



**OIL&GAS<sup>UK</sup>**

**ECONOMIC REPORT 2017**





## Contents

<b>1.</b>	<b>Foreword</b>	<b>4</b>
<b>2.</b>	<b>Industry at a Glance</b>	<b>6</b>
<b>3.</b>	<b>Economic Contribution</b>	<b>8</b>
3.1	The UK Energy Mix	9
3.2	The Role for Oil and Gas in the Lower-Carbon Economy	12
3.3	Total Employment	15
3.4	Regional Centres of Excellence	17
<b>4.</b>	<b>The Business Environment</b>	<b>22</b>
4.1	Oil and Gas Markets	23
4.2	Impact of Brexit	27
<b>5.</b>	<b>Creating a Long-Term Future</b>	<b>33</b>
5.1	Vision 2035	34
5.2	Delivering the Vision	35
<b>6.</b>	<b>UK Continental Shelf Performance and Opportunity</b>	<b>39</b>
6.1	Key Performance Indicators	40
6.2	Global Competitiveness	45
6.3	The Efficiency Task Force	51
6.4	Fiscal Policy	55
6.5	Mergers and Acquisitions	58
6.6	Investor Case Studies	60

## 1. Foreword

Welcome to Oil & Gas UK's 2017 *Economic Report*. Our annual report once more reflects a challenging business environment against which industry has been in action to improve its competitiveness, maximise economic recovery and position itself effectively to ensure longer-term sustainability.

The sector has done much to address its cost base and pursue the efficiency needed to compete in the current environment. While it has been, and continues to be, relentlessly demanding for many people – both professionally and personally – it is really good to see companies increasingly committed to embracing real change to secure their short and longer-term future.

As this report shows, industry initiatives are helping to establish a culture focused on improving operational effectiveness, streamlining business processes and contributing to tangible increases in capital efficiency without compromising on safety. The Oil & Gas UK-led Efficiency Task Force has been instrumental in helping to catalyse pan-industry sustainable change.

Companies have delivered unit operating cost improvements greater than in any other basin in the world since 2014. Although the maturity and complexity of the UK Continental Shelf (UKCS) means it remains a more expensive basin in which to operate, this is still a basin worth investing in, with exciting hydrocarbon opportunities, established infrastructure, access to a world-class supply chain, a highly skilled workforce, as well as a globally competitive fiscal regime.

There are tentative signs that investor confidence is starting to return to the sector, and to the UK. Over the first half of 2017, almost \$6 billion was invested in UKCS asset and corporate acquisitions. That trend is set to continue throughout this year and into 2018 with Total's proposed acquisition of Maersk Oil announced just before publication. The sector continues to support over 300,000 jobs across the economy, but as this is around one-third lower than the peak in 2014, it could threaten core capabilities within the supply chain if activity does not pick up. The latest analysis shows the decline between 2015-16 was sharper than previously anticipated, however, there is evidence that the rate of job loss is now slowing to a reduction of around 13,000 in 2017 compared to almost 60,000 in 2016.

More needs to be done to drive any upturn and secure long-term employment. Up to £40 billion worth of potential investment opportunities currently sit in company business plans. Industry will have to stay the course in terms of safely and relentlessly improving its efficiency and reducing its cost to ensure these opportunities become business realities in the near term, and that our hard-won progress is not lost in any upturn.

The UK Government's continued commitment to its *Driving Investment Plan* is a prerequisite for investors. Deal flow and asset trading can also be assisted by enabling the transfer of tax history between sellers and buyers of North Sea oil and gas assets. The industry has presented compelling evidence for change, which should be included in the Autumn Budget 2017.

Potential investors also require clarity as to how the UK will respond to the macro-economic impact of Brexit. The UK Government must maintain a strong voice for our industry in Europe where indigenous oil and gas will continue to provide a vital part of the energy mix. Our industry needs frictionless access to markets and people for our supply chain and protection of energy trading and the internal energy market, which have helped provide secure, affordable energy to the UK for decades.

The current low level of exploration and appraisal activity remains a serious concern as it is vital to replenish production with new development opportunities. The recently launched 30th Offshore Licensing Round offers companies the opportunity to bid for fresh acreage and an interesting inventory of yet-to-be-developed discoveries. However, it remains a challenge for companies to be able to commit limited funds for exploration activity in the ongoing downturn.

Given all of the above, we should still take confidence in our achievements to date as we look to the future. The potential of our industry is captured in Vision 2035, which shows that the UK can continue to deliver hundreds of billions of pounds in revenue through the oil and gas sector over the next generation and beyond. While setting us the challenge of maximising the value of our indigenous resources, Vision 2035 also seeks to ensure our supply chain maintains a strong UK base while pursuing a greater share of the global energy market.

With this longer-term view, the UKCS needs to continue to compete with other oil and gas producing regions as well as promote the contribution that oil and gas can continue to make to the energy mix over decades to come. The UK will need to ensure its energy supply is secure, affordable and as low-carbon as economically possible, and our indigenous offshore oil and gas resources have a key contribution to make. Global oil and gas demand is forecast to rise by 25 per cent between now and 2035, and so will continue to have a crucial role to play in satisfying the world's need for energy.

The UK Department for Business, Energy & Industrial Strategy confirms that oil and gas will remain vital sources of energy – fuelling transport, power generation, heating and industrial usage – forecasting that it will supply around two-thirds of domestic energy demand in 2035.

There is a compelling need for a clear energy policy from government, which can provide the long-term clarity and certainty needed to help secure investment in oil and gas in the UK.

Industry continues to make a convincing case that the sector should be at the heart of the UK Government's Industrial Strategy. The strategy should recognise the sector's significant contribution to the economy through indigenous production that lowers import requirements, through generating exchequer revenues, by providing employment for hundreds of thousands of skilled people across our supply chain, and delivering a secure supply of energy. A specific Sector Deal for the oil and gas industry will also be needed and we are working closely with many other organisations to develop a coherent business case.

It is crucial that industry and government work together to ensure that as much of the UK's energy needs as possible are met through domestic resources. Last year, £17 billion worth of oil and gas was produced from the UKCS. The focus on developing as much of our natural resource as possible is an opportunity that neither the industry or the government can afford to forgo.

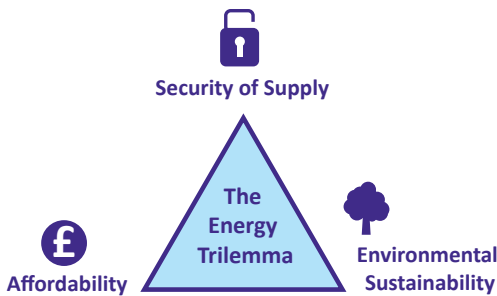


**Deirdre Michie,**  
Chief Executive, Oil & Gas UK

## 2. Industry at a Glance

### Economic Contribution

Companies involved in oil and gas activity



- Last year, oil and gas provided 76 per cent of the UK’s primary energy, 60 per cent of which was satisfied from indigenous production making an estimated contribution of £17 billion to the UK’s balance of trade.
- Oil and gas will still provide two-thirds of total primary energy by 2035, according to the Department for Business, Energy & Industrial Strategy, and therefore needs to be a vital component of an energy policy that considers affordability, security of supply and environmental sustainability.
- Latest estimates show that the oil and gas sector continues to support over 300,000 jobs in the UK.
- The UK oil and gas supply chain spans the length and breadth of the country, servicing both domestic activities and exporting almost £12 billion of goods and services to other basins around the world.

### The Business Environment



- Oil markets remain volatile, although dated Brent averaged \$51.6 per barrel (bbl) over the first six months of the year, 30 per cent higher than over the same period in 2016.
- A shortage of storage and uncertainty over liquefied natural gas cargoes caused the NBP day-ahead gas price to rise above 60 pence/therm (p/th) in February, before the market fundamentals of structural global oversupply led to a sharp fall to 25 p/th by June.
- Weaker sterling improved margins for most oil and gas producers and made exports more competitive for businesses across the supply chain.
- The long-term impact of Brexit is uncertain, with analysis showing that the cost of trade for the whole industry could increase by as much as £500 million per annum if the UK reverts to World Trade Organization rules, or could be reduced by around £100 million under optimal trade agreements.



## Creating a Long-Term Future



- Vision 2035 sets an aspiration for industry and shows that it could deliver hundreds of billions of pounds in additional revenue to the domestic economy over the next 20 years.
- Global competitiveness; a clear energy policy; technological advancement; development of new skills across the energy sector; and more active promotion of trade and exports are the catalysts that will drive industry towards the vision.
- The vision must unite the industry's drive to maximise economic recovery with the UK Government's Industrial Strategy.
- It is vital that the UK Industrial Strategy recognises the key role of the domestic oil and gas industry to the economic success of the country, and central to this will be developing a comprehensive energy policy.

## UK Continental Shelf Performance and Opportunity



- Significant improvements have been made in the basin over recent years, although challenges remain:
  - Production has increased by 16 per cent since 2014, driven by production efficiency improvements and new field start-ups.
  - Unit operating costs (UOCs) almost halved over the last two years and are expected to fall further to around \$14 per barrel of oil equivalent this year.
  - The basin needs fresh capital investment, with only three new field approvals sanctioned since the start of 2016.
  - Drilling activity remained at record low levels last year with only 14 exploration wells and 8 appraisal wells drilled.
  - Decommissioning is currently the only area of increasing expenditure, but remained just 7 per cent of total industry spend last year at £1.2 billion.
- The Efficiency Task Force drives continuous improvement and shares best practice across the basin; around 100 company case studies are now accessible through a new online Efficiency Hub.

Cost Reduction	Efficiency Improvement	Transformational Change
<ul style="list-style-type: none"> <li>• Spend reduction</li> <li>• Tactical process improvements</li> <li>• Cost avoidance</li> </ul>	<ul style="list-style-type: none"> <li>• Activity improvement</li> <li>• Consolidation</li> <li>• Organisation design</li> <li>• Technology</li> </ul>	<ul style="list-style-type: none"> <li>• Asset/service/geographic restructure</li> <li>• M&amp;A + network integration</li> <li>• Operating model reviews</li> </ul>

- The UK Continental Shelf has become more internationally competitive, with UOC improvements greater than in any other basin since 2014 and the UK now ranking in the top quartile in terms of fiscal attractiveness.
- Almost \$6 billion worth of UK traded value was announced over the first half of this year, a sign of confidence returning to the basin.

### 3. Economic Contribution

#### In Summary

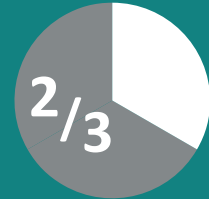
Oil and gas is the dominant fuel powering our economy, our transport network and our heating systems, providing over three quarters of the total energy mix in the UK. Around 60 per cent of this comes from indigenous resources. Over the next 20 years, renewables capacity will grow primarily for electricity generation, but not quickly enough to displace fossil fuels. Oil and gas is still expected to comprise two-thirds of the energy mix in 2035. It will remain part of a diverse mix of fuels that is required to ensure an affordable and secure future energy supply while achieving emissions reduction targets.

The benefits of meeting domestic oil and gas demand from indigenous sources of production are widespread. The UK Continental Shelf's (UKCS) resources are critical to security of energy supply to minimise import dependencies. Without domestic production, the UK would have had to import £17 billion worth of oil and gas last year to meet demand, which would have increased the UK's balance of trade deficit by almost 50 per cent.

The industry also currently supports over 300,000 jobs in the UK. Although this is around 35 per cent below the peak in 2014, the level of employment is expected to stabilise over the rest of the decade if activity begins to pick up. Despite most of the UK's reserves lying off the coast of Scotland, the value generated from the industry is spread across the entire country. The diverse and highly skilled supply chain anchored here also acts as an export hub, generating almost £12 billion worth of revenue last year from servicing overseas basins.

Furthermore, the sector can help the UK achieve its climate change targets. Natural gas is an affordable, reliable, relatively lower-carbon fuel that can fill renewable energy intermittency gaps. It has already helped the UK achieve significant emissions reductions in power generation by displacing highly carbon-intensive fuels such as coal. A reduction in emissions released during the production of oil and gas is a sign of the industry's commitment to its own sustainability and maximising domestic production will reduce reliance on fuel imports that can be more carbon intensive.

The UK Government forecasts that



of the UK's energy mix will still come from oil and gas by 2035

The oil and gas industry supports over



**300,000 jobs**  
in the UK

Every £1 million of industry expenditure sustained around 17 jobs across the UK economy last year





### 3.1 The UK Energy Mix

Last year oil and gas provided 76 per cent of the UK's total primary energy. This equates to 76 million tonnes of oil equivalent (mtoe) and 77 mtoe of natural gas (85 billion cubic metres). Sixty per cent of this net demand was met by resources from the UKCS<sup>1</sup>, with the rest satisfied through imports. Without domestic production, the UK would have had to import a further £17 billion worth of oil and gas last year to meet demand.

Although worldwide demand for energy is forecast to increase by a third by 2035<sup>2</sup>, the UK's total primary energy demand is likely to remain at around 200 mtoe over that time. An increasing population and economic growth are expected to be offset by energy efficiency gains. According to UK Government forecasts, overall domestic primary energy supply is expected to fall faster than demand, and so the UK will become more reliant on fuel imports that can be more carbon intensive in their production and transportation.

Forecasts show that global oil and gas demand is set to increase by more than 25 per cent between now and 2035. The UK, with lower consumption of coal and nuclear, is still expected to meet two-thirds of its energy demand with oil and gas in 2035<sup>2</sup>. Despite progressive decarbonisation in electricity generation over the last few years, hydrocarbons are less easy to replace in the other major usages such as transport, heating and industrial use.

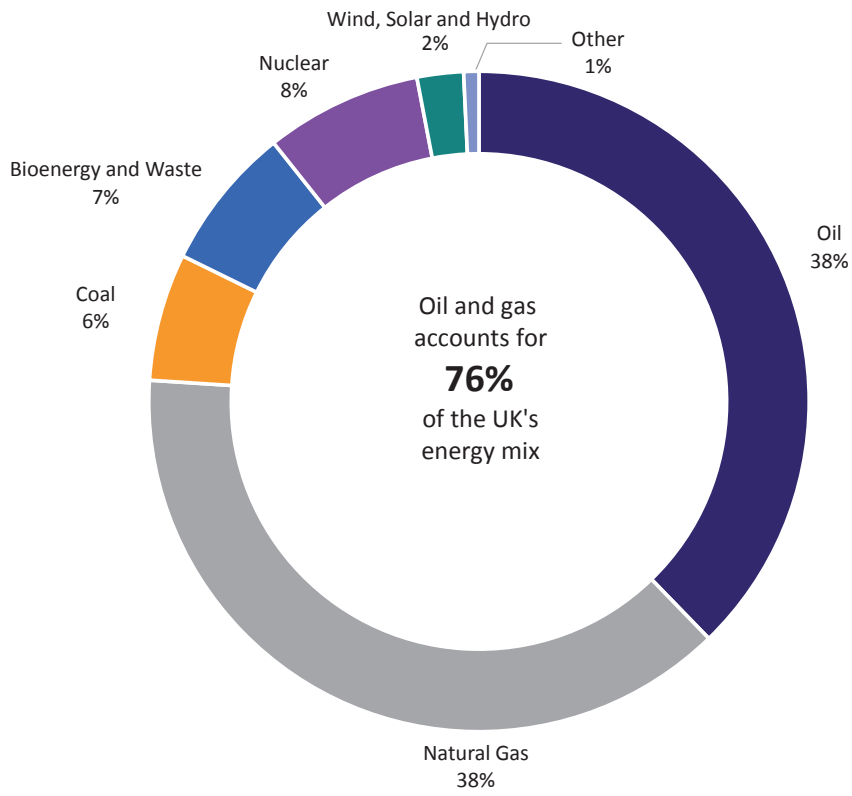
With up to an estimated 20 billion barrels of oil and gas equivalent left to recover on the UKCS, domestic offshore oil and gas resources will continue to play a crucial role in satisfying the UK's future energy demand and will remain a key component of energy supply for decades to come. The industry's MER UK (maximising economic recovery from the UKCS) strategy will maintain this indigenous oil and gas production, in turn, minimising import dependencies and ensuring security of energy supply.

