operating expenditure has not only provided the supply chain with a much-needed boost, but should also help improve asset reliability in coming years.

New stream of projects anticipated for 2018 could signal the end of market contraction

Total UKCS expenditure is expected to remain at just over £17 billion this year, bringing an end to the sharp reductions seen over the last two years.

Figure 6: Expenditure

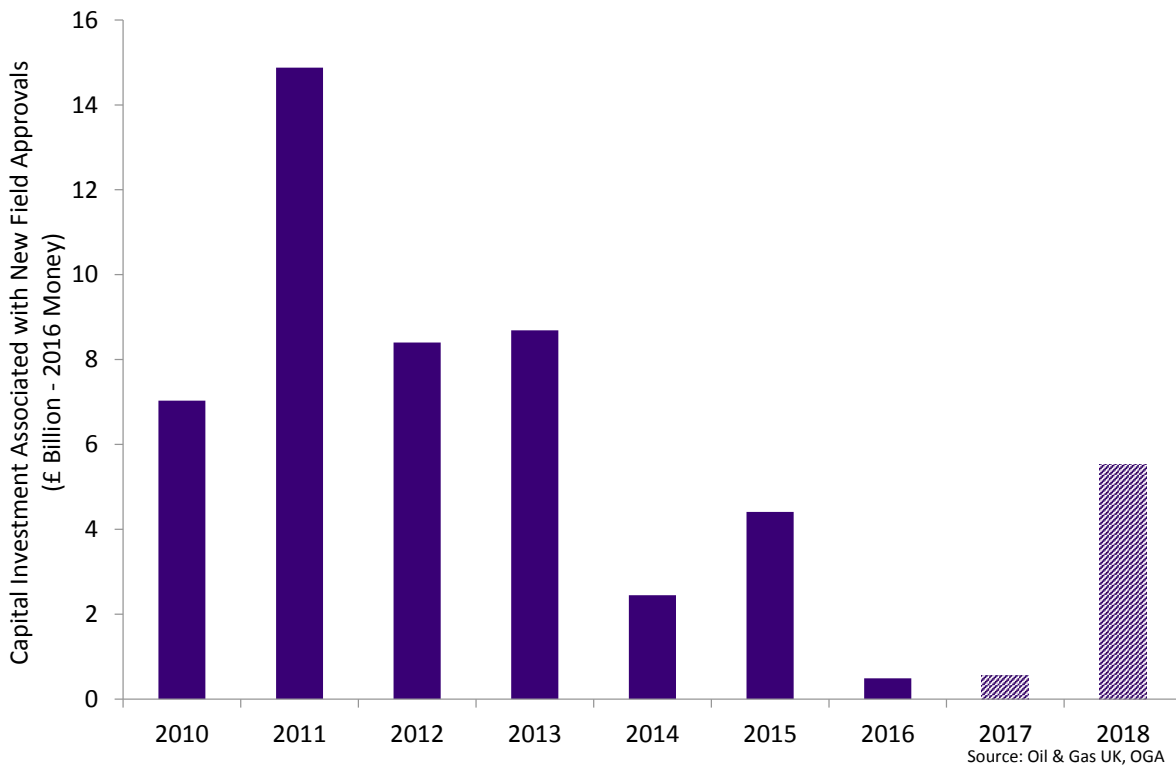


With many recent development projects now ending and production starting, capital investment is expected to fall below £7 billion this year for the first time since 2010. This reflects the caution around sanctioning new projects following the sharp oil price fall that began in summer 2014. Indeed, there have been just ten greenfield projects sanctioned on the UKCS over the last three years and only two of these came during the first three quarters of this year: the cross-border Utgard field that is 62 per cent based in the Norwegian Sea; and the Lancaster Early Production System that is a pioneer field for fractured basement reservoir plays in the UK.

However, there has been a steady stream of brownfield investments throughout the year, varying in size and scale. Most notably, it was announced in October that Chevron would deploy enhanced oil recovery technology on their Captain field.

The outlook for the rest of this year and into 2018 is more positive with projects operated by Shell, Nexen, Alpha Petroleum and Independent Oil and Gas all in the final stages of the approval process. Although the scale of these investments is not on par with those seen during the 2011-13 boom period, this is positive news for the UK supply chain and will help to improve order books for those specialising in capital project development. While there remains considerable uncertainty on timings and approvals, up to £5.5 billion worth of new capital projects could be approved during 2018, the most in any year since 2013.

Figure 7: Capital Investment by New Field Approval



Over the last three years unit operating costs have fallen by around 50 per cent and, while the relentless drive towards efficiency continues, operational expenditure may increase in 2017 for the first time since 2014. The main driver behind any potential increase is the focus on improving recovery rates within existing assets, and it is likely that operational spend will be higher than capital investment this year for the first time since 2010. Decommissioning expenditure is set to increase to around £1.8 billion in 2017, accounting for more than 10 per cent of total expenditure for the first time⁴.

⁴ For more information on decommissioning trends, see Oil & Gas UK’s *Decommissioning Insight 2017* at www.oilandgasuk.co.uk/decommissioninginsight.

Well count remains low, but technical exploration success tops 300 million boe for the second consecutive year

The number of exploration wells drilled in 2017 looks set to remain low and in line with the four-year average, with 14 spuds over the first three quarters of the year and just one more drilled over the fourth quarter. Of those drilled so far, at least two are known to be technical successes with combined recoverable volumes estimated to be over 300 million boe. Both, however, represent challenging potential developments. The Statoil-operated Verbier well was initially announced as dry, but after side-tracking to target an up-dip location, technical reserves with current estimates of between 25-130 million boe were discovered requiring further appraisal. The other success was at the Halifax well, which was exploring basement plays in Hurricane’s west of Shetland acreage analogous to their nearby Lancaster field. Hurricane encountered technical reserves currently estimated at 250 million boe, making it one of the UK’s biggest discoveries in the last decade. At the time of publication, six exploration wells have been plugged and abandoned, while a further well, Nexen’s Glengorm, was abandoned due to mechanical problems. At least two wells have not yet released their results, with two more still actively drilling in the basin.