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<sup>1</sup> Department for Business, Energy & Industrial Strategy (BEIS), *Digest of the UK Energy Statistics 2017*

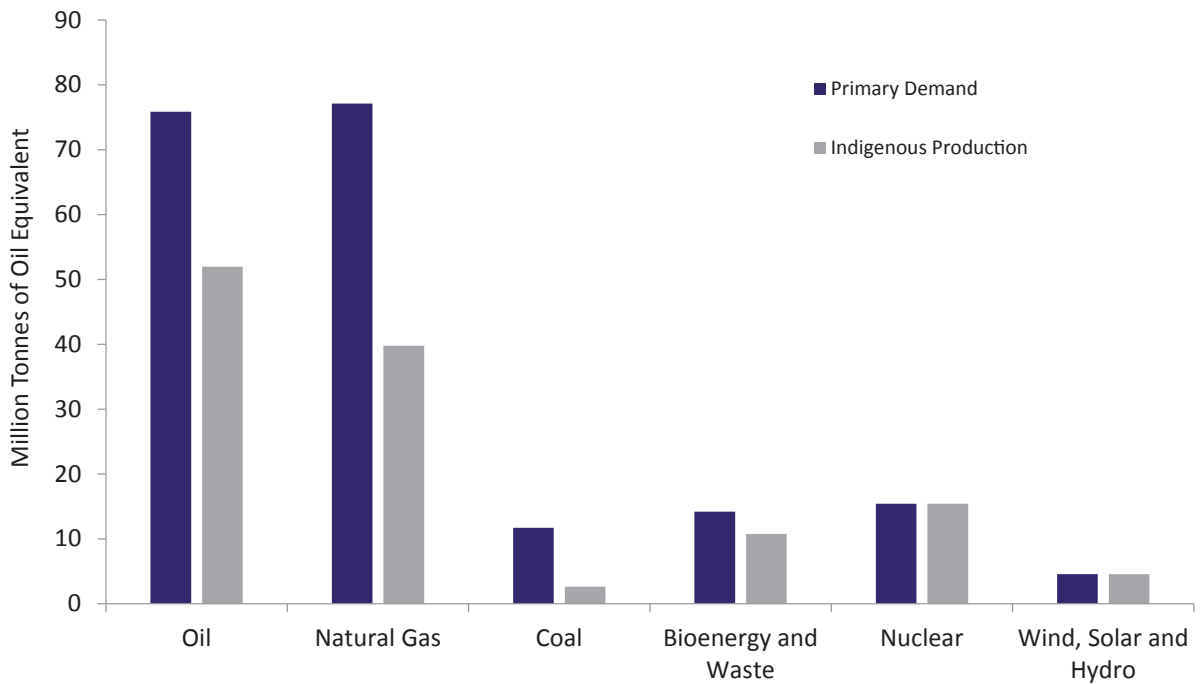
<sup>2</sup> *BP Energy Outlook 2017*

**Figure 1: UK Primary Energy Demand by Fuel Type in 2016**



Source: BEIS

**Figure 2: Indigenous Production and Demand for Primary Fuels in 2016**



Source: BEIS

Figure 3: UK Primary Energy Demand by Fuel Type in 2035

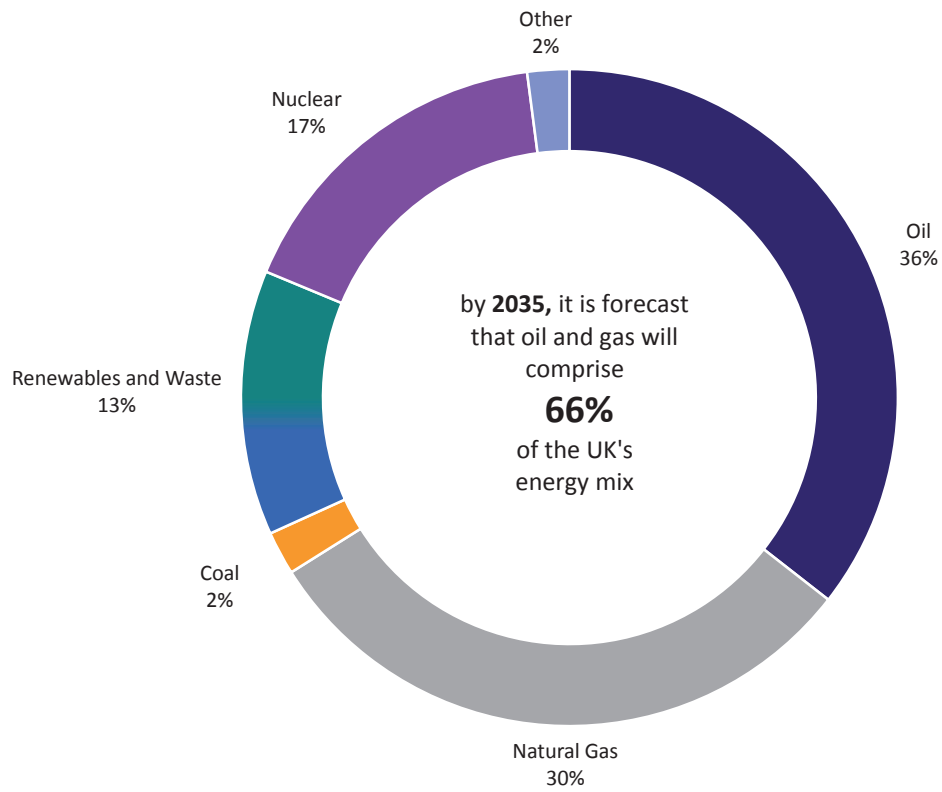
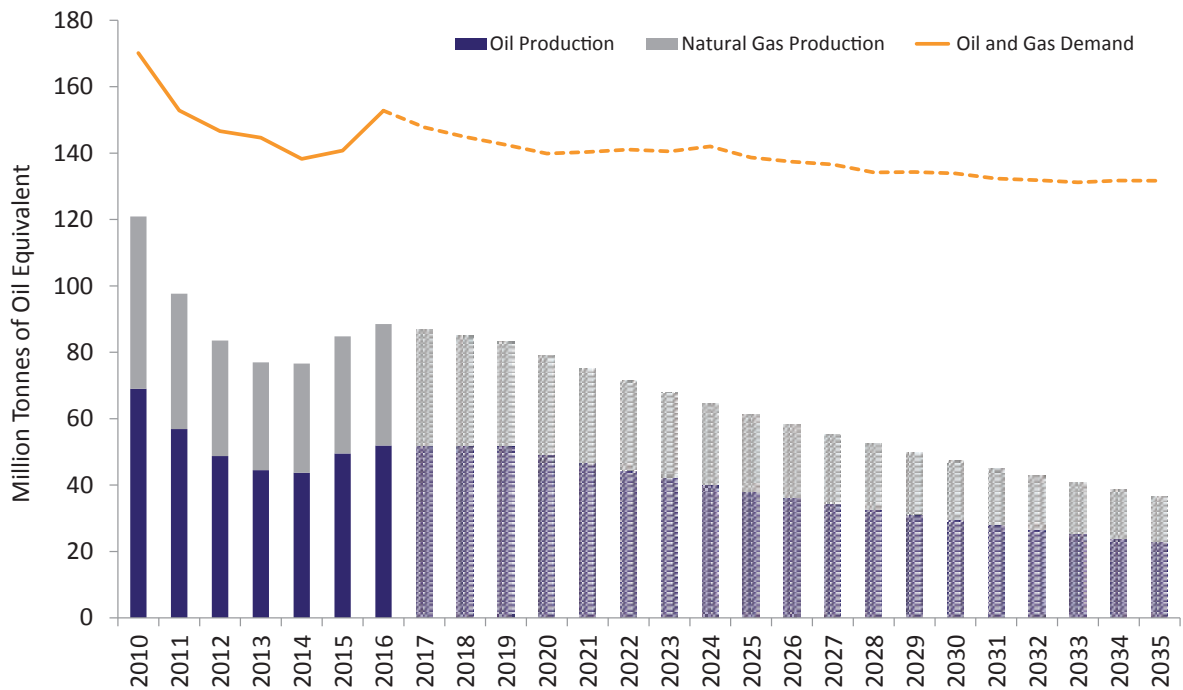


Figure 4: Indigenous Oil and Gas Production and Demand Projection



# The Journey of Oil and Gas in the UK

1-5+ years

5-18 years

1-10 years

5-40 years

6-15 years

## Seismic Surveying and Obtaining Licences

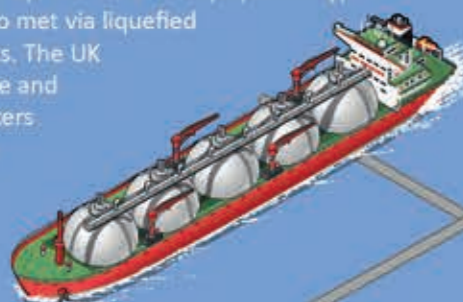
- Given that most of the UK's oil and gas is offshore, seismic surveying vessels are used to help identify where oil and gas may be present.
- This enables oil and gas companies to target areas to explore.
- The UK Government auctions off licences to prospective bidders, enabling exploration to take place.



From sitting deep under the North Sea, unseen and undeveloped, the journey a barrel of hydrocarbons takes to reach everyday household items is astounding

## UK Oil and Gas Supply 2016<sup>1</sup>

Gas is both delivered to and exported from the UK, depending on varying international demand, via pipelines with Belgium (Bacton-Zeebrugge Interconnector), the Netherlands (Bacton-Balgzand Pipeline), and the Republic of Ireland (export only). Gas demand is also met via liquefied natural gas imports. The UK imports both crude and refined oil via tankers to meet domestic demand.



## Exploring and Appraising Prospects



- Once a licence has been obtained, the next step is to drill an exploration well to determine whether hydrocarbons are present.
- If successful, this is often followed by drilling of appraisal wells to better understand the reservoir's characteristics.
- This drilling is often undertaken by jack-up or semi-submersible mobile drilling rigs.

## Final Investment Decision and Development

- If successfully explored and appraised, the partners will consider a range of development concepts.
- This process typically assesses everything from facilities design to operating models and decommissioning.
- Once finalised, a Field Development Plan (FDP) is submitted to the Oil and Gas Authority for consideration and, when approved, development can begin.



## Production and Transportation

- Following development of wells and facilities, the field will reach first production.
- Oil and gas are then produced and transported ashore via a network of subsea pipelines, or in some cases for oil via tankers.



- It is common for investment in the field to continue during production, either through the drilling of more development wells or construction of new facilities.

Gas is typically treated onshore at processing plants, providing the primary fuel for heating, or sent to power plants for conversion into electricity.

Most oil is converted into petroleum products such as feedstock and fuel for transport or other industrial use.

## Decommissioning

- Once the reservoir of a field is sufficiently depleted to the extent that no further reserves can be economically recovered, the field will cease production.
- Companies are legally required to decommission assets once they have ceased production, which the Oil and Gas Authority estimates will cost around £60 billion (in 2016 money).
- This process includes plugging and abandonment of wells and the removal of topsides, platforms, certain pipelines and subsea equipment.



Processed gas enters the National Transmission System, or in some cases, components are stripped out and used as chemical feedstocks.

MTOE

<b>Total Oil Supply<sup>2</sup></b>	<b>76</b>
<b>Indigenous Supply</b>	<b>52</b>
<b>Unrefined Oil Import</b>	<b>53</b>
<b>Refined Oil Import</b>	<b>38</b>
<b>Unrefined Oil Export</b>	<b>-38</b>
<b>Refined Oil Export</b>	<b>-27</b>
<b>Total Gas Supply<sup>2</sup></b>	<b>77</b>
<b>Indigenous Supply</b>	<b>40</b>
<b>Natural Gas Import</b>	<b>46</b>
<b>Natural Gas Export</b>	<b>-10</b>



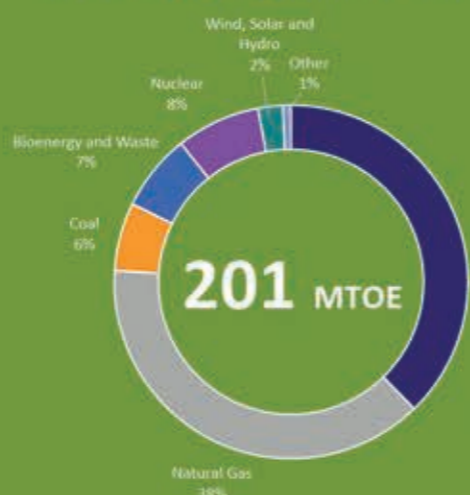
# Energy Demand 2016

The UK's primary energy demand is broadly met by two sources: indigenous production and the net of energy imports and energy exports. In 2016, the UK was a net importer of energy, as indigenous production satisfied 62 per cent of total demand<sup>1</sup>. Oil and gas are dominant in the UK's energy mix, of which 60 per cent is met by indigenous production (on a net basis).

## How the UK's Energy Demand was met in 2016 (MTOE)<sup>2</sup>

	Indigenous Production	Energy Imports	Energy Exports	Total
Oil <sup>3</sup>	+ 52	+ 92	- 65	76
Natural Gas <sup>4</sup>	+ 40	+ 46	- 10	77
Nuclear <sup>5</sup>	+ 15	+ 0	- 0	15
Bio+Waste <sup>6</sup>	+ 11	+ 4	- 0	14
Renewable <sup>7</sup>	+ 5	+ 0	- 0	5
Coal <sup>8</sup>	+ 3	+ 6	- 0	12
Other <sup>9</sup>	+ 0	+ 2	- 0	1

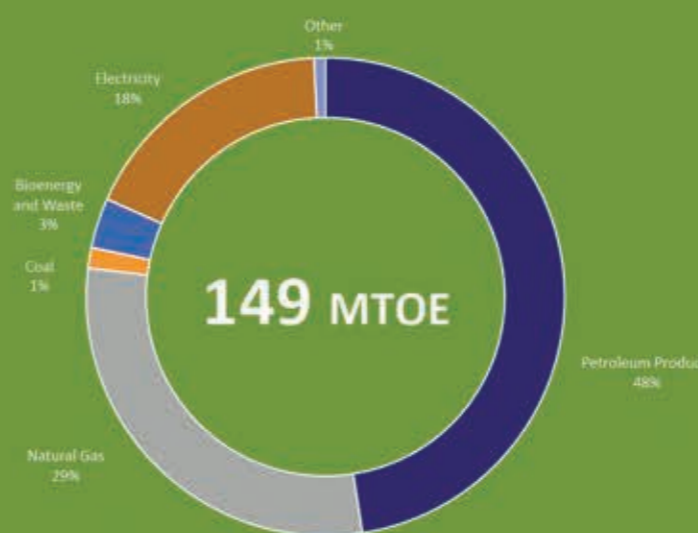
## UK Primary Energy Demand 2016<sup>1</sup>



# Energy Consumption 2016

The transformation of primary supply input (201 mtoe) into energy ready for consumption (149 mtoe) resulted in losses of 52 mtoe. Conversion of primary energy supply into electricity was 41 per cent efficient, with 63 mtoe of primary energy supply converted into 26 mtoe of electricity, with associated losses of 37 mtoe. 15 mtoe was lost through transforming other primary supply into products ready for consumption in 2016<sup>1</sup>.

## Consumption by Energy Type 2016<sup>1</sup>

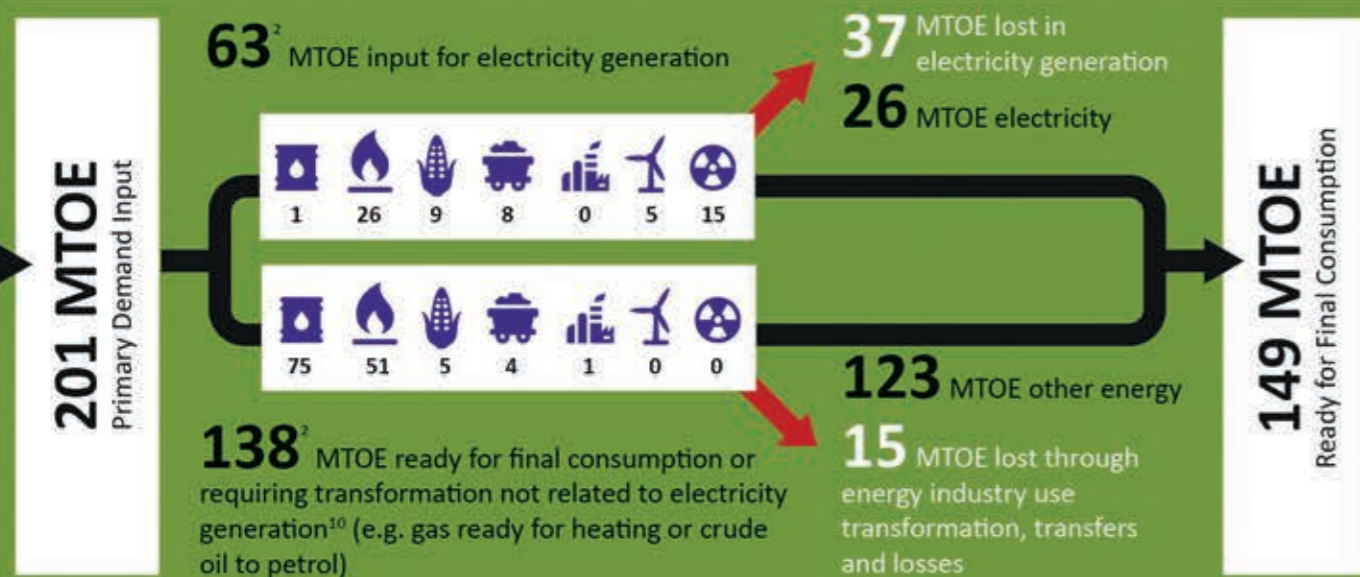


Oil and gas based products accounted for 77 per cent of the UK's final energy consumption in 2016.

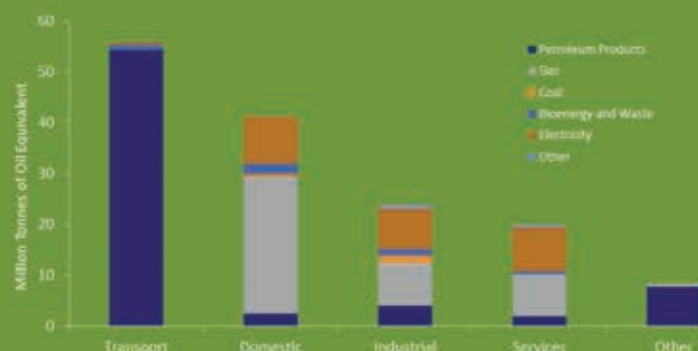
Electricity accounted for almost a fifth of end use in 2016. Gas, at 40 per cent, was the dominant input fuel.

Although renewable sources of energy are expected to provide more electricity over the coming years, gas will continue to displace coal as a cheaper and cleaner alternative and act as a swing source when renewable supplies are insufficient to meet demand during peak times.

Most primary energy cannot be consumed in its raw form and must undergo transformation to satisfy end user needs (e.g. crude oil to petrol). Almost one-third of primary energy is used for electricity generation, for which gas is the largest input fuel. This involves conversion losses, as shown below.



## End Product Use by Energy Type 2016<sup>1</sup>



Petroleum products accounted for over 97 per cent of transport fuels in 2016.

Gas and electricity together provided over 90 per cent of domestic energy and over 80 per cent of industrial and service energy.

End usage is broken down below for some of the UK's largest energy-consuming sectors.

Road	Rail	Food and Drink	Chemicals	Agriculture
41.45 mtoe	1.03 mtoe	2.84 mtoe	3.40 mtoe	1.24 mtoe
Pet 98%	Pet 61%	Pet 5%	Pet 3%	Pet 39%
Gas 0%	Gas 0%	Gas 60%	Gas 50%	Gas 7%
Bio/Waste 2%	Bio/Waste 0%	Bio/Waste 1%	Bio/Waste 1%	Bio/Waste 23%
Coal 0%	Coal 1%	Coal 1%	Coal 1%	Coal 0%
Electricity 0%	Electricity 38%	Electricity 33%	Electricity 39%	Electricity 31%
Other 0%	Other 0%	Other 0%	Other 6%	Other 0%

<sup>1</sup> BEIS, *Digest of the UK Energy Statistics 2017*

<sup>2</sup> Total does not equal sum of the sources due to statistical difference, stock changes, marine bunkering and rounding

<sup>3</sup> Includes crude oil and petroleum products

<sup>4</sup> Includes colliery methane

<sup>5</sup> In the form of primary electricity

<sup>6</sup> Includes geothermal and solar heat

<sup>7</sup> Wind, solar and hydroelectricity as primary electricity

<sup>8</sup> Includes manufactured fuels, benzole, tars, coke oven gas and blast furnace gas

<sup>9</sup> Includes imported/exported electricity and heat sold

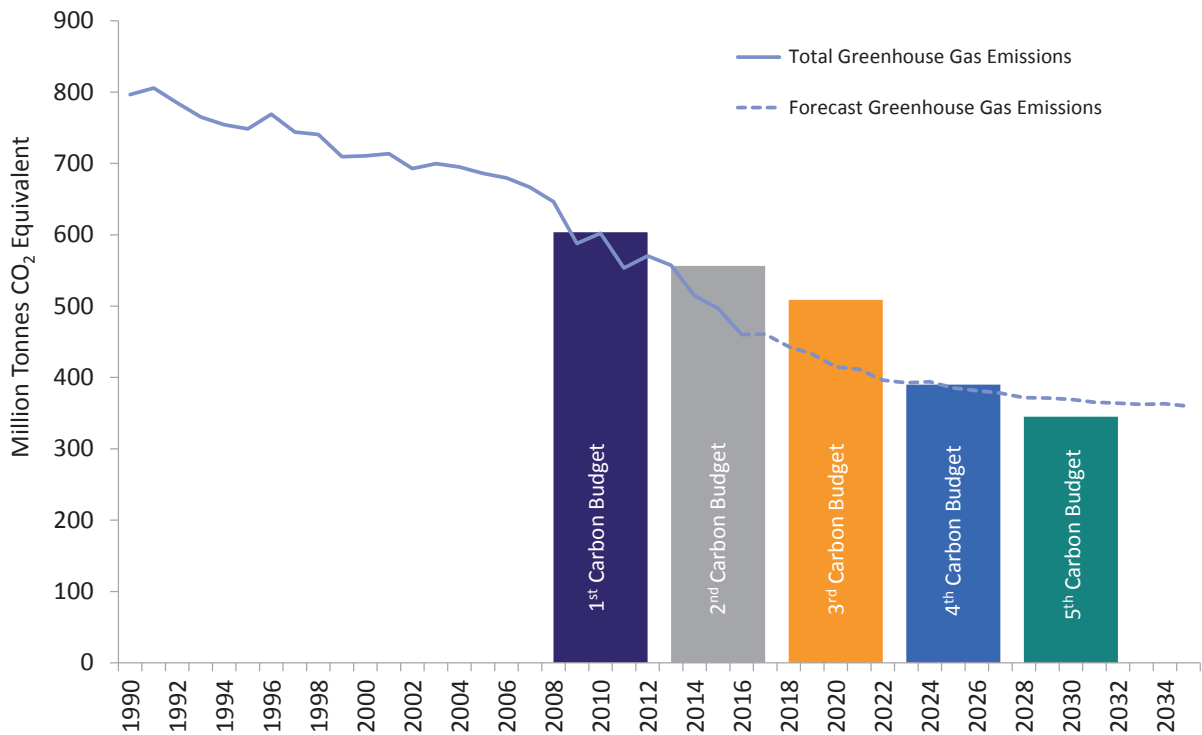
<sup>10</sup> A lot of imported supply has already been through the transformation process so is ready for final consumption

### 3.2 The Role for Oil and Gas in the Lower-Carbon Economy

It is widely recognised that climate change is a global challenge that requires a collective response. To deliver a lower-carbon future, further substantial improvements in energy efficiency combined with major changes in the fuel mix will be required. Oil & Gas UK recognises the importance of addressing climate change and meeting carbon targets as key elements of UK energy policy. It is committed to playing its part in building a sustainable industry that is progressively lowering its emission intensity in the production of oil and gas. There needs to be an appropriate balance between meeting greenhouse gas (GHG) emission reduction targets with the need for secure and affordable energy supply that can sustain growth in the economy. It is important that the UK Government’s Industrial Strategy recognises that oil and gas will remain part of a diverse mix of fuels that is required to ensure the security of the UK’s future energy supply while achieving emissions reduction targets. Central to this is an energy policy that realises the full benefits of indigenous resources.

Under the Climate Change Act (2008), the UK has set ambitious targets to reduce emissions by 80 per cent of 1990 levels by 2050. These targets are outlined in Carbon Budgets, mandated by legislation, to help combat the risks of climate change. The UK Government’s ratification of the Paris Agreement in 2016 further emphasises the commitment to achieve these targets.

**Figure 5: Total UK Greenhouse Gas Emissions**



Source: BEIS

It is essential to continue the flexible partnership between renewable and other lower-carbon energy sources within the energy mix. Renewable sources of energy will grow over the coming decades but fuels such as natural gas that can fill renewable energy intermittency gaps will be crucial in ensuring supply remains reactive to changes in demand. Given that energy demand routinely exceeds the total available supply of renewable energy, gas has a critical role in providing energy storage capacity.

Natural gas is an affordable, reliable, relatively low-carbon fuel that has helped the UK achieve significant GHG emission reductions in the power generation sector (by 48 per cent on 1990 levels<sup>3</sup>), displacing highly carbon-intensive coal. Furthermore, upgrading to more efficient and modern gas condensing boilers for domestic heating, which release similar amounts of CO<sub>2</sub> as electric heat pumps, can help consumers reduce emissions<sup>4</sup>.

Natural gas should therefore be recognised as an ideal partner for renewables in the UK energy system and can be a destination fuel in the power sector; in heavy industry (particularly over the longer term when coupled with carbon capture and storage (CCS)); and in heating and transport. Collaboration between government and industry is key to establishing an energy policy that balances affordability, security of supply and environmental sustainability.

CCS is recognised as one means to decarbonise power generation and energy-intensive industries via deployment at gas-fired power stations or refining and other industrial plants. The UK Committee on Climate Change recommends that the development and deployment of CCS technology is critical to meeting the 2050 low-carbon economy targets.

The widespread deployment of CCS will play to the strength of the UK oil and gas supply chain, which has all the skills needed to excel in its deployment under the right commercial model. Hundreds of thousands of workers with transferable skills and knowledge – for example in geoscience, subsea engineering and fabrication – can build on existing expertise and infrastructure to enable safe and effective transportation and storage of CO<sub>2</sub> in depleted oil and gas reservoirs offshore. Electrification, carbon offset and carbon abatement research and technologies also present an important opportunity to deploy the skills of the wider oil and gas supply chain.

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<sup>3</sup> BEIS, *Updated Energy & Emissions Projections*, March 2017

<sup>4</sup> See [http://cired.net/publications/cired2015/papers/CIRE2015\\_1327\\_final.pdf](http://cired.net/publications/cired2015/papers/CIRE2015_1327_final.pdf)

During offshore operations, emissions arise from power generation required to process well fluids, treat oil and gas to export specification, and safely accommodate staff on offshore installations. The reduction of these emissions is a sign of the industry's commitment as the UK continues to make progress in delivering its carbon targets. In 2015, these emissions made up less than 3 per cent of the UK's overall emissions.

In 1996, UK upstream GHG emissions peaked at 28.3 million tonnes CO<sub>2</sub> equivalent and have declined steadily since 2000. This is due to the fall in oil and gas production; improved management of operations; lower emissions from new fields with more efficient technology; tighter regulations; and the decommissioning of older, more emission-intensive platforms. Participation in the EU Emissions Trading Scheme has also helped provide a framework for emissions reduction. Oil and Gas Authority (OGA) data show that industry initiatives have helped production efficiency increase from 60 per cent in 2012 to an average of 73 per cent in 2016, while data from the UK Environmental Emissions Monitoring System illustrates that the carbon intensity of offshore installations has fallen since 2013. In 2015, despite an increase in production, this downward trend continued with a carbon emission intensity of 22,000 tonnes per million barrels of oil equivalent (boe)<sup>5</sup>.

The industry has implemented several initiatives aligned with reducing emissions, including:

- Innovative design choices for new installations and facilities that minimise GHG emissions
- Monitoring and reporting of energy usage and GHG emissions
- Reducing system leakages (e.g. from flare stack)
- Upgrading and altering equipment to maximise operational and energy efficiency
- Proposed funding for the Oil & Gas Technology Centre (OGTC) to research, develop and deploy new low-carbon technologies

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<sup>5</sup> Oil & Gas UK's *Environment Report* provides more information on atmospheric emissions from the industry. The publication is available to download at [www.oilandgasuk.co.uk/environmentreport](http://www.oilandgasuk.co.uk/environmentreport)



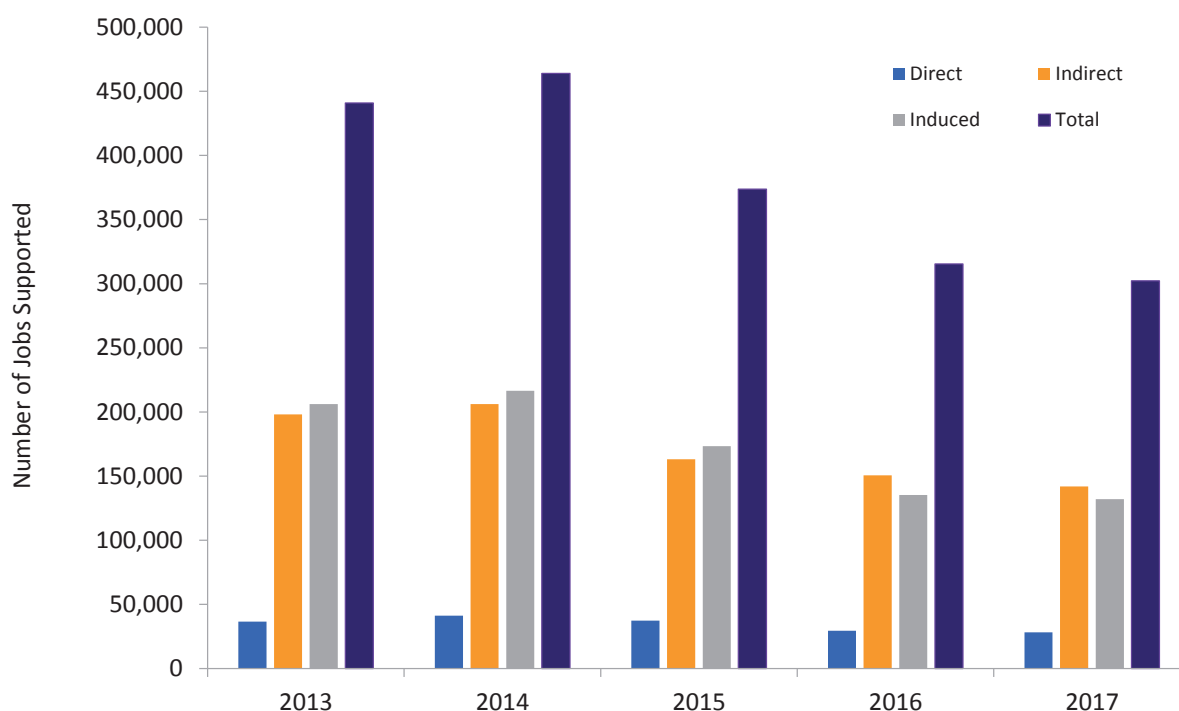
### 3.3 Total Employment

People are vital to the industry’s success and will shape its future. Maintaining a diverse range of highly skilled employees is critical. It is important for the economy and the industry itself that key oil and gas supply chain expertise anchored across the UK is not lost as employment contracts during the current downturn.

Latest estimates show that the oil and gas sector continues to support over 300,000 jobs in the UK through direct employment<sup>6</sup>, indirect employment<sup>7</sup> and jobs that are induced<sup>8</sup> by the sector’s wider economic contribution. While hundreds of thousands of jobs across the UK are still supported by the sector, the latest estimate represents over 13,000 fewer jobs than were supported in 2016<sup>9</sup> and 160,000 fewer than the peak of over 460,000 jobs in 2014. However, over the last 12 months, the pace of contraction has slowed significantly to just 4.2 per cent, compared with annual contractions of 19.4 per cent and 15.6 per cent in 2015 and 2016, respectively.

**Figure 6: Employment Supported by the UK Offshore Oil and Gas Industry**

	2013	2014	2015	2016	2017
Direct	36,600	41,300	37,300	29,500	28,300
Indirect	198,100	206,100	163,100	150,600	141,900
Induced	206,200	216,500	173,400	135,300	132,000
Total	440,900	463,900	373,800	315,400	302,200



Source: Experian

<sup>6</sup> Those employed by companies operating in the extraction of oil and gas and associated services.

<sup>7</sup> Employment as a result of supply chain effects caused by oil and gas sector activity. For these companies, extraction of oil and gas and associated services will be one part of a wider business.

<sup>8</sup> Employment supported by the redistribution of income from the oil and gas sector.

<sup>9</sup> The 2016 employment estimate has been revised down from 330,400 in the *Economic Report 2016* to 315,400 as new expenditure estimates and revised government statistics have become available.

Although some companies are still reducing headcount, particularly as supply chain companies continue to cope with low activity levels and a lack of future projects, the slowdown in employment contraction suggests that the largest reductions to the workforce may now be behind us. The reasons for the changing size of the workforce have also evolved. During 2015 and 2016, the industry was focused on lowering headcount as a way of quickly reducing costs. However, in 2017, changes appear to be more transformational aimed at creating a sustainable workforce for the long-term. For example, there are more instances of workforce contraction due to synergies made through mergers and acquisitions (M&A) or due to efficiencies unlocked within businesses (see section 6).

Looking ahead, the level of activity on the UKCS and the ability of UK-based businesses to win contracts overseas will largely determine the number of jobs supported by the sector. Direct jobs, most closely linked to operating expenditure, are likely to be more stable in the near-term. This is in part thanks to recent efficiency improvements helping existing facilities extend their economic limit and continue operations for longer. Indirect jobs, more closely linked to capital investment, have a less certain outlook as they are reliant on new project sanctions. Induced jobs are a by-product of spending across all areas of the business and the associated wealth being redistributed across the domestic economy.