Just seven appraisal wells were drilled over the first three quarters of 2017. With no pick-up in activity expected during the fourth quarter, this is likely to be another year of single-figure well spuds in line with forecasts at the start of the year. One reason for this low well count is the similarly low levels of recent exploration success, meaning few new opportunities have arisen for companies to pursue and appraise. However, Apache has successfully appraised their Callater discovery and one well is still active: the Wintershall’s Winchelsea discovery, which is likely to be tied back to its Wingate field if results are positive.

The number of development wells drilled during 2017 is also an area of concern for the future of the UKCS. With 63 wells drilled during the first three quarters of the year, around 80 development wells are forecast to be spudded over the full year. This represents the second consecutive year of record low development drilling. Although this may be partly attributable to more efficient drilling and recent development concepts requiring fewer wells to maintain production, there are concerns about the potential impact on production from existing platforms. Over the last 40 years, the number of development wells spudded has strongly correlated with total production from the basin, indicating that a decline in development drilling could be quickly followed by a decline in production.

Figure 8: Exploration Well Count versus Volumes Discovered

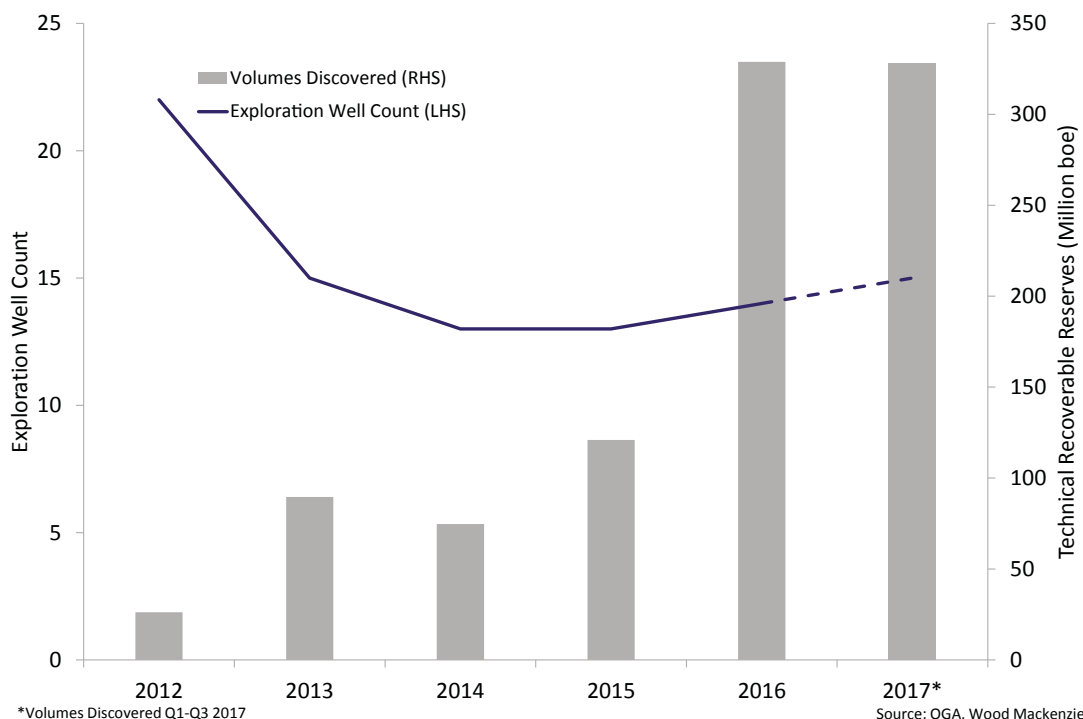


Figure 9: Appraisal Well Count

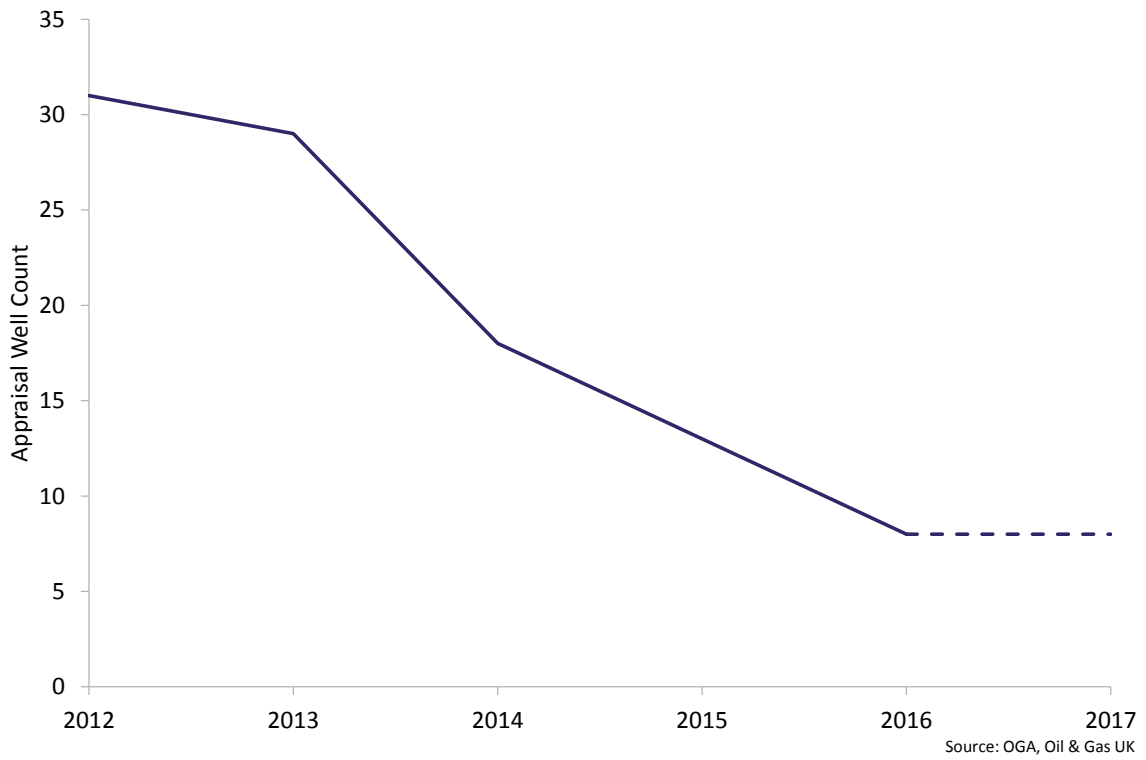
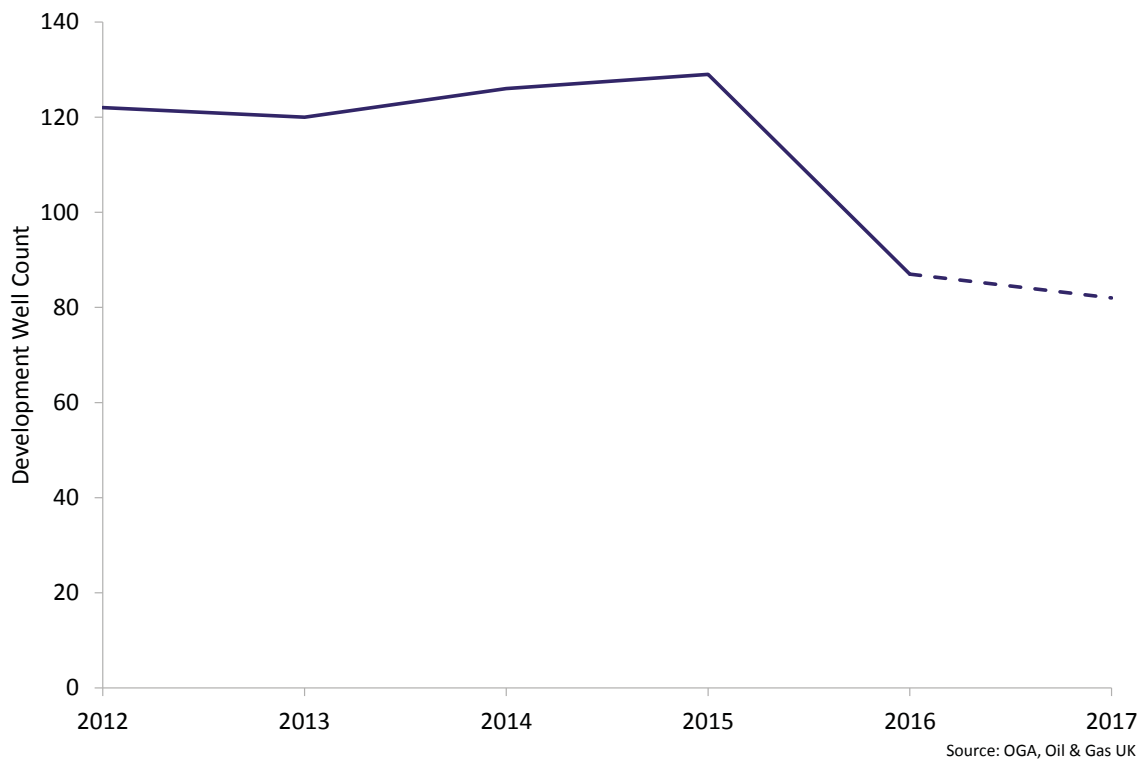


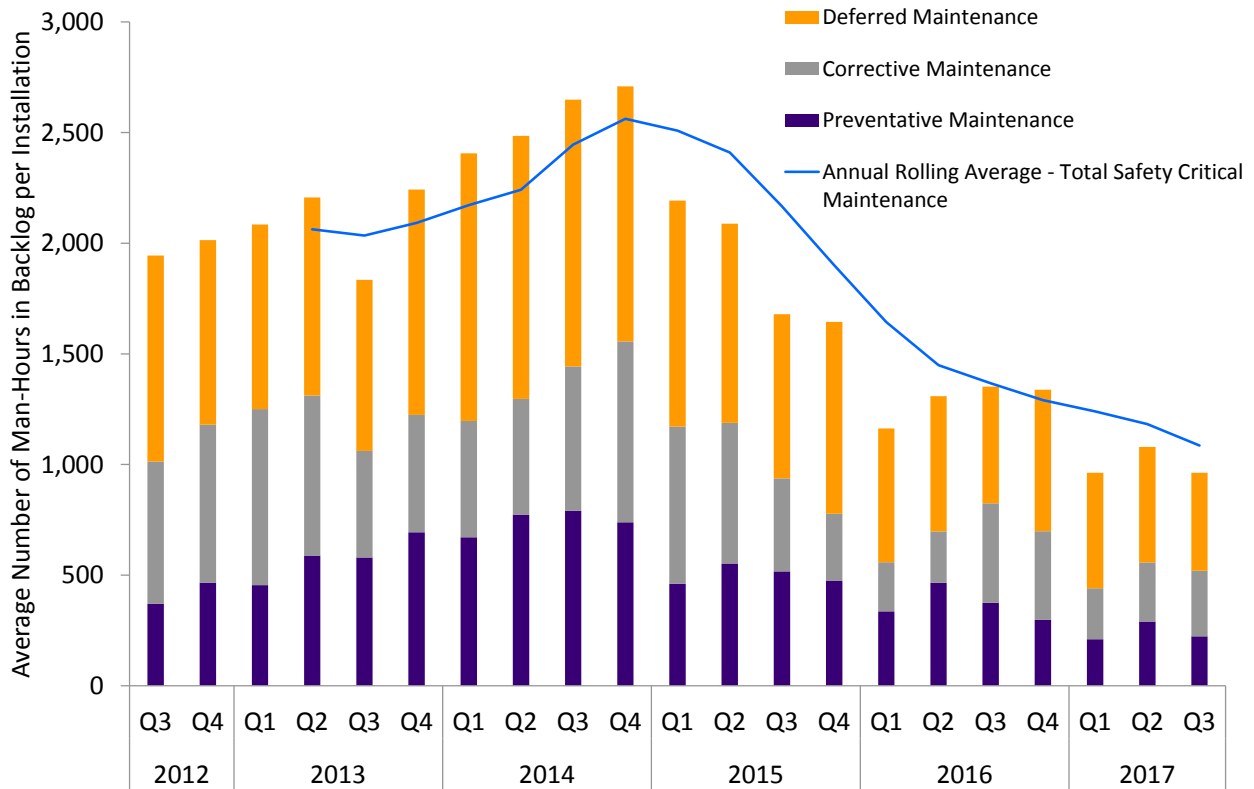
Figure 10: Development Well Count



Maintenance backlog improves, continuing the long-term downward trend

All three types of recorded maintenance backlog (deferred, corrective and preventative) have fallen in 2017, compared with last year. The longer-term trend has been downward since the start of 2015 despite the brief upturn in 2016. Oil & Gas UK continues to work with its members to improve the quality and consistency of the data it receives on maintenance.

Figure 11: Maintenance Backlog



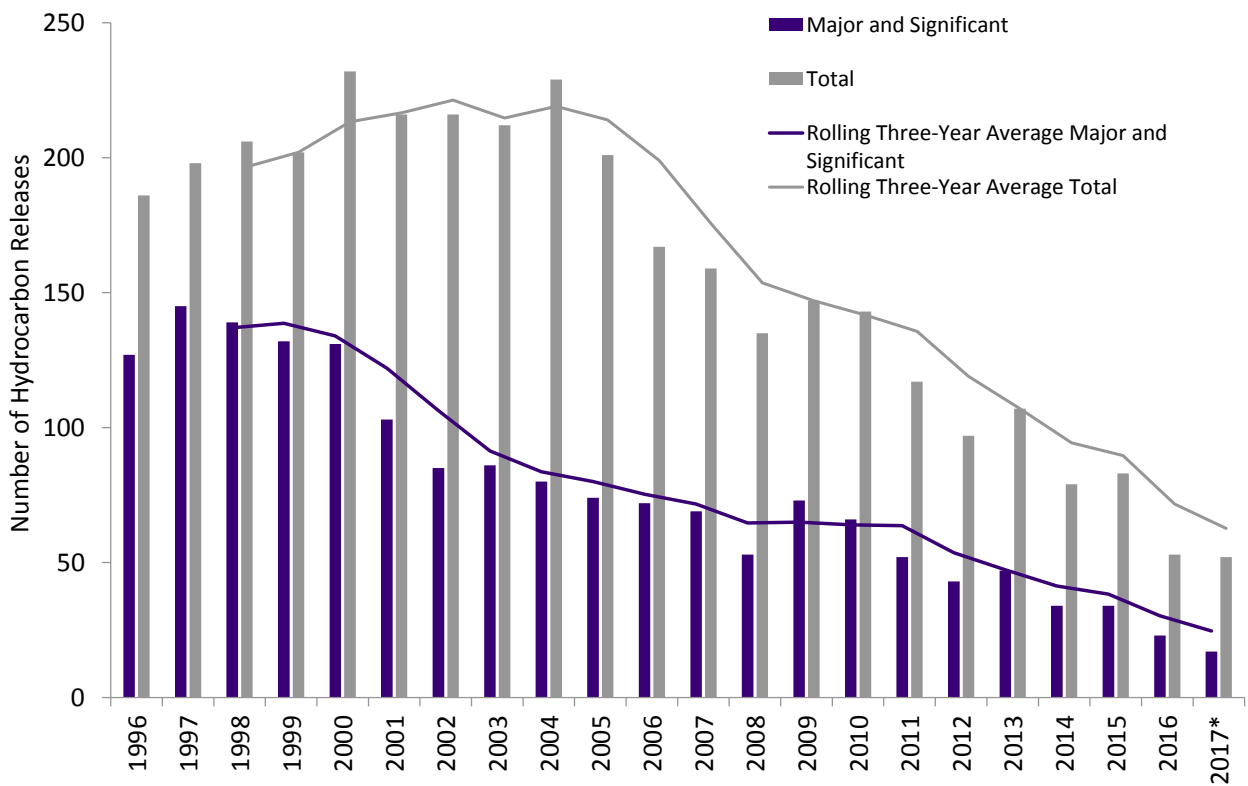
Source: Oil & Gas UK

Dangerous occurrences at lowest point on record as industry maintains its focus on safe operations

The latest statistics show the improving health and safety trends. Dangerous occurrences⁵ – such as hydrocarbon releases, fires or explosions, and dropped objects – are at their lowest on record at 292 in 2016, 62 per cent lower than the peak in 2000-01.

Process hydrocarbon releases, both in total and those classified as ‘major and significant’, are on a long-term downward trend. Although total releases look likely to increase in 2017, they are still set to be the second lowest on record. The consistent improvement in reducing the number of releases began in 2004, with the start of the Asset Integrity Key Programme initiated by the Health and Safety Executive and committed to by industry.