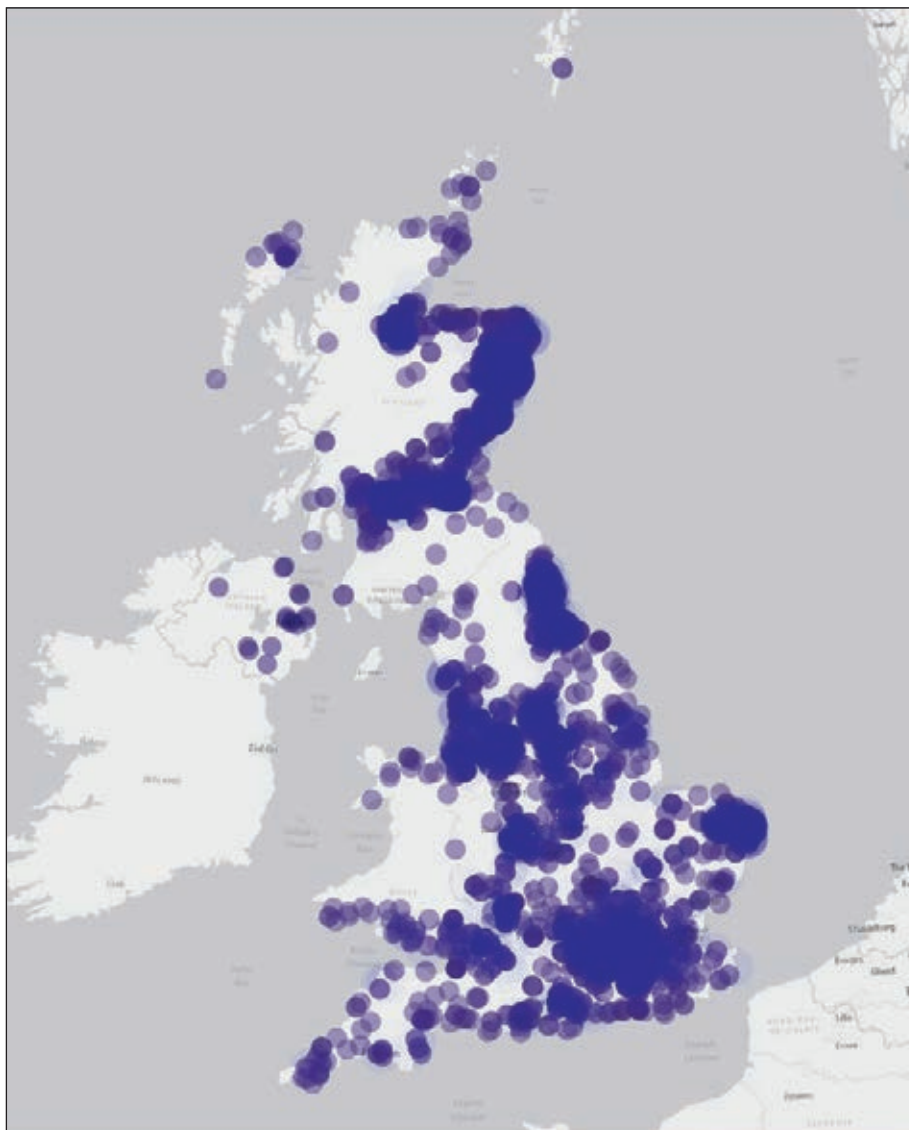
As the industry continues to face challenges in a tough economic climate, the importance of positive and proactive workforce engagement to help deliver a sustainable long-term future becomes ever greater, on and offshore. A compelling and clearly articulated vision of the future has been formed (see section 5) that can help to illustrate the opportunities that industry is working towards.

### 3.4 Regional Centres of Excellence

The UK supply chain encompasses a wide range of expertise across the whole country that services oil and gas activities from exploration through to decommissioning. The diverse set of skills and experience not only enables the UK's domestic activities, but also form global centres of excellence that export goods and services to other basins around the world as well as other industries.

From the design and manufacture of specialist subsea equipment for new developments to the engineering expertise required to prepare a platform for removal, regional areas of excellence have evolved and developed right across the UK over the 50 years since gas was first discovered off the coast of East Anglia. Two case studies that follow (see overleaf) demonstrate the regional spread of the domestic supply chain. These are diverse multi-billion-pound projects – one a brownfield development and another a decommissioning programme – that have relied heavily on the UK supply chain for the highest quality goods and services, ensuring safe delivery. Oil & Gas UK estimates that, in 2016, every £1 million of expenditure by the oil and gas industry sustained around nine indirect jobs and a further eight induced jobs across the UK economy.

**Figure 7: UK Map of Companies Involved in Oil and Gas-Related Activity**



Source: Companies House

### Supply Chain for the Quad 204 Project

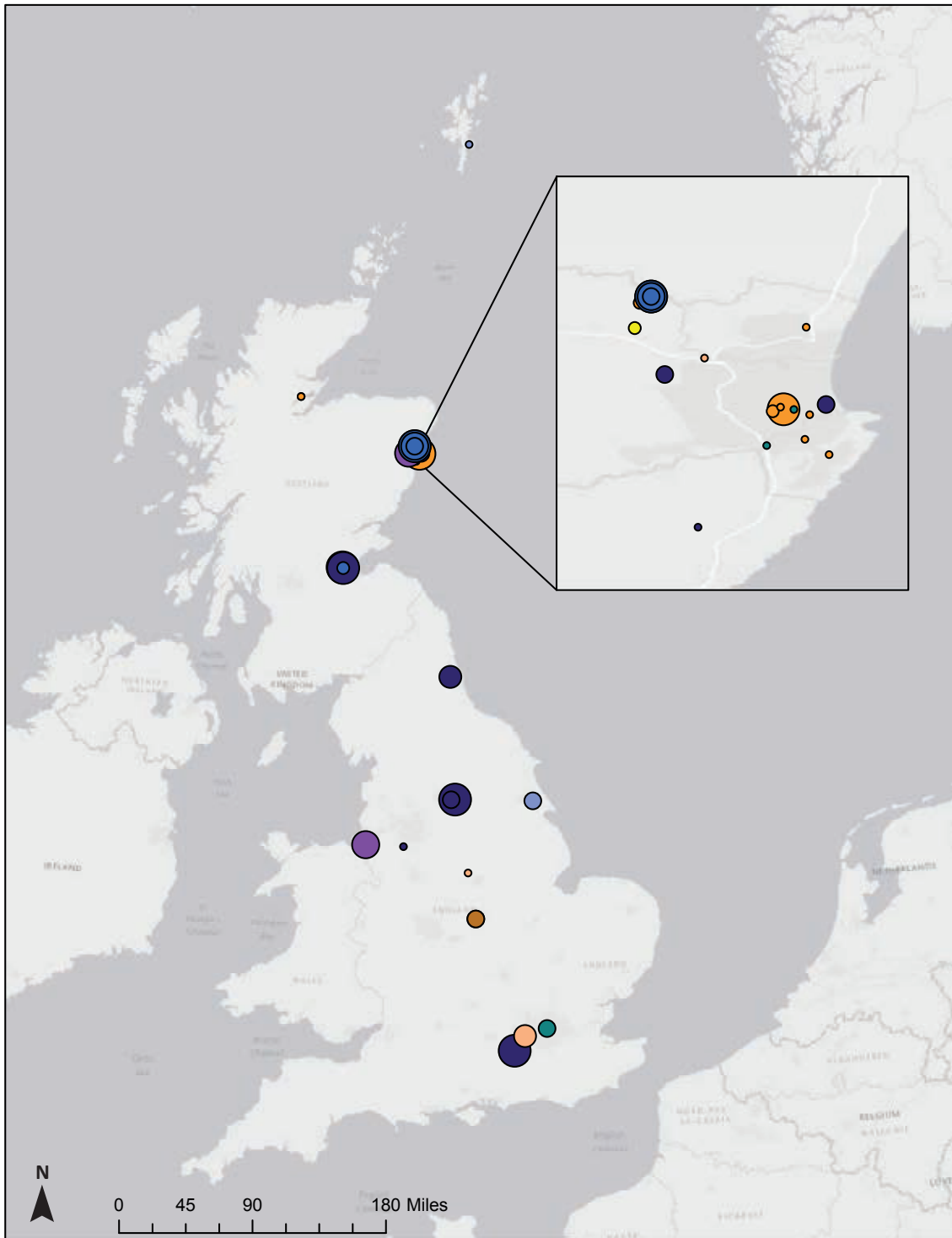
After 15 years of operating in harsh conditions and producing nearly 400 million boe, the FPSO (floating, production, storage and offloading vessel) servicing the Schiehallion and Loyal fields, 175 kilometres west of Shetland, had to be replaced to maintain production from the fields. The redevelopment was one of the most complex engineering challenges undertaken by BP and its partners and has involved constructing and installing a purpose-built FPSO – the Glen Lyon; a complete upgrade of the subsea infrastructure; and the start of a major drilling campaign. The project is expected to unlock a further estimated 450 million boe, extending the life of the fields beyond 2035.

Over £2 billion of contracts were awarded to companies across the UK. The supply chain capabilities required to design and manufacture the specialist equipment associated with the Quad 204 project, as well as the engineering expertise required for the subsea control system and hook-up and commissioning, are well-established and highly competitive in the UK. Figure 8 depicts the locations of Quad 204 UK contracts with a value of over £1 million each.

Some 13 of these contracts were over £10 million in value, more than half of which were awarded to companies within the UK but based outside of Aberdeen. Rosyth-based Babcock fabricated 73 subsea structures for the project – one of the largest subsea fabrication orders placed in the UK in 50 years. Other key contracts were awarded to Aberdeen-based Technip for the supply and installation of flexible risers; the OneSubsea facility in Leeds for subsea trees; and Bromborough and Knaphill based AF Global for the diverless pipeline connection system and tooling.

In addition to these larger contracts, the UK supply chain also provided expertise in procurement, logistics, training and assurance, as well as a variety of specialist engineering support offshore. While many of these contracts were awarded in the Aberdeen region, injecting capital into the city and its surrounding areas, the supply chain was involved right across the country. Contractors from Inverness to London were engaged and the experience gained from complex projects such as this allows lessons to be exported globally.

Figure 8: Map of the Larger UK Contracts Awarded for the Quad 204 Project



**Legend**

<b>Contract value (£m)</b>	● 10.1 - 20	<b>Sector</b>	● Procurement and Assurance Services
● < 2	● 20.1 - 50	● Catering/Facility Management	● ROV Support
● 2.1 - 5	● > 50	● Engineering Support Services	● Recycling and Disposal Services
● 5.1 - 10		● Equipment Design, Engineering & Manufacture	● Subsea/Topsides Control System
		● Logistics	● Training

Source: BP, CDA

### **Brent Decommissioning Project – the Role of the Supply Chain**

After 40 years of operations, the Brent Field, north-east of the Shetland Islands, is reaching the final stage of its life cycle. Since it was discovered in 1971, the Brent Field operations have produced over three billion boe, contributed more than £20 billion in government tax revenue (in today's money), and created and sustained thousands of jobs. At its peak in 1982, the Brent Field was producing more than 500,000 boe per day (boepd), equivalent to the annual energy needs of around half of all UK homes at the time.

The Brent Field has four large production platforms – three concrete gravity structures (Bravo, Charlie and Delta) and one steel jacket (Alpha). Brent Delta ceased production in 2011, and Brent Alpha and Brent Bravo in 2014. Brent Charlie is expected to cease production within the next few years.

Planning for decommissioning the field started in 2006 and Brent decommissioning is an iconic, multi-billion-pound project. It is one of the largest decommissioning projects to take place on the UKCS due to the size and complexity of the facilities and inter-related infrastructure, its age, remote location, and the harsh environment of the North Sea. Shell submitted its draft Decommissioning Programme to the Department for Business, Energy & Industrial Strategy (BEIS) in February 2017. A 60-day public consultation commenced on 8 February 2017 and ended on 10 April 2017.

The Brent Field is a 50-50 joint venture between Shell and Esso, with Shell as operator, and they have invested billions of pounds in Brent infrastructure, including a £1.2 billion redevelopment project in the 1990s that significantly extended the lifespan of the field. Throughout the Brent Field's history, tens of thousands of jobs have been created for Brent operations, many of them highly skilled, and there have been huge benefits to local companies through the significant supply chain servicing Brent.

Currently, around 1,000 people onshore and offshore are employed on the Brent operations and the decommissioning project. The Brent decommissioning project is working with over 100 north east of Scotland companies in a wide range of capacities and disciplines. Additionally, work is being conducted by Able UK Limited in Teesside, north east England, with some study work carried out in the Netherlands by the Allseas Group. The UK does not have a heavy-lift vessel capability comparable to that of Allseas' Pioneering Spirit. In terms of overall project spend to 2025, it is currently anticipated to be around 85 per cent on UK local content.

Shell has been preparing for, and conducting, an extensive range of engineering decommissioning activities including: plugging and making safe the 154 wells across the Brent Field; strengthening the underdecks; installing lift points and cutting the legs and securing with clamps ahead of removal to shore and recycling of the four platform topsides; recovering oil and gas debris across the Brent Field and removing the oil – known as 'attic oil' – trapped at the top of some of the subsea storage cells; and cleaning and flushing of pipelines in preparation of stabilisation or removal.

Well plugging and abandonment (P&A) is one of the key activities in decommissioning, representing close to half of the total spend on a typical project. Since 2016, 32 different contracts have been involved in well P&A activity on the Brent Field. Seventy per cent of these contracts are with Aberdeen-based firms, with the remainder spread across the rest of the UK. Well P&A has already been completed on Delta and Bravo.

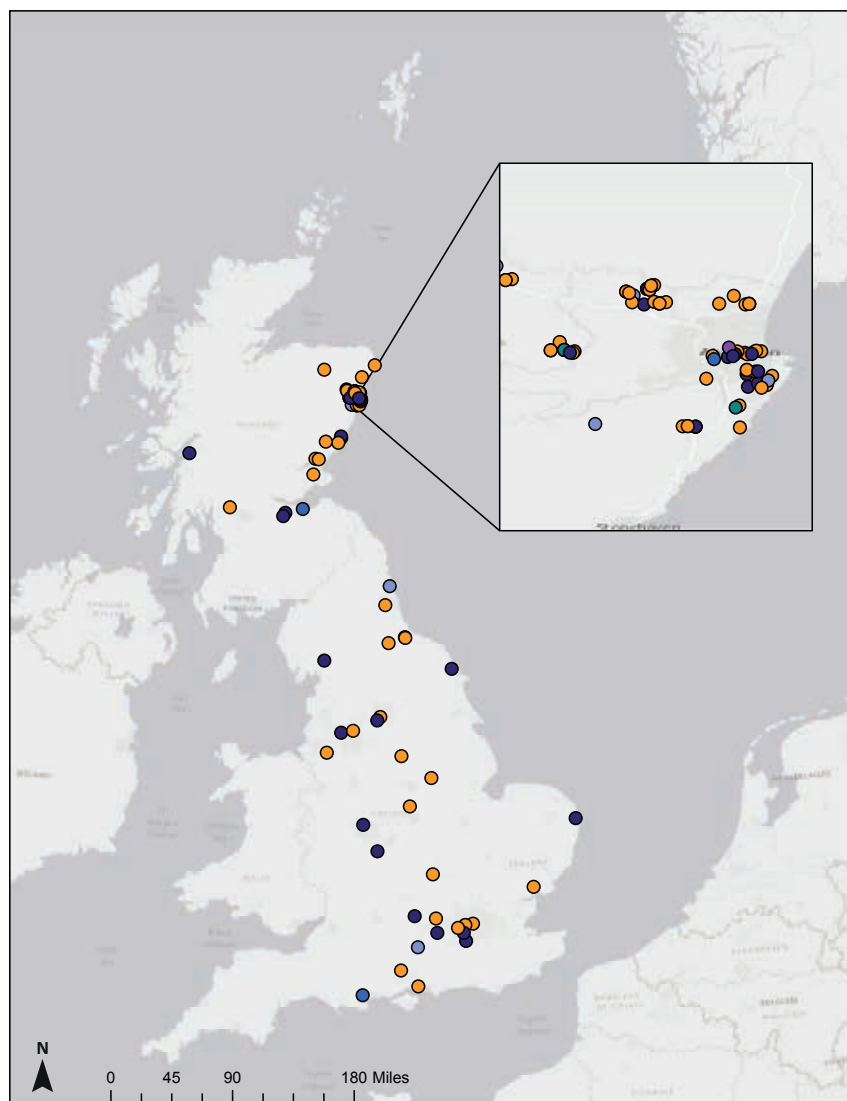
Other services provided by the UK supply chain have included: environmental impact assessments and preparatory studies in support of the decommissioning programme; stakeholder engagement, verification and assurance services; innovative technical solutions to sample the storage cells on the three concrete gravity base structures; and site remediation. The Brent project demonstrates that the skill set exists for these activities across the UK.

The topside on the Brent Delta platform, weighing 24,200 tonnes, was successfully removed in a single lift by Allseas' single lift vessel Pioneering Spirit and taken to Able's yard on 2 May 2017. Dismantling and recycling Delta's topside will sustain around 50 local jobs, and Able has also created three new apprenticeships. It is estimated that over 97 per cent of the topsides will be recycled.

Shell is committed to supporting the development of the emerging decommissioning sector. As demand increases, there will be further opportunities for the UK supply chain to capitalise by developing key skills, capability and capacity to service the local markets, and to export this expertise internationally.

Of the project spend since 2016, Figure 9 shows the spread of work contracted to companies based in the UK.

**Figure 9: Map of UK Contracts Awarded for the Brent Decommissioning Project**



**Sector**

- Operator Project Management
  - Platform Removal Activities
  - Post CoP Facility Running and Preparation for Removal
- Recycling and Disposal Services
  - Site Remediation Work
  - Wells P&A

Source: Shell, CDA

## 4. The Business Environment

### In Summary

The last year has seen significant changes to the business environment within which the oil and gas industry operates. Commodity prices and political and regulatory issues, most notably Brexit, have dominated the agenda. Against this backdrop, industry has pursued efficiency improvements aimed at driving transformational change.

Volatility in oil and gas markets has continued over the first six months of this year, although there are some signs of oil price recovery from the recent lows of 2016. The average dated Brent price was 30 per cent higher over the first half of this year than in the same period last year. The longer-term outlook for oil prices remains unpredictable, with the major uncertainty being the resilience of supply following the global reduction in investment.

The average NBP day-ahead gas price was 40 per cent higher over the first half of 2017 than it was last year, but the price has dropped back since. Although demand for gas is forecast to continue to rise over the next decade, the pace of growth will not match that of supply in a market where production costs have fallen rapidly over recent years.

Brexit brings another macro-economic uncertainty into play that will be considered when investors are assessing opportunities on the UKCS. In the short-term, the weakening of Sterling in response to Brexit was positive for many oil and gas companies, particularly producers with a local cost base and supply chain companies with a propensity to export. However, in the long term, there are still a wide range of potential approaches to how the UK will leave the EU, each with different implications for the oil and gas industry. Oil & Gas UK, on behalf of its members, has emphasised to government the need to maintain a strong voice in Europe, enable continued frictionless access to markets and labour, and to protect energy trading and the internal energy market.

The average Brent oil price was

**30%**

higher over the first half of this year than the same period last year

The average NBP day-ahead gas price was

**40%**  
higher

over the first half of 2017 than the same period last year

The cost of industry trade could increase by as much as

**£500**  
million

per annum if the UK reverts to World Trade Organization rules



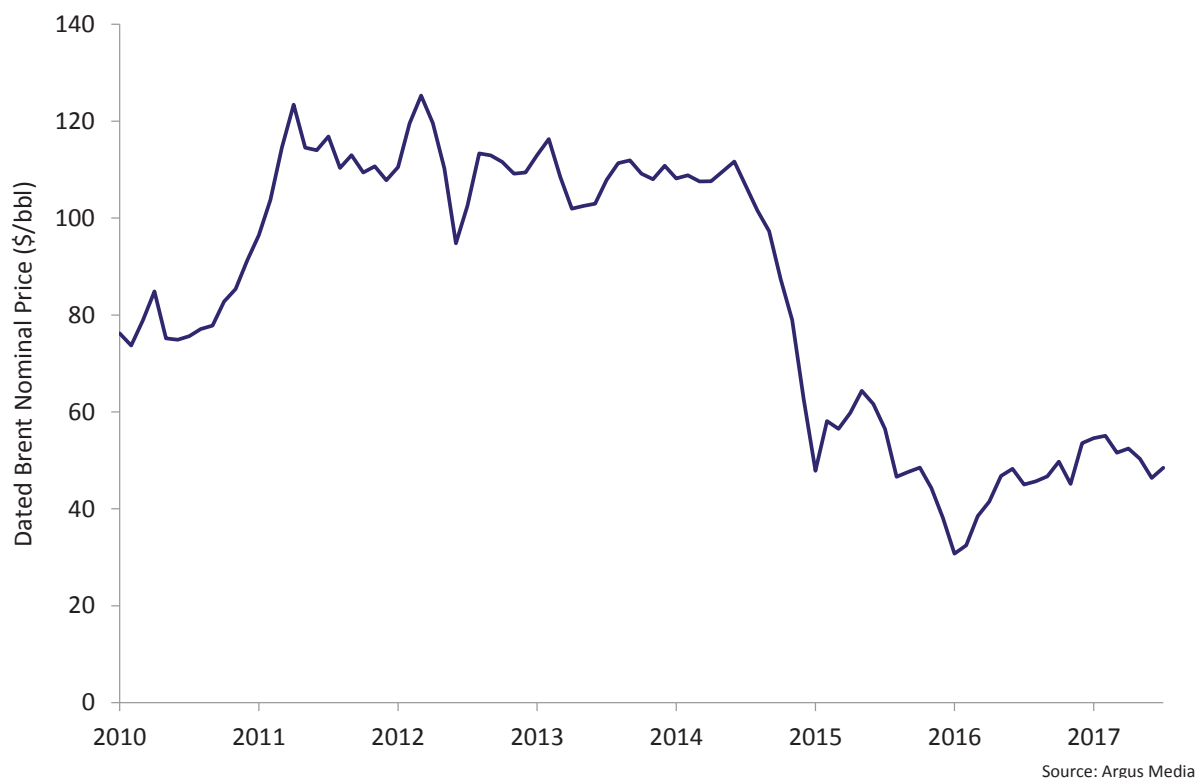
## 4.1 Oil and Gas Markets

### Oil Prices and Market Trends

Oil markets continue to be characterised by uncertainty in global supply and price volatility. Dated Brent averaged \$51.6 per barrel (bbl) over the first six months of this year, compared with \$39.8/bbl over the same period last year. The price fell back below \$45/bbl in June, representing a seven-month low against the backdrop of rising global supply, but it has recovered slightly since.

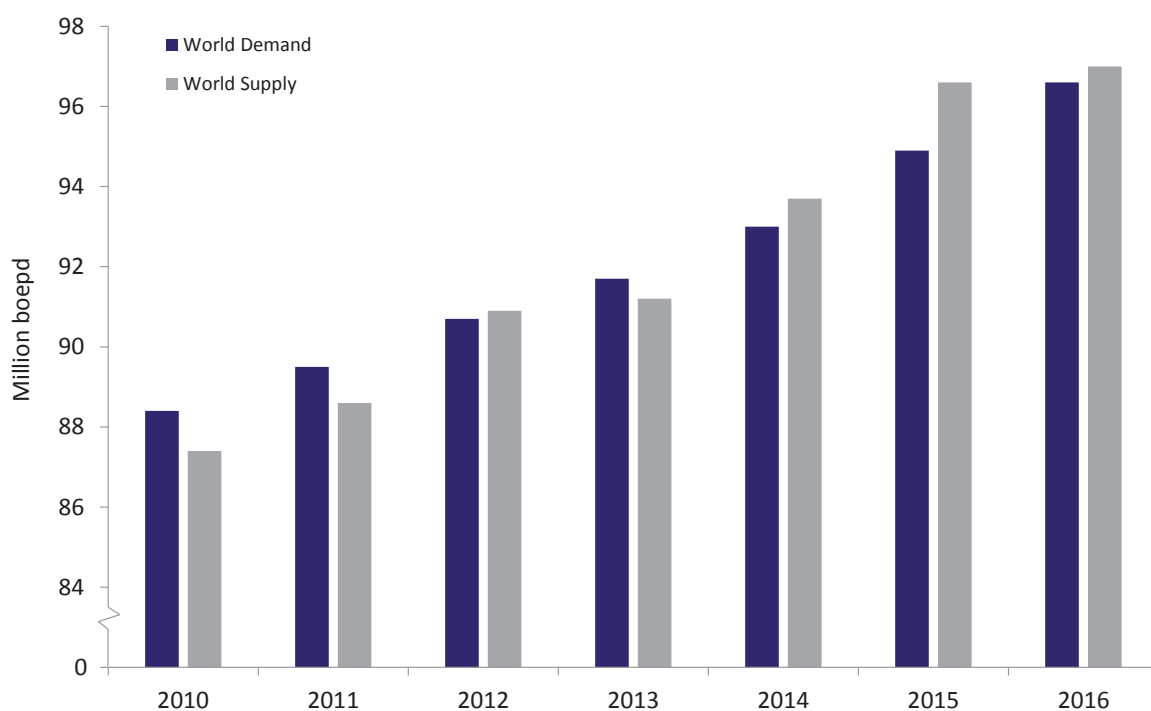
These price fluctuations are all the more marked when considered against a period of high price and low volatility at the start of this decade. The average dated Brent price consistently traded within the relatively tight range of \$95-125/bbl over a three-year period between quarter one 2011 and quarter three 2014, before prices fell to \$63/bbl by the end of 2014. There was a slight increase in price over the first half of 2015 before another decrease saw the average price drop to a trough of \$30.75/bbl in January 2016, the lowest since 2003. The progressive recovery thereafter has been welcome but question marks remain over long-term price expectations and investors are increasingly of the view that oil prices will be structurally lower over the long term with much greater volatility than seen in the recent past.

**Figure 10: Dated Brent Price**



Global oil demand is forecast to be 97.8 million boepd this year, an annual increase of 1.3 million boepd on 2016. Although demand is growing, this is forecast to be the second consecutive year when the rate of growth has slowed<sup>10</sup>. This is partly due to the slowing expansion of the Chinese economy, with an annual primary energy demand growth rate of 1.3 per cent last year compared with an average of 5.3 per cent per annum between 2005-15<sup>11</sup>. More efficient energy use is also a factor.

**Figure 11: Global Oil Demand and Supply**



Source: IEA

On the supply side, output cuts declared by OPEC in November last year have taken effect in the first half of this year. Over the first few months of the agreement, compliance rates were very high, with output supply from OPEC and the 11 non-OPEC countries lower than what was agreed.

On 25 May 2017 at the 172<sup>nd</sup> meeting of OPEC, it was formally announced that the 1.8 million boepd cut in output would be extended for a further nine months from 1 July 2017 through to the end of March 2018. The nine-month extension was agreed so that the end of the cuts would not coincide with the seasonal decline in demand at the start of 2018. However, the announcement did little to provide an uplift to the market, instead shifting prices further downwards as many investors concluded that the proposed cuts would not be sufficient and compliance rates would not be high enough to diminish global stockpiles. This suggests that it may be more difficult to overcome the global oversupply than previously anticipated.

<sup>10</sup> See International Energy Agency (IEA) *Oil Market Report* at [www.iea.org/oilmarketreport/omrpublic](http://www.iea.org/oilmarketreport/omrpublic)

<sup>11</sup> See BP *Statistical Review of World Energy* at <http://on.bp.com/2xaD2v8>

Over the short term, supply will continue to dominate price expectations. According to Petro-Logistics, output from those committed to the OPEC agreement increased by more than 600,000 boepd in July compared with the first half of 2017, which marks the third consecutive month of reduced compliance as certain members' commitment to the agreement falters. Furthermore, growing volumes from countries such as Nigeria and Libya that are exempt from the agreement are putting further pressure on the deal's effectiveness. Any long-term growth in oil price will not only require a reduction in output from OPEC, but also a gradual reduction of oil inventories, many of which are held in North America.

Onshore shale production from the US Lower 48 States more than doubled between 2011 and 2014, driving an increase in total US output to around 12.3 million boepd, which has remained flat over the last two years. Despite the pressures on global oil price, output has increased by over 300,000 boepd during the first half of this year<sup>12</sup>. The renewed resilience of US production has been driven by an increase in drilling activity with the rig count at its highest in over two years. Alongside further productivity improvements from existing wells, producers have been able to successfully increase output at little marginal cost.

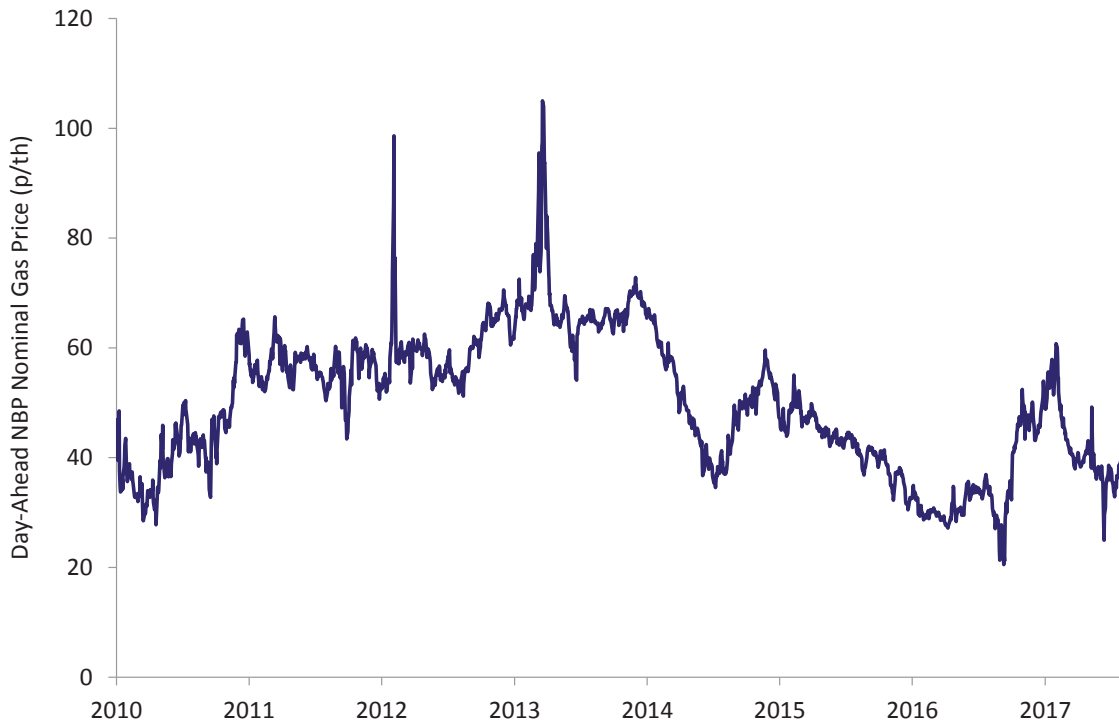
Oil demand is expected to continue to increase over the second half of this year and will be an important factor in determining whether the combined efforts of OPEC to reduce the world supply glut are effective. By the end of this year, we could see average annual global demand exceed supply for the first time in more than three years. If signs of a change in demand are not apparent by the third quarter of this year, then there could be calls for further cuts in output by OPEC. This volatility and uncertainty in the market will likely persist into 2018-19.

### Gas Prices and Markets

The NBP day-ahead gas price has averaged 43.3 pence/therm (p/th) over the first half of this year, 40 per cent higher than the 30.89 p/th in the first half of 2016. This is largely due to a sharp price increase over the second half of last year and into the early part of this year. Although the role of gas as a heating fuel means it is common for prices to be higher over winter months when demand is higher, the impact was heightened over the winter of 2016-17 due to a shortage of gas storage and uncertainty over liquefied natural gas supply to the UK. The price has fallen quite rapidly since, reaching a daily low of 25 p/th in June this year, almost 60 per cent below the daily high of 60.8 p/th at the start of February, and shows little sign of structural recovery in a market defined by a large global oversupply.

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<sup>12</sup> Source: US Energy Information Administration

**Figure 12: Day-Ahead NBP Nominal Gas Price**

Source: ICIS Heren

Rough storage facility, the largest seasonal storage facility in the UK, has experienced ongoing operational problems over the last two years. In June last year, operations were temporarily ceased leading to Centrica Storage announcing this summer that the facility will not be returning to injection and storage operations this year. This is due to well integrity issues and facilities reaching or approaching the end of their design-life. Short-term refurbishment or rebuild options required to bring down longer-term running costs are not seen as economically viable and, as a consequence, the remaining 5.2 billion cubic metres (bcm) of cushion gas will be produced and the field will cease to be used as a storage facility<sup>13</sup>.

Shippers will look to alternative options for storage, with much being delivered via the interconnector from Bacton Gas Terminal to Zeebrugge where it will be transported and stored in other facilities in mainland Europe. The future without Rough, which accounted for over 70 per cent of total British storage capacity, will put an increased reliance on other sources of gas storage. New investments in seasonal gas storage capacity are no longer as economically attractive as the swing between summer and winter gas demand has diminished over recent years.

The announcement that Rough will permanently cease storage operations contributed to the gas price rebounding back into the mid-thirties range after dropping to an annual low of 25p/th at the start of June. The availability of UK gas storage capacity will be a key factor in determining how the market develops over the second half of the year, alongside more traditional factors such as regional and global supply and winter temperatures.

<sup>13</sup> See [www.centrica.com/news/cessation-storage-operations-rough](http://www.centrica.com/news/cessation-storage-operations-rough)

## 4.2 Impact of Brexit

Following the UK's decision to leave the European Union (EU) last year, the UK Government stated its intention to materially change the country's relationship with the EU, as outlined by Prime Minister Theresa May's Lancaster House speech in January 2017 and the government's subsequent *White Paper*<sup>14</sup>. The government has stated its intention to end the free movement of people, the UK's membership of the Single Market and Customs Union, and oversight of the European Court of Justice, returning sovereignty to the UK Parliament. In place of current EU membership, the government would seek a comprehensive Free Trade Agreement between the UK and the EU.

Although much of the detail regarding the UK's withdrawal remains unknown, an assessment is offered here on the potential impact of Brexit on the UK's oil and gas industry.

### Short-Term Impact

The initial result of the EU referendum saw significant volatility in financial markets. Forecasters, economists and bookmakers alike all predicted that the result would be to remain in the EU. The surprise result created uncertainty around how Brexit would be implemented and what the impact would be for UK businesses. Investors are generally averse to uncertainty and therefore UK business has looked to the government to reassure financial backers, particularly those from overseas, that their investments will not be negatively impacted.