Figure 12: Process Hydrocarbon Releases



*2017 Q1-Q3 data only

Source: Health and Safety Executive

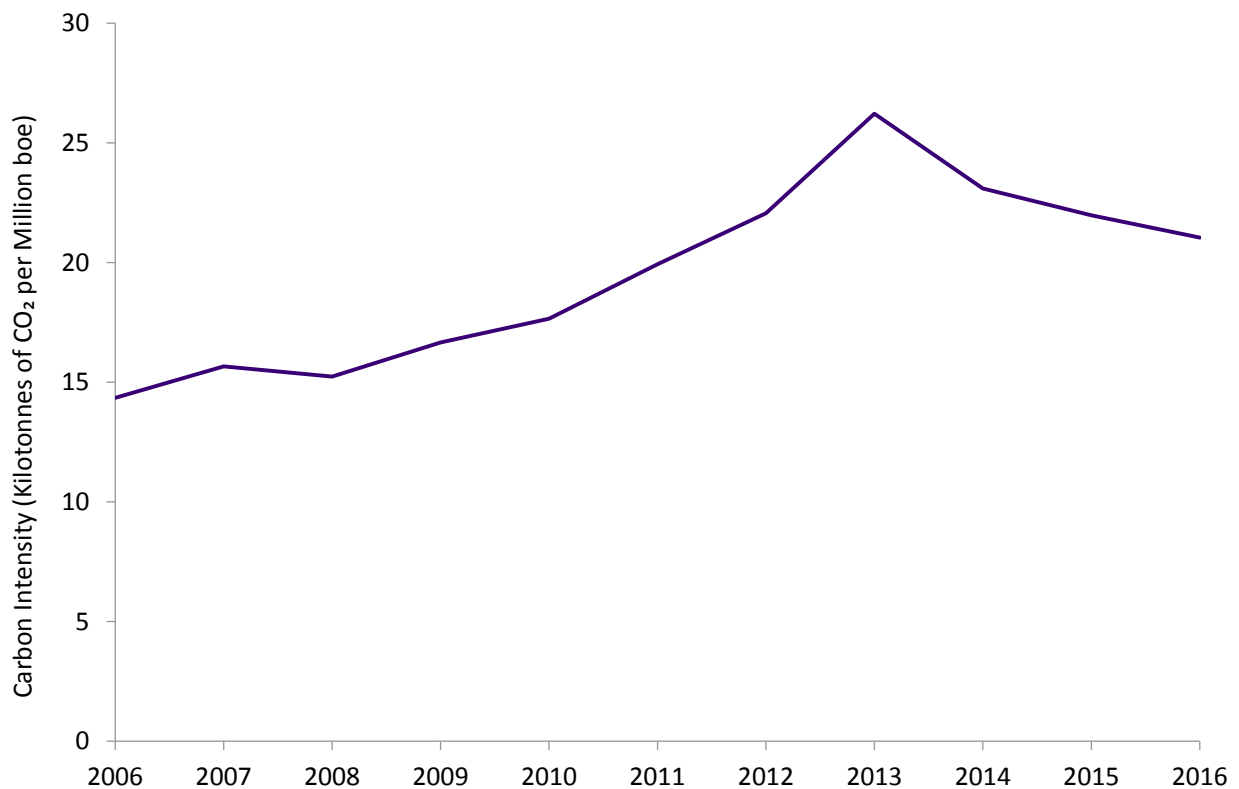
⁵ Dangerous occurrences refer to specified events as defined by the Reporting of Injuries, Diseases and Dangerous Occurrences Regulation 2013 (RIDDOR).

Efficiency improvements drive third successive year of declining carbon intensity

The carbon intensity of UKCS production fell for the third consecutive year, reaching 21,000 tonnes of carbon dioxide (CO₂) per million boe produced in 2016. The total emissions footprint of the upstream industry also decreased by almost 1 per cent last year. These improvements have primarily been driven by:

- Improved production efficiency from existing assets
- Platforms that used older turbine technology being decommissioned as they reach the end of field life
- The start-up of new, more energy efficient installations

Figure 13: Carbon Intensity of Production



Source: EEMS, Oil & Gas UK

4. Spotlight on Wells

Drilling wells is at the heart of the oil and gas business. The well life cycle begins with exploration and appraisal (E&A) of reservoirs, followed by drilling development wells to produce hydrocarbons. The life cycle comes to an end when production ceases and wells are plugged and abandoned as part of the decommissioning process. The drilling sector has arguably been one of the most negatively impacted areas of the business since the downturn began in mid-2014.

After another difficult year for the UK drilling market, 2018 offers signs of improvement

Capital budgets have been under immense pressure in recent years and the drilling market has often been an area where discretionary expenditure has been cut. The impact of this is seen in rig utilisation rates, which fell to less than 50 per cent during the first half of 2017. Utilisation rates have increased slightly to 60-70 per cent during the second half of the year, as some previously stacked rigs have been reactivated. Despite this it remains an area of major concern for the industry that the number of rigs becoming cold-stacked or leaving the basin altogether is beginning to rise. However, Oil & Gas UK expects rig demand to continue to increase gently through 2018 if the recent oil price upturn is sustained.

Figure 14: Semi-submersible Rig Utilisation

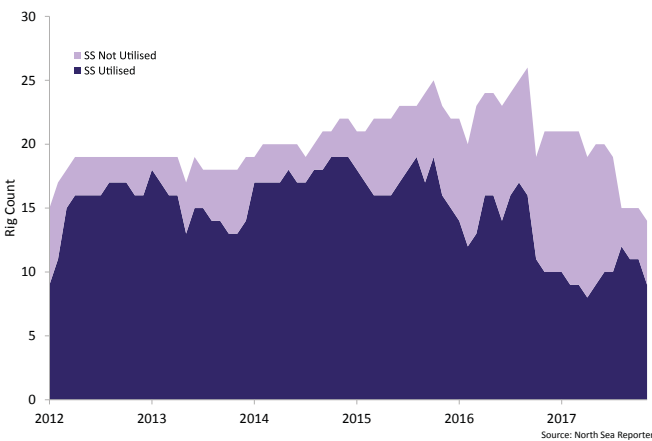
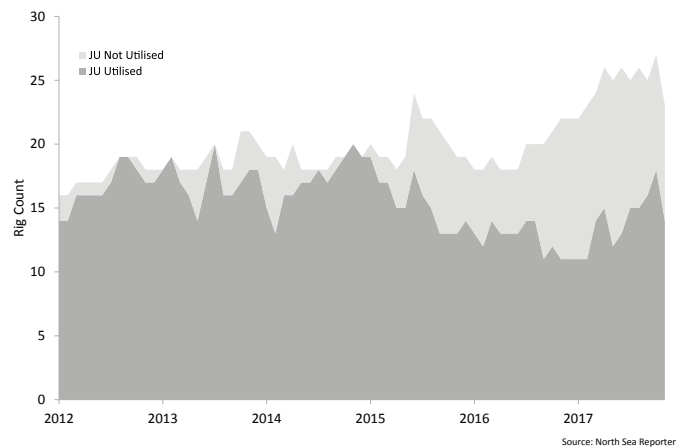


Figure 15: Jack-up Rig Utilisation



Following the sharp decline in rig rates during 2015 and 2016, the market day-rate has remained flat throughout 2017. The average market rate for a standard jack-up rig in 2017 has held at \$70,000 per day, compared to \$165,000 per day at the market peak in January 2015. Standard specification semi-submersible rigs have typically been leased at \$115,000 per day this year, compared to \$385,000 per day at the market peak in April 2014.