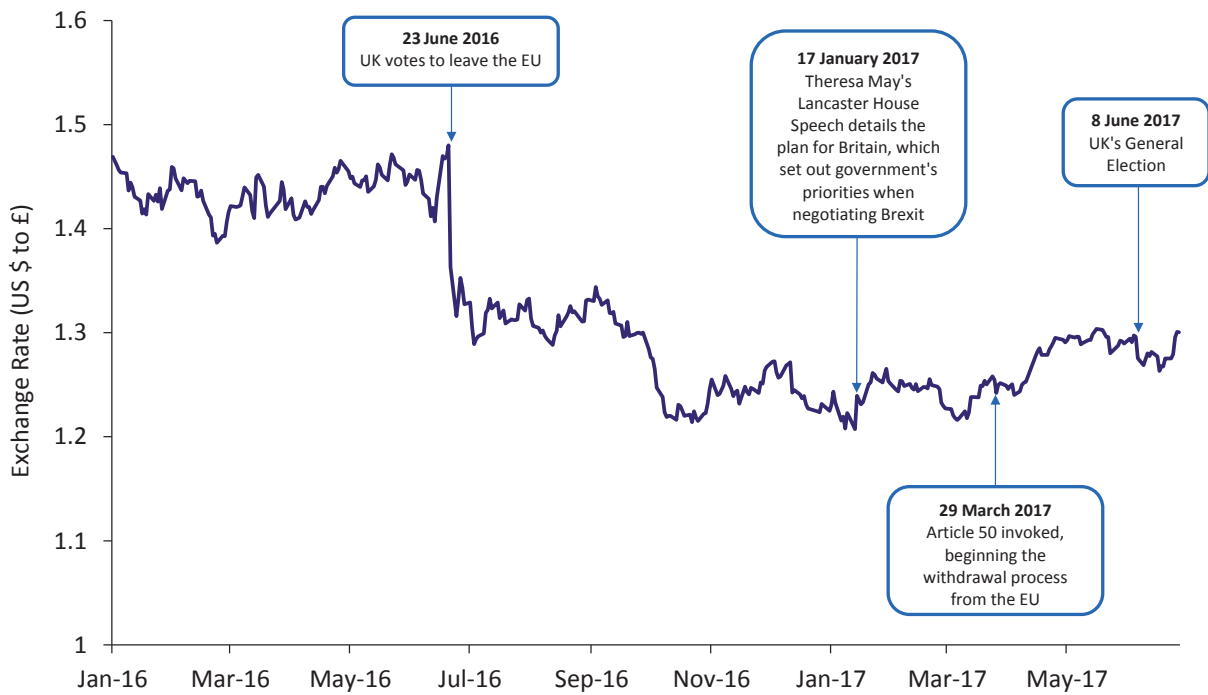
Despite this uncertainty, there were some short-term positives for some sectors of UK business. On the morning immediately after the EU referendum result, Sterling fell to its lowest level against the dollar since July 1985, closing at 1.33 \$/£<sup>15</sup>. Without any change to prices, UK exports became more competitive overnight and more attractive to foreign buyers.

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<sup>14</sup> The UK Government *White Paper* is available to download at <http://bit.ly/2wanZEm>

<sup>15</sup> See Bank of England <http://bit.ly/2uKMUF>

**Figure 13: US Dollar/Sterling Exchange Rate**

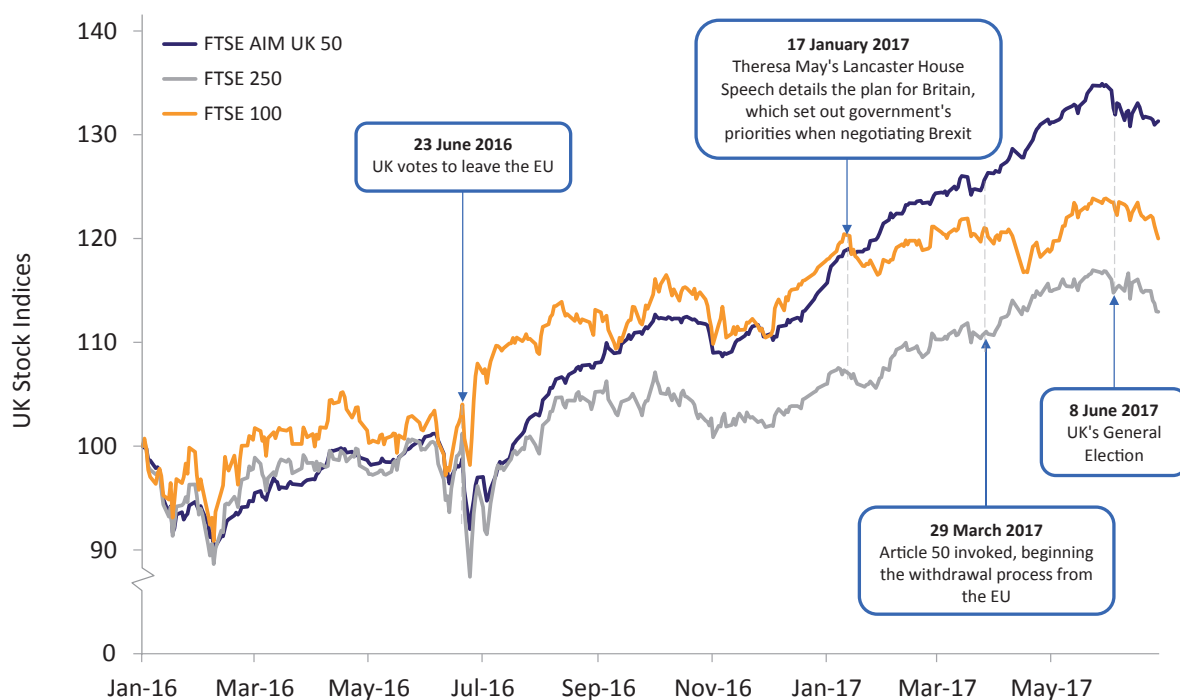


Source: Bank of England

For UK oil and gas producers, there was an additional positive benefit to margins arising from the currency depreciation. Unhedged oil producers with a local cost base selling product into a dollar-denominated global market benefitted most from the weaker pound, in some instances increasing revenues by more than 10 per cent with Sterling-denominated costs remaining unchanged.

In the 12 months following the Brexit result, UK stock indices performed very well. This is in part because UK-listed companies have income in foreign currency, but also indicates that investors believed the short-term benefit of more competitive exports sufficiently outweighed the longer-term uncertainty to create a bull market. However, both the FTSE and AIM all-share indices have fallen back since the General Election result on 8 June, reinforcing the need for the government to finalise policy positions and offer greater clarity on potential outcomes.

Figure 14: UK Stock Indices Performance



Source: Google Finance

### Long-Term Impact

The long-term impact of Brexit remains difficult to assess while there are still a wide range of approaches to how the UK will leave the EU, each with different implications for the oil and gas industry. However, Oil & Gas UK has looked at the value of goods and services traded with the rest of the world and how the cost of that trade may change under certain scenarios. This analysis encompasses the whole oil and gas sector in the UK, both upstream and downstream.

The primary objective of a tariff, where one is applied, is to protect a domestic industry. However, trade in natural resources such as oil and gas, where a domestic market cannot be created if resource is not abundant, is typically subject to zero or very low tariffs. Tariffs are often applied to refined products given that the refining process can be undertaken locally. Other products, many of which are used throughout the oil and gas supply chain, carry varying tariffs as shown in Figure 15 below.

Figure 15: EU Most Favoured National Applied Trade Tariffs for Goods Used in the Oil and Gas Supply Chain

Product Group	Average Ad Valorem Duty
Crude Oil	0.00%
Natural Gas	0.00%
Petroleum Products	3.00%
Inorganic Chemicals	4.50%
Organic Chemicals	4.30%
Plastics and Articles thereof	6.00%
Articles of Iron and Steel	1.70%
Electrical Machinery and Equipment	2.80%

Source: World Trade Organization

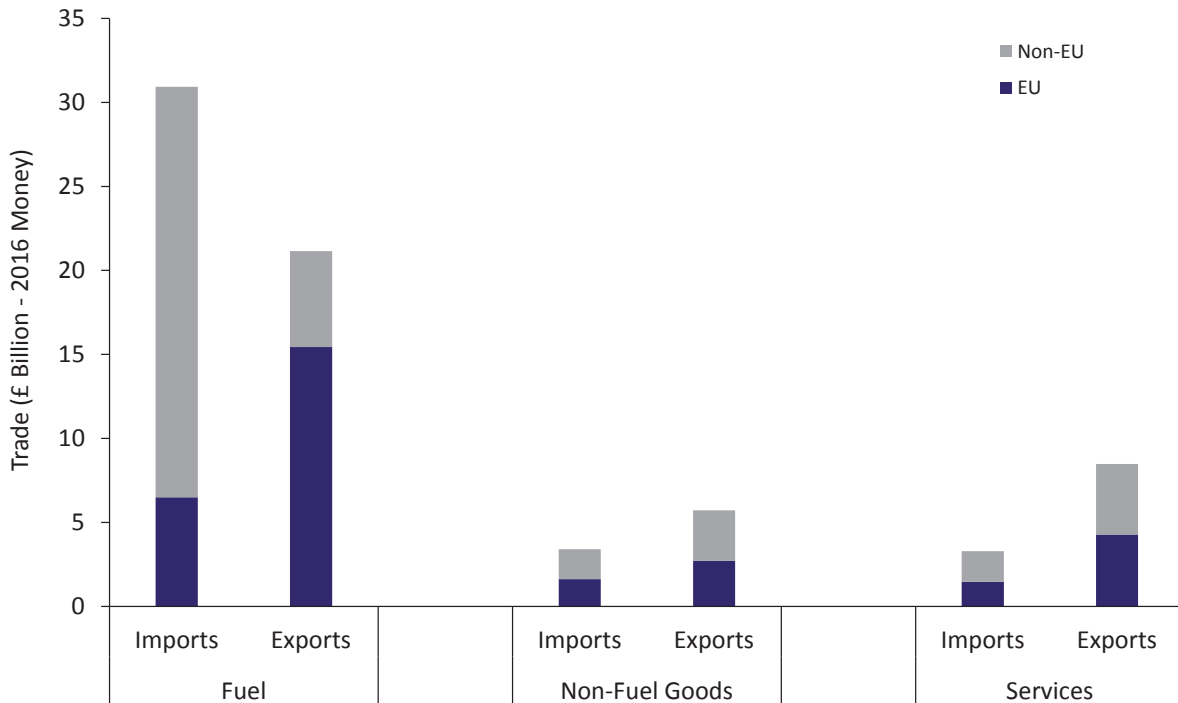
In 2016, as a member of the EU, approximately £73 billion worth of oil and gas related goods and services were traded between the UK and the rest of the world (£61 billion of goods and £12 billion of services). This equates to approximately 5 per cent of the UK’s total trade footprint of £1.5 trillion<sup>16</sup>.

The £73 billion of traded goods and services can be broken down further, as shown in Figure 16:

- £52 billion of fuel trade
  - £31 billion of imports, £7 billion of which came from the EU
  - £21 billion of exports, £15 billion of which were exported to the EU
- £9 billion of non-fuel trade (supply chain goods)
  - £3 billion of imports, just under half of which came from the EU
  - £6 billion of exports, just under half of which were exported to the EU
- £12 billion of services
  - £3 billion of imports, just under half of which came from the EU
  - £9 billion of exports, around half of which go to the EU

This trade, both imports and exports, came at a cost of around £600 million in direct tariff payments, around 40 per cent of which was incurred by the UK as an importer.

**Figure 16: UK Oil and Gas Industry’s Trade Breakdown**



Source: EY

<sup>16</sup> Office for National Statistics 2015 data are available to download at <http://visual.ons.gov.uk/uk-trade-partners>

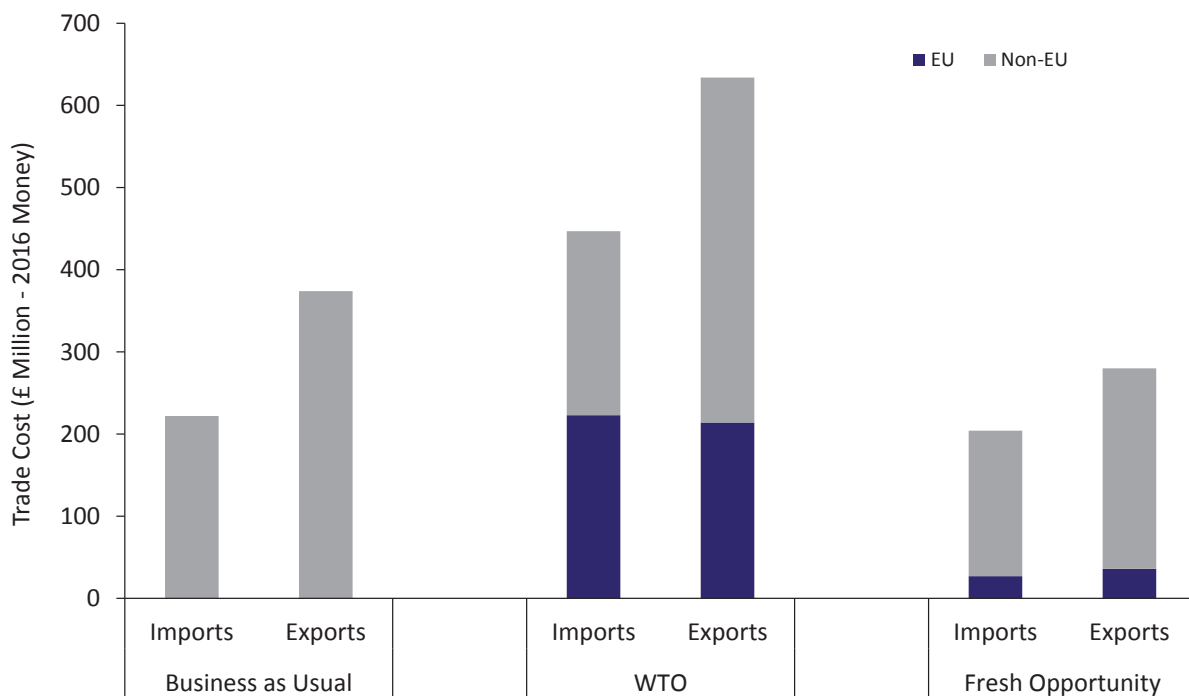


To assess the impact of leaving the EU, two different Brexit scenarios have been modelled:

- **Fresh opportunity scenario** – whereby the UK negotiates minimal tariffs with the EU and improved tariffs and favourable trade agreements with other non-EU nations. In this scenario, the direct cost of trade falls to around £500 million per annum.
- **World Trade Organization (WTO) scenario** – whereby the UK is not able to negotiate new trade deals and reverts to WTO rules. In this scenario, the direct cost of trade increases to around £1.1 billion per annum.

Figure 17 shows how the costs of trade may change under the two different Brexit scenarios compared to business as usual, should trading patterns remain unchanged.

**Figure 17: Annual Direct Tariff Costs Under Different Scenarios for the Whole Oil and Gas Sector**



Source: EY, Oil & Gas UK

At around 2 per cent of the total value of trade, even under the WTO Brexit scenario, the direct tariff costs associated with Brexit for the oil and gas industry are an unhelpful additional cost on an industry that continues to be under significant pressure from a sustained global downturn. Non-tariff barriers that may arise post-Brexit, which are far harder to quantify, may be of greater concern to industry and increase the cost of trade further.

Potential non-tariff barriers to trade include:

- **Mobility of labour** – Of the 300,000 jobs supported by the industry, more than half are employed either directly by oil and gas companies, or indirectly through the supply chain (see section 3.3 for more detail on industry employment). Around 10 per cent of that workforce comes from outside of the UK, with around half of these non-UK workers coming from the EU and may be affected by any changes to immigration policy post-Brexit. Around 70 per cent of these workers from within the EU are highly skilled and hold managerial or technical roles in the industry. Any barriers that prevent their free movement could not only increase associated employment costs and compliance administration, but also potentially undermine key projects and operations.
- **Customs processes** – With the UK no longer an EU member state and unlikely to remain part of the Customs Union, UK goods could face customs checks at EU borders. Any delays or added bureaucracy in sourcing goods or services would be unwelcome and could even result in unplanned operational shutdowns in extreme cases. It could increase the physical costs of trade and may ultimately influence companies to source goods and services from other nations.
- **Regulation and technical standards** – The Great Repeal Bill will look to transpose all existing EU law applying to the UK into UK law directly (where practical). However, the future relationship between the UK and the EU will govern the extent to which the UK can amend or repeal any laws or regulation and may result in the UK deviating from the EU. This could increase the compliance burden for UK businesses if overseas trading partners insist on additional procedures such as certification, testing and inspection.

Oil & Gas UK has emphasised the need for predictability for the industry, particularly at a time when commodity prices are volatile. We have recommended that the UK Government prioritises the following during Brexit negotiations:

- Maintain frictionless access to markets and labour
- Maintain a strong voice in Europe for this industry
- Protect energy trading and the internal energy market

The government can help to drive growth in the industry and Brexit provides an opportunity to promote the sector internationally. Oil & Gas UK urges policymakers to manage Brexit in a way that supports the industry and its long-term goals to maximise economic recovery of indigenous oil and gas resources.