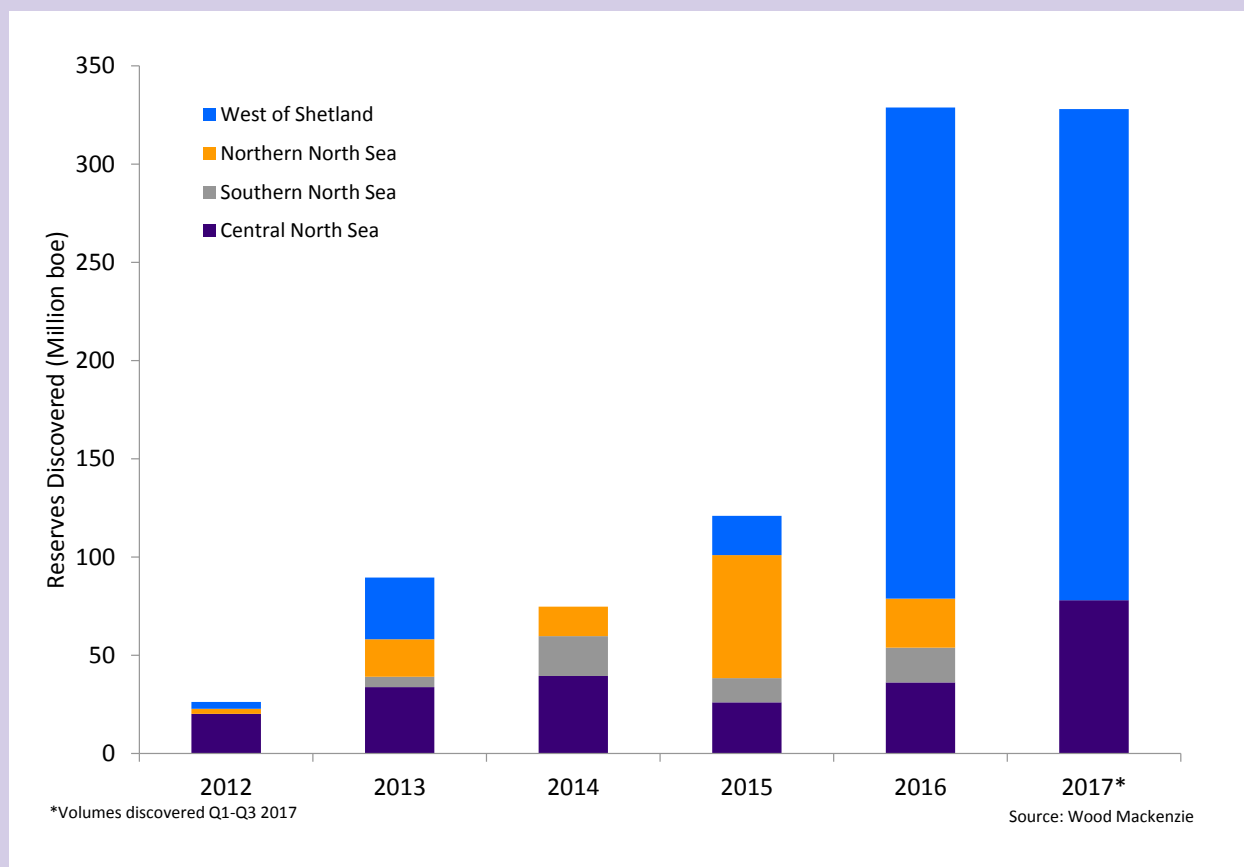
At a time when rigs are under-utilised and day-rates for leasing them are at a relatively low point, it should be seen as an opportune time to reinvigorate drilling on the UKCS. There are a number of ways industry can approach this on a practical level, for example, by working together to create longer campaigns of work, which are more efficient and cheaper to deliver. Companies are also assessing more innovative rig contracting strategies that approach funding, financing, performance and risk sharing in new ways.

Exploration and Appraisal

Challenge

Although exploration and appraisal drilling is at an all-time low, volumes discovered in both 2016 and 2017 are higher than in any year since 2008. This is a positive sign for the basin, especially since the majority of volumes discovered this year have been in areas considered frontier and under-explored. This indicates that there are still large discoveries to be had in a basin where recent focus has largely been on near-field exploration and the development of ‘small pools’.

Figure 16: Barrels Discovered by Region



Attracting fresh investment to drill more exploration wells on the UKCS must be a priority if the UK is to fulfil its yet-to-find potential and provide opportunities for the wider supply chain. The OGA’s current estimate for yet-to-find potential is between 1.9 billion boe and 9.2 billion boe, with a central estimate of 6 billion boe.

Progress

The OGA-led 21st Century Exploration Roadmap Technical Advisory Committee has been established to provide an up-to-date, readily accessible, digital perspective on the prospectivity and geology of the UKCS. The committee aims to conduct regional subsurface studies to support exploration, both in mature and frontier areas. These studies will help to derisk plays and improve success rates across the basin. The work complements the release of government seismic data, which includes both newly acquired seismic lines and reprocessed seismic in frontier and mature areas. These projects are examples of where successful cross-industry collaboration has led to increased interest in the basin, from both existing players and potential new entrants from overseas.