## 5. Creating a Long-Term Future

### In Summary

In a rapidly changing energy landscape, the UK oil and gas industry needs to adapt to maximise its value within the energy mix over the long-term. Vision 2035 is designed to help the sector focus on long-term goals to stay relevant and successful.

The remaining value of this industry will depend largely on two factors. Firstly, the successful implementation of the industry's MER UK strategy is critical to maximise potential recovery from the UK's own natural resources underpinned by a strong supply chain. Secondly, the UK oil and gas supply chain must focus on diversifying and deepening its interests in the UKCS while collectively growing its export potential to capture as much of the global energy market as possible.

Work is now ongoing to try and secure a Sector Deal whereby industry and government work together to maximise existing and realise new opportunities in the UK offshore oil and gas sector.

## VISION 2035

sets out aspirations  
for the industry

The industry could  
deliver hundreds  
of billions of pounds  
in additional revenue  
to the UK by 2035



Vision 2035 will  
require an integrated  
policy approach  
between industry and  
government

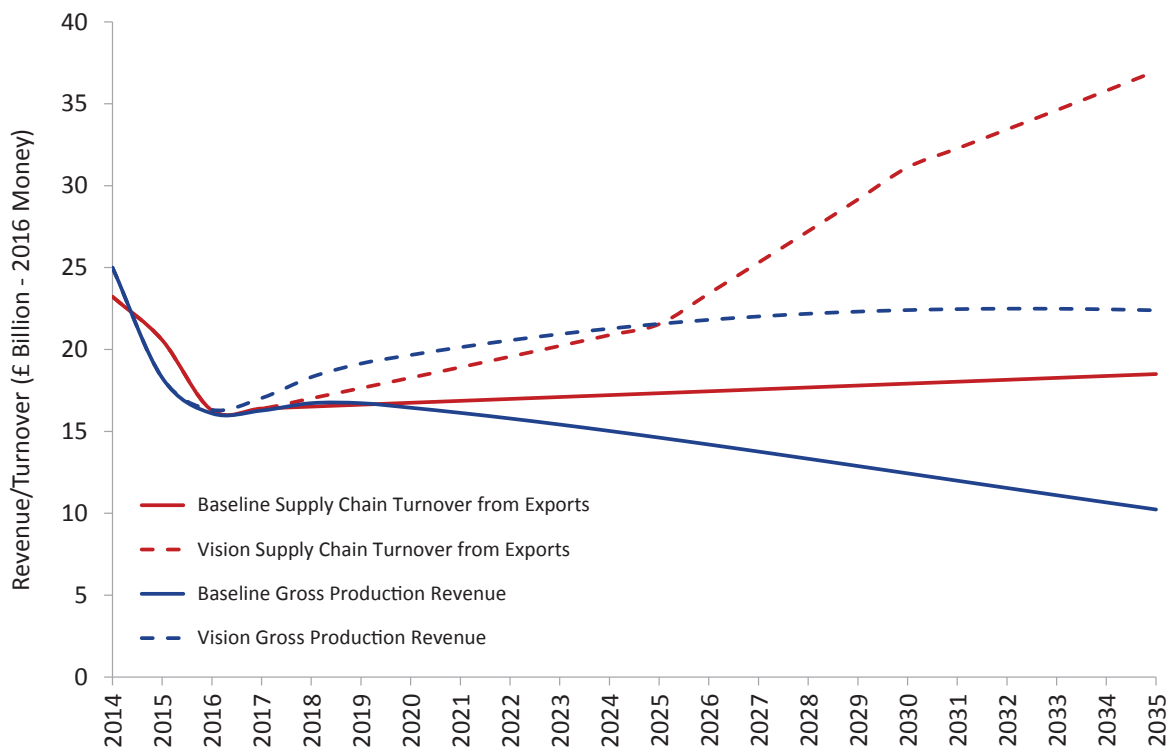
## 5.1 Vision 2035

It is crucial that as much domestic energy demand as economically possible is met through indigenous sources of production, provided they are competitive on both cost and against other forms of energy. As well as equipping itself to meet the UK’s forecast demand, the oil and gas industry must also recognise it has a role to play in facilitating a smooth transition to a lower-carbon economy (see section 3.2 for more information).

To help achieve this, the UK’s oil and gas industry has developed a vision for the sector out to 2035. Vision 2035 brings together two scenarios that depend on each other and could together generate hundreds of billions of pounds in additional revenue for the UK economy over the next 20 years:

- 1) **UKCS production scenario** (see the blue lines in Figure 18 below) – focuses on delivering an additional three billion boe above the baseline scenario, which projects that around 7.3 billion boe of oil and gas will be produced from 2016-35.
- 2) **Supply chain scenario** (see the red lines in Figure 18 below) – focuses on increasing the total revenue generated by the industry’s supply chain between 2016-35. To unlock this value, the supply chain must anchor and grow current capability and expertise in the UK to increase its domestic revenues while simultaneously growing an export business to become a global leader in mature basin management. Achieving the desired scale of supply chain growth will see the UK double its share of the global oil and gas market for goods and services from 3.7 per cent in 2016 to 7.4 per cent by 2035.

**Figure 18: Vision 2035**



Source: OGA

The purpose of the vision is not to forecast performance of the industry out to 2035 but to set aspirations that the industry should seek to pursue if it is to maximise its economic value. As such, the baseline scenarios should not be interpreted as ‘no further investment’ scenarios, but more as challenging ‘status quo’ scenarios whereby the industry continues to invest but does not make any fundamental changes in the way it operates. Likewise, the vision scenarios illustrated in Figure 18 are not simply a depiction of a high investment case – they will require fundamental transformation in delivery models if they are to be achieved.

The successful delivery of these scenarios requires progressive and continuous improvement in the competitiveness of the UKCS which must be sustained over time (see section 6). There are two areas in which the UK is competing. The UKCS and its supply chain are competing against other oil and gas producing regions where the differentiating factors include productivity, cost, gross and net margin, and materiality of fields under development. Oil and gas must also remain competitive against competing fuel sources where key differentiating factors include affordability, security of supply, environmental sustainability, and storage and transportability to global energy markets.

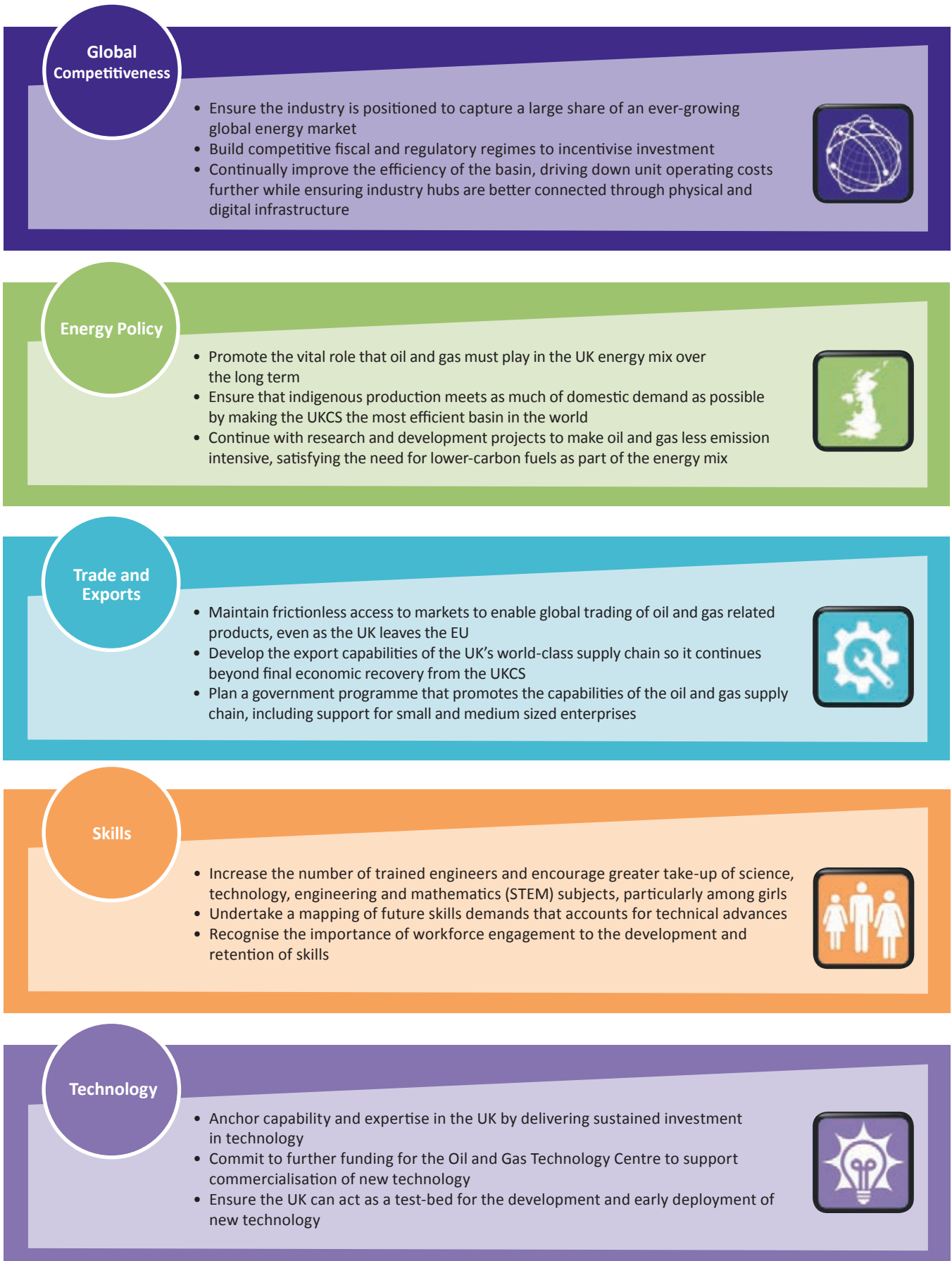
## 5.2 Delivering the Vision

As well as improving global competitiveness, a clear energy policy; technological advancement; the development of new skills across the energy sector; and more active promotion of trade and exports have been identified as catalysts that can drive industry towards the vision (see Figure 19 overleaf).

The vision serves to:

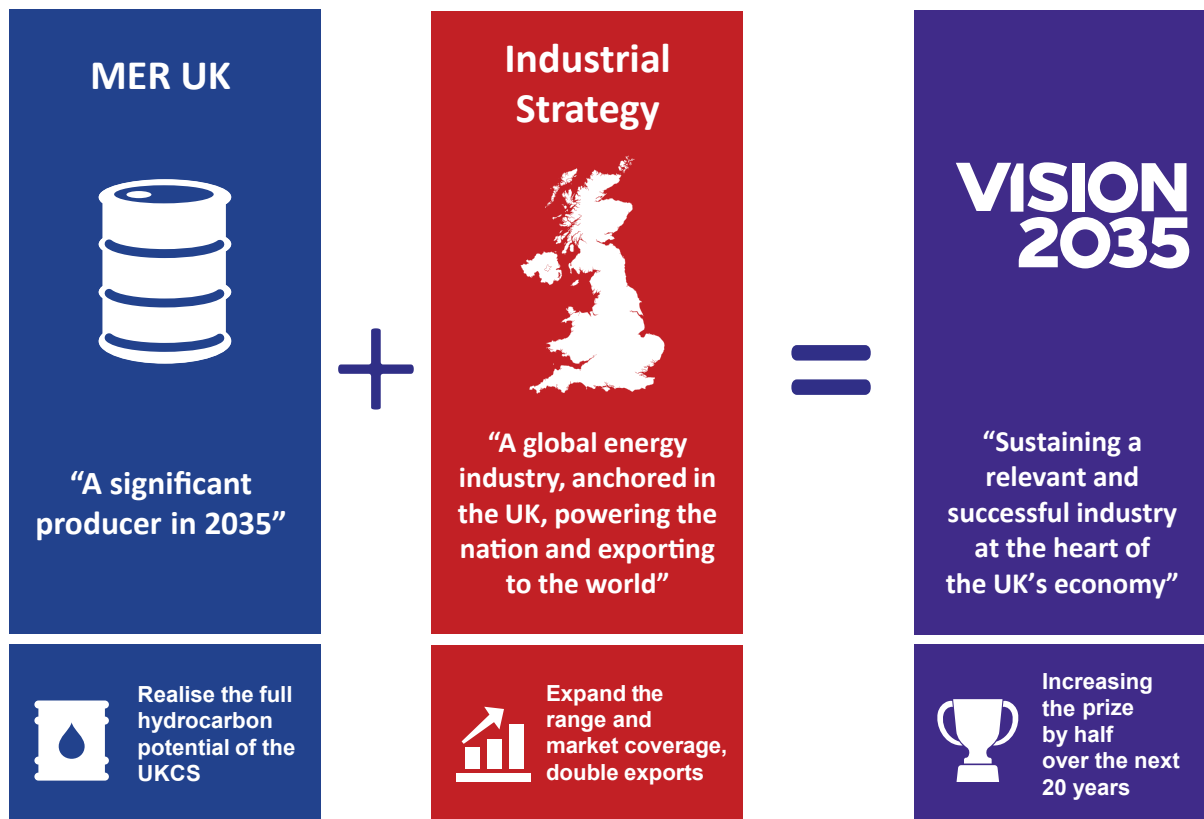
- **Raise awareness** – communicate a consistent story that brings the opportunity to life
- **Generate interest** – create broad interest in Vision 2035 by making it relevant to all audiences
- **Align on outcome** – build strong willingness from all stakeholders to get behind Vision 2035 with aligned leadership
- **Facilitate action** – secure commitment to action by demonstrating positive examples

**Figure 19: The Key Components to Achieve Vision 2035**



Delivering in these areas to achieve Vision 2035 will require an integrated policy approach. It must unite MER UK, industry’s drive to maximise recovery from the UKCS, with the UK Government’s Industrial Strategy, which seeks to make the most of the opportunities presented to the UK’s world-class supply chain.

Figure 20: Driving the Vision



5

It is vital for the future of the oil and gas industry that the government plays an active role in supporting the action being taken by industry to safeguard its future. In January 2017, the UK Government released an *Industrial Strategy Green Paper*<sup>17</sup> with an explicit aim “to improve living standards and economic growth by increasing productivity and driving growth across the whole country”. Government invited responses from industry and, after extensive consultation with members, associations and other trade bodies, Oil & Gas UK submitted a response to the public consultation in April 2017.

The response outlines the vital economic contribution that the oil and gas industry continues to make to the UK economy and its security of energy supply, as well as setting out Vision 2035 and the significant opportunity that could be realised if this sector is included as a key element of the Industrial Strategy. Part of Oil & Gas UK’s submission proposes that the Industrial Strategy should incorporate specific recommendations, in alignment with MER UK. Oil & Gas UK has also submitted a response to the Scottish Government’s Energy Strategy consultation. It is important that both governments work together to ensure their policies are complementary.

<sup>17</sup> The paper is available to download at <http://bit.ly/2g198Gt>

Within the *Industrial Strategy Green Paper*, the government set an open-door challenge to industry to come forward with proposals to transform and upgrade their sector through targeted Sector Deals. Any potential Sector Deal will have a quid-pro-quo element. There is an expectation that the sector proposes an area of business within which they could take action to transform their strategic prospects and need the government to intervene, where practical, to maximise the chance of success.

Oil & Gas UK forms part of a Sector Deal Task Finish Group that will present the case on behalf of industry via a submission to government. The other members of the group are: BEIS, Decom North Sea, International Association of Drilling Contractors, East of England Energy Group, NOF Energy, OGTC, Subsea UK, Energy Industries Council and OGA.



## 6. UK Continental Shelf Performance and Opportunity

### In Summary

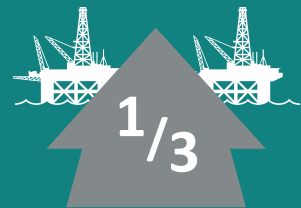
**P**erformance improvements have been achieved across a range of industry key performance indicators (KPIs) over the last 12 months. Production is still rising, driven by continued progress in improving production efficiency and better project execution so that start-ups are increasingly coming on-stream on time and within budget. Unit operating costs (UOCs) are expected to be around \$14/boe this year, making brownfield investments more appealing and helping to extend economic field life.

Challenges remain, however, and the industry is in urgent need of fresh capital investment, much of which may come from new entrants to the basin. This is true across all areas of the business, from exploration and appraisal through to development of new projects and late-life management of older assets.

A raft of M&A activity seen over the first half of 2017, worth almost \$6 billion in UKCS asset and corporate purchases, is a strong vote of confidence in a basin that has shown impressive resilience through the market downturn.

It helps that the UKCS is a more attractive place to invest for the long term than it had been previously, with UOC improvements greater than any other basin in the world. Fiscal change has also been positive with the highest tax rate falling from 81 per cent to 40 per cent over the last three Budgets. The UK now has a fiscal regime that ranks among the top quartile in terms of pre-tax value returning to investors. This backdrop presents the UK with an immense opportunity to flourish over the next few years, maximising its contribution to the UK economy.