New licensing flexibility is also intended to stimulate exploration drilling in the basin. The 29th Offshore Licensing Round tied in with the release of the 2015 government seismic data, including lines shot in frontier areas such as the Rockall Trough, and was the first time the Innovate Licence was rolled out. This new licence offers far more flexibility of terms for applicants and allows for more pragmatic work programmes to be designed by licensees. The round resulted in 25 licences being awarded for 111 blocks, with three firm well commitments – an encouraging sign for exploration in the basin.

2017 also saw the 30th Offshore Licensing Round announced, which offered opportunities to acquire licences in areas containing undeveloped discoveries. The round saw more data released by the OGA to help support industry's efforts. After closing on 22 November, early signs from the round are positive. More than 90 applications were received for over 200 blocks, suggesting that confidence is returning to the basin. Results will be announced in the second quarter of 2018, which Oil & Gas UK hopes will lead to many new licences being awarded and commitment from industry for a firm programme of wells.

Next Steps

The work in preparation for the 31st Offshore Licensing Round, due to open in mid-2018, has already begun. The OGA has wholly-funded new, openly available, seismic and well data packages for the East Shetland Platform and south west Britain areas. The OGA is also releasing a number of geological reports as part of the 21st Century Exploration Roadmap aimed at investigating key subsurface uncertainties in these areas.

Oil & Gas UK holds its annual Exploration Conference on 1 February 2018, offering a unique opportunity for industry to share key exploration challenges in the basin. The collaborative event will see operators present case studies on high-profile E&A wells drilled in the past 18 months, giving industry unique insight into successes and failures and providing a platform for companies to learn from each other.

Well Construction

Challenge

A lower and more sustainable cost of constructing wells is critical to unlocking more opportunities on the UKCS. Data show that from 2004-14 the time taken to drill development wells more than doubled, resulting in much higher well costs. This emphasises the need for a basin-wide performance improvement strategy that will help to make well construction a more efficient and cost-effective process. Key contributing factors to this strategy include concepts such as: improved corporate alignment within companies, encouraging innovation and step-changes in technology, simplifying well designs, and encouraging innovative contracting strategies.

Progress

Oil & Gas UK has conducted analysis into drilling flat time, made possible by industry's willingness to collaborate and share data. This initiative is examining how to carry out flat time activities (any activity throughout the drilling process that does not involve cutting rock) more consistently and efficiently by benchmarking over 100 wells drilled since 2014, across 18 companies. Initial findings show a wide range of performance, both across and within companies. The group is now focusing on the best performing wells and companies to try to understand the factors that may lead to improved performance.

Cross-industry scrutiny sessions aimed at simplifying well designs have also been very effective. These sharing events have been held by various operators to facilitate peer reviews of their wells and have helped to make progress on at least five wells, three of which have since been drilled.

The well construction challenge is not just technical but also cultural. The industry has appointed Shell UK's Steve Phimister as its cultural change champion, who is investigating behavioural factors holding back progress across the entire sector, including wells and drilling.

Next Steps

Although considerable progress has been made, there are still opportunities for further improvement that industry will pursue throughout 2018 and beyond.

Oil & Gas UK facilitates initiatives through its Wells Forum, which is working on a wells performance improvement plan for the basin. This aims to highlight key areas where there are further opportunities for cross-industry collaboration. There is early appetite for investigating procurement practices, the interface with suppliers, logistics and the simplification of well design.

Production Optimisation

Challenge

Raising the potential of existing fields and maximising production from existing reservoirs and well stock in a cost effective and efficient manner is a key focus. The industry is looking to improve in these areas to sustain production levels and maximise recovery from producing assets.

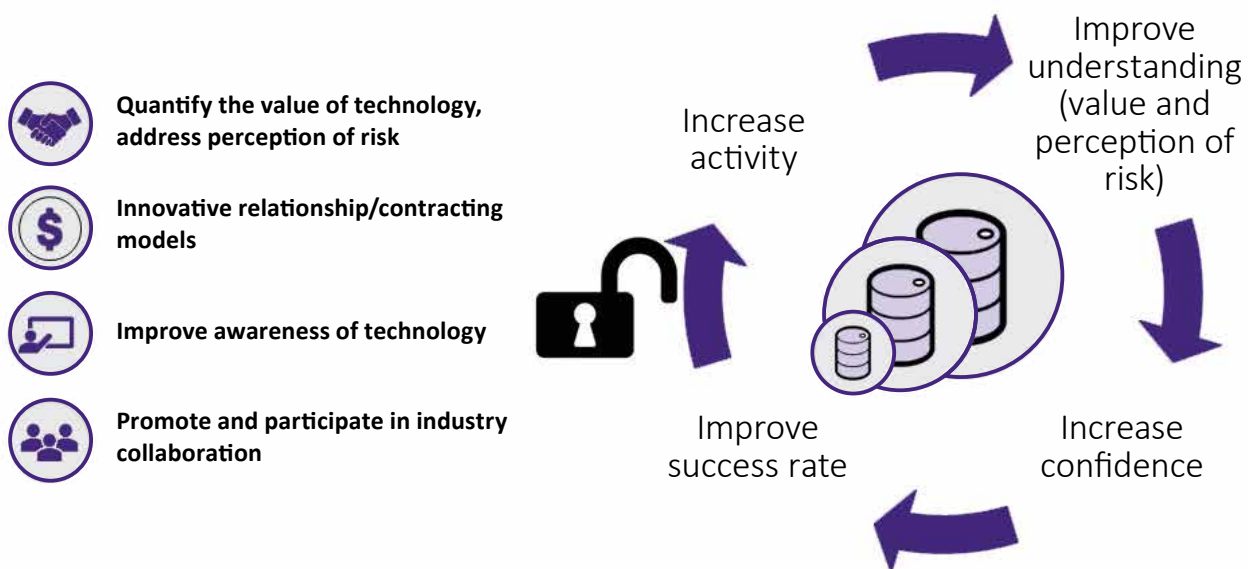
Progress

Fracking and well stimulation were identified as areas with significant potential for improvement and have therefore been a focus for 2017, with a workshop held on 11 December. Cross-industry representatives meet regularly to identify other areas related to production optimisation that they can collaboratively address. The group has successfully incorporated production optimisation benchmarking into the 2017 Asset Stewardship Survey.

Next Steps

Blockers to production optimisation have been identified by Oil & Gas UK’s Reservoir and Wells Optimisation Forum, which will work in partnership with the OGA’s Asset Stewardship Task Force to improve performance and increase recovery factors across the industry. Work is also ongoing to look at how the supply chain can help unlock production optimisation opportunities, as shown in Figure 17 below.

Figure 17: How can the Supply Chain Help to Unlock the Opportunities?



Well P&A – Reducing the Cost of Decommissioning

Challenge

With decommissioning becoming increasingly prominent on the UKCS, an expanding area of work is the plugging and abandonment (P&A) of wells. According to Oil & Gas UK's *Decommissioning Insight 2017*, well P&A accounts for almost half of total decommissioning expenditure on the UKCS. Although the average unit cost for well P&A has fallen by 4-5 per cent since forecasts were made in 2016, there remains a significant opportunity for the industry to reduce costs in this area.

Progress

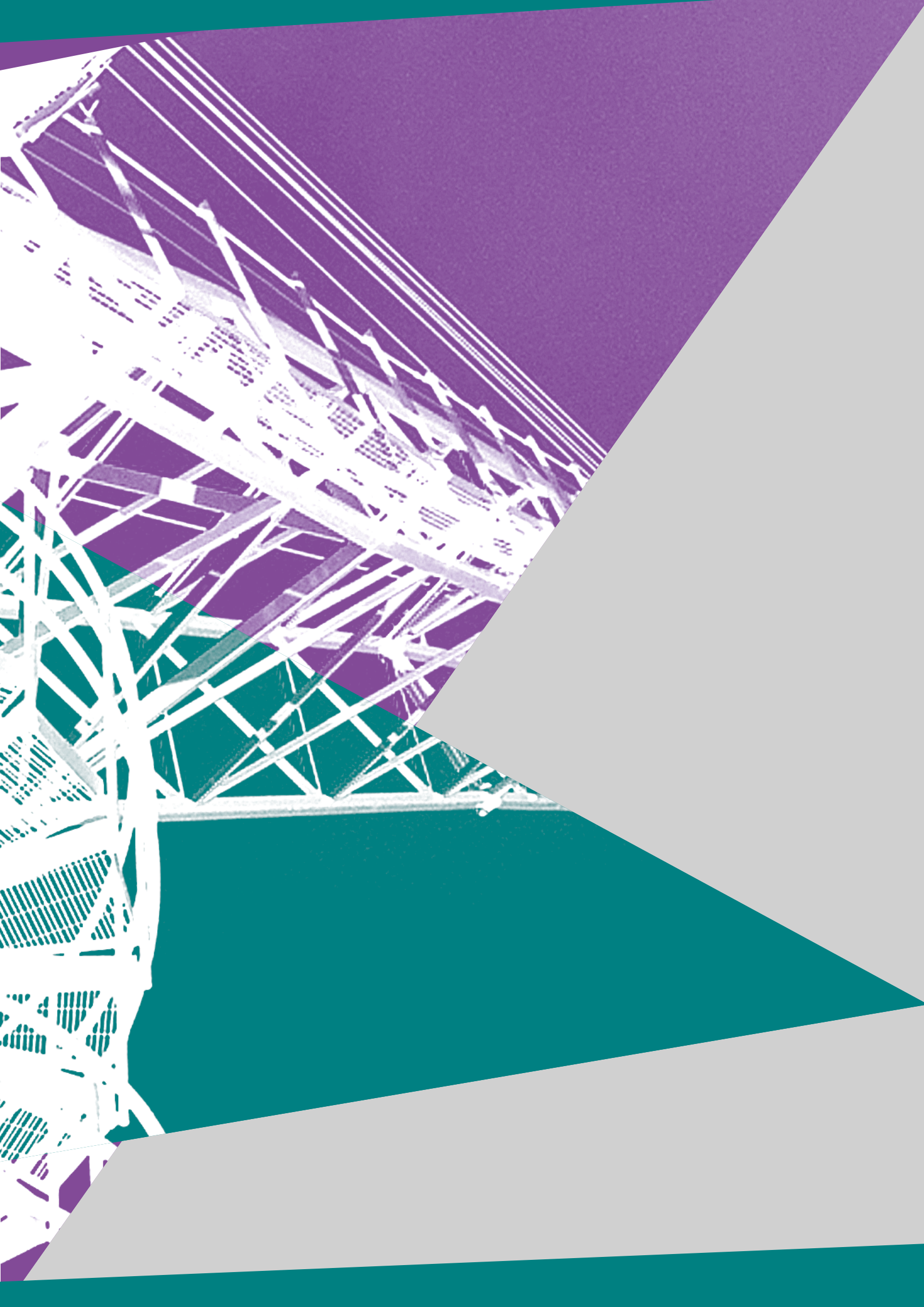
Well P&A is a fast-changing area of the business, with new technologies and techniques constantly entering the industry. As companies adopt these and gain more experience in well P&A, the cost is expected to fall. Initiatives that have already driven higher performance and yielded cost reductions include:

- Adopting a campaign approach to well P&A
- Cross-operator collaboration
- Sharing of best practice
- Encouraging risk-based approaches to P&A operations, developing a scope of work specific to the well in question
- Optimising activity schedules, both within and across operators

Next Steps

An update to Oil & Gas UK's *Guidelines for Well Abandonment* has been accelerated and publication is due in the first quarter of 2018. This update was fast-tracked to reflect industry's need for the latest guidance on best practices.

Oil & Gas UK's *Decommissioning Insight 2017* shows how well P&A costs vary across different areas of the UKCS. This data-rich publication will help to measure progress and will be updated with revised well P&A cost forecasts in November 2018.





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