By the end of 2018  
over



of total production  
will come from start-ups  
post-2016

Unit operating cost  
improvements have  
been greater in the UK  
than any other basin  
since 2014



High profile

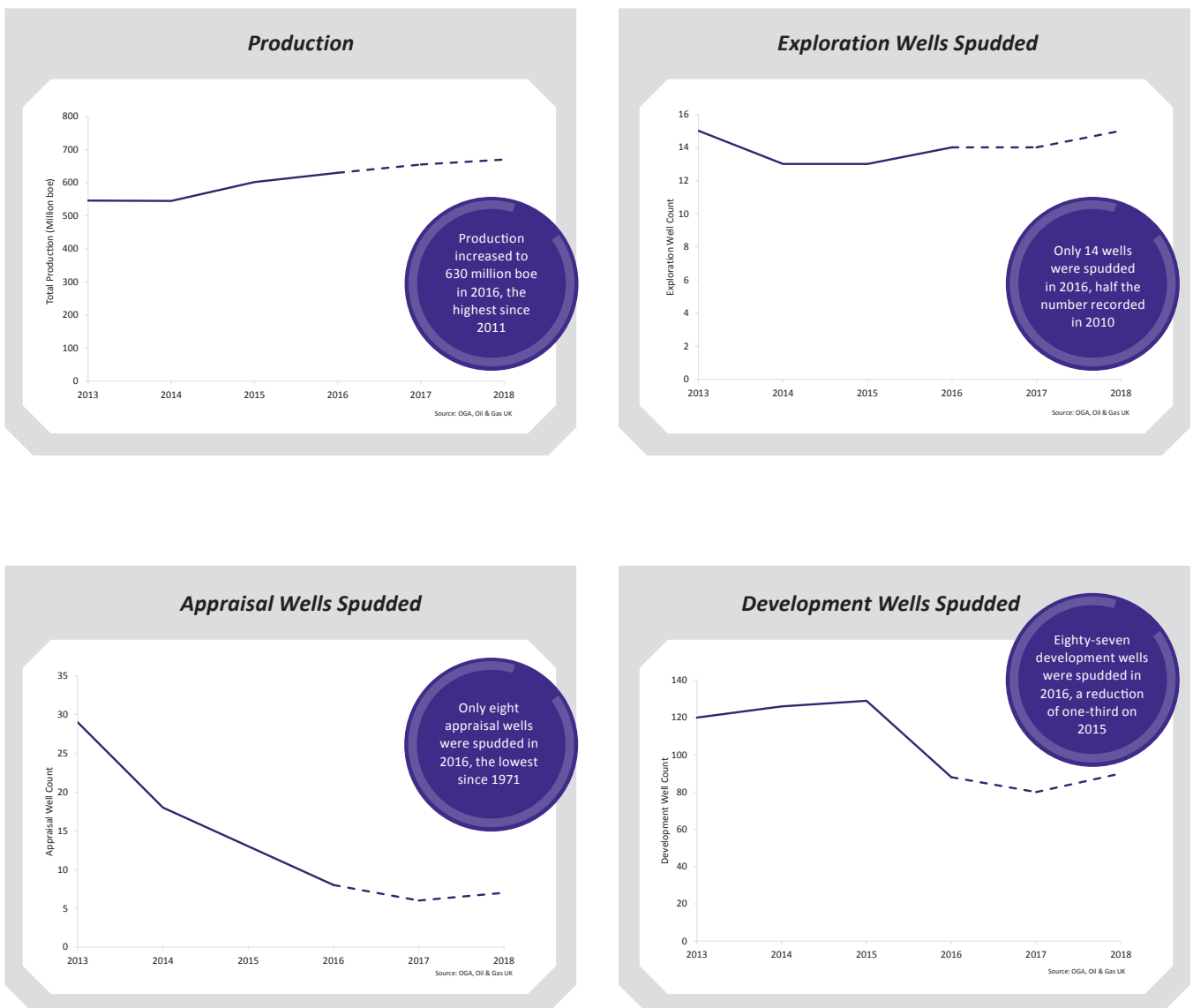


deals total nearly  
\$6 billion combined over  
the first half of the year

## 6.1 Key Performance Indicators

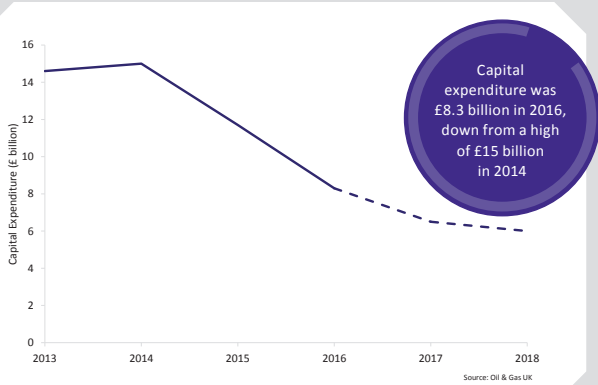
The UKCS has made significant progress in recent years across a range of key metrics. This is underpinned by new business models to maximise value from both late-life operations and new field start-ups. Examples include moving towards incentive-based contracts rather than cost-plus and adopting asset-focused business structures rather than traditional function-led models. Challenges remain, however, and the industry is in urgent need of fresh capital investment across all areas, from exploration and appraisal through to development of new projects and late-life management of older assets.

**Figure 21: Industry Key Performance Indicators<sup>18</sup>**

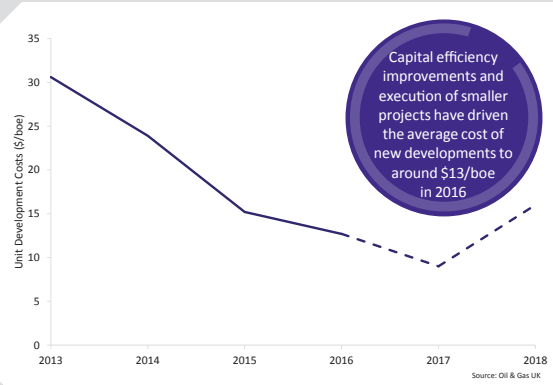


<sup>18</sup> All financials shown in 2016 money.

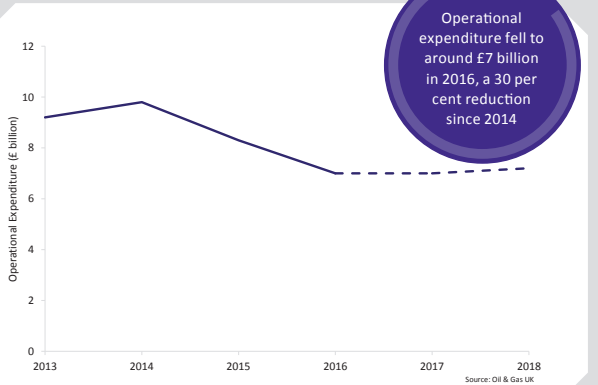
## Capital Investment



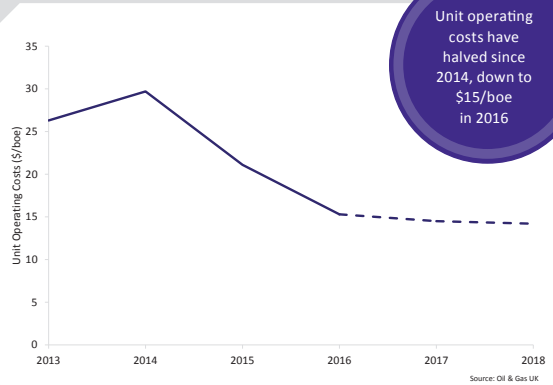
## Unit Development Costs



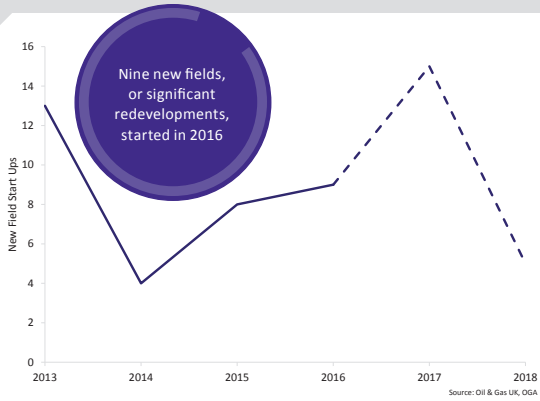
## Operating Expenditure



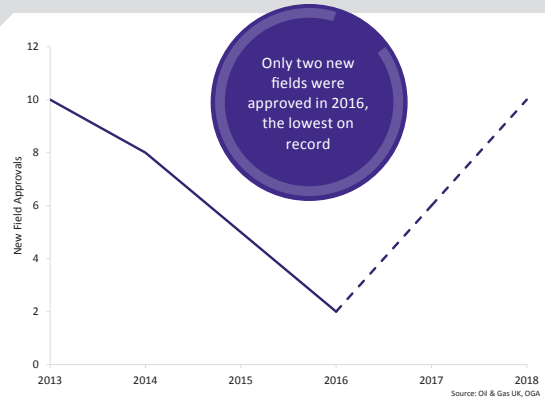
## Unit Operating Costs



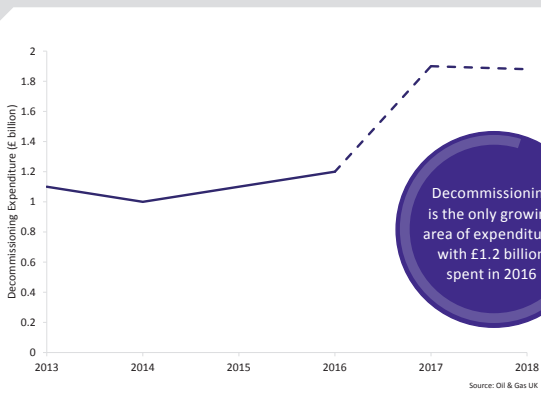
### New Field Start-Ups



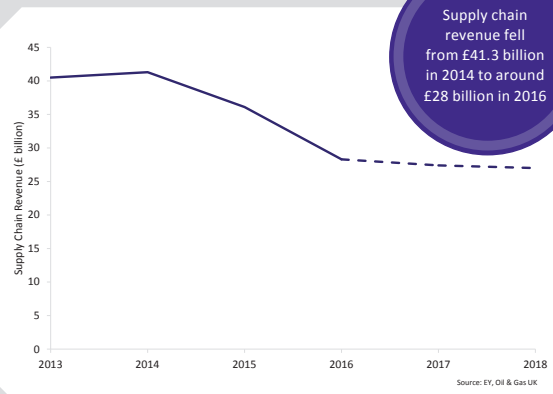
### New Field Approvals



### Decommissioning Expenditure



### Supply Chain Revenue



## Production

Between 2014 and 2016, production on the UKCS increased by 16 per cent – a significant achievement given that the basin had previously seen a consistent decline in production since 2000. The good performance looks set to continue with production almost 1 per cent higher over the first half of this year compared with the same period last year.

The improved performance of existing assets has been at the heart of recent impressive output, with UKCS production efficiency<sup>19</sup> rising to 73 per cent in 2016 from a low of 60 per cent in 2012. Even the two-percentage point increase in production efficiency over the last year is significant, adding around 12 million boe to the basin – the equivalent to one year of production from the eighth largest field in the UK.

As well as getting more from the existing asset base, significant new capacity has been added in recent years following a wave of fresh capital being invested between 2010 and 2014. Nine new fields commenced production in 2016 (Laggan, Tormore, Conwy, Solan, Aviat, Cygnus, Alder, Crathes and Scolty), with a further seven in the first half of this year (Schiehallion Quad 204, Callater, Stella, Shaw, Flyndre, Kraken and Cayley). These 16 developments will contribute over 300,000 boepd in the second half of 2017. A further 12 fields are due on-stream by the end of next year, increasing the contribution from recent developments to around 600,000 boepd. By the end of 2018, over one-third of total production will come from assets that have started production since 2016.

Oil & Gas UK expects that production will continue to increase through to 2019 provided that further new field start-ups come on-stream as anticipated and existing assets maintain recent uptime improvements. However, production volumes in the next decade remain vulnerable to a sharp fall if fresh investment in the UKCS does not materialise soon. There will simply not be enough new capacity to replace assets that have maximised economic recovery from their reservoir and moved into the decommissioning phase.

The large opportunities that remain undeveloped on the UKCS are mostly unconventional, such as the west of Shetland fractured basement play being appraised by Hurricane Energy<sup>20</sup>. Operators in the southern North Sea are also examining the potential of unconventional resources in tight gas plays, with early estimated recoverable potential of a game-changing 3.8 trillion cubic feet of gas<sup>21</sup>. This demonstrates that companies are still targeting significant volumes, even within the most mature areas of the basin.

## Operating Costs

If the remaining potential of the UKCS (believed to be up to 20 billion boe) is to be realised, lower operating costs are essential for companies to extend the economic limit of existing fields and convince investors that they can operate potential new assets competitively compared with other basins (see section 6.2 for a global comparison).

Significant progress has been made in this regard with UOCs halving between 2014 and 2016 from almost \$30/boe to around \$15/boe. This reduction was driven by the removal of £3 billion of operational expenditure alongside a 16 per cent increase in production. It is believed that around two-thirds of the cost efficiency improvements can be sustained in the long term, even if market conditions improve and the industry moves out of its current downturn (see section 6.3 for more on the Efficiency Task Force). It is forecast that operational expenditure will remain stable from now through to 2019, with further room for UOCs to drop if production increases in line with expectations. Oil & Gas UK forecasts that UOCs could fall to \$14/boe by the end of this year.

<sup>19</sup> Production efficiency is the total annual production divided by maximum production potential of an asset.

<sup>20</sup> Find out more about Hurricane Energy's work on fractured basement plays at <https://cld.bz/oS0j96p/20>

<sup>21</sup> See <http://bit.ly/2inP2XJ>

### Capital Investment

Ongoing uncertainty and volatility in commodity prices continues to constrain fresh capital commitments in the sector, both globally and within the UK. In 2016, only two new developments gained approval, releasing less than £500 million, compared to 2011 and 2012 when 14 and 22 projects, respectively, were sanctioned. Only one new field was approved in the first six months of 2017, bringing less than £80 million of associated capital. Although there is optimism that around five other new developments could be approved in the second half of 2017, the lack of new developments gaining approval in recent years has created a degree of uncertainty surrounding UKCS production post-2020.

There is no shortage of investment opportunities in the basin, with almost £40 billion of potential capital development projects within company business plans. Around two-thirds (£25.4 billion) of this is related to modifications and redevelopments of currently producing fields, with around one third (£14.1 billion) associated with new developments currently under consideration. However, less than two-thirds of this £40 billion is viewed as having a greater than 70 per cent chance of progressing in current market conditions, which highlights the need for further improvements in operational and capital efficiency. There is some optimism that given a surge of new entrants to the basin over the last two years (see section 6.5), with different investment drivers, some of these potential developments will be reconsidered by their new owners and progressed.

### Drilling Activity

Revitalising drilling activity is key to ensuring maximum recovery through the development of known volumes and through the discovery and subsequent evaluation of yet-to-find resources. However, drilling activity remains at record low levels. Only 14 exploration wells and 8 appraisal wells were drilled in 2016. The downward trend continued during the first half of 2017 with only five exploration wells and one appraisal well drilled. However, some wildcat wells are scheduled for later in the year targeting large reserves which, if successful, could rejuvenate exploration drilling on the UKCS.

Eighty-seven development wells were spudded in 2016, a 30 per cent decline on 2015 and the first time since 1986 that fewer than 120 development wells were drilled in a single year. With just 47 development wells spudded during the first six months of this year, there is no sign of an uptick in activity. Although more recent development concepts often require less producing wells than has typically been the case, the decline in development drilling must be closely monitored to prevent irreversible damage to the goal of maximising economic recovery. If key infrastructure begins to be removed, there may not be an opportunity to drill postponed development wells at a later date.

### Oilfield Services Market

The relative lack of new activity on the UKCS has had a significant impact on the domestic supply chain. Supply chain revenues fell by 30 per cent on average between 2014 and 2016, and are expected to fall by a further 3 per cent in 2017. The fall in income has contributed to a significant reduction in the number of jobs supported by industry to an estimated 302,000 in 2017 (see section 3.3 for more on industry employment). However, an opportunity exists for the UK supply chain through capturing a larger share of the global exports market.

Further opportunity lies in the nascent decommissioning market, with this being the only increasing area of expenditure in the UKCS in 2016<sup>22</sup>. Through to 2025, it is estimated that over £17 billion will be spent on decommissioning activity. Industry is working closely with OGA and HM Treasury to ensure that this activity is carried out as efficiently as possible, providing scope for the supply chain to develop skills and expertise that can be exported to other basins. Nonetheless, despite the potential business in this area, it is widely accepted that greater value exists through prolonging production operations.

## 6.2 Global Competitiveness

UKCS investment opportunities must look attractive against global alternatives if they are to proceed. Every oil and gas company – from super-majors through to small private equity-backed producers – has a choice when deciding where to invest their capital. With easier access to information and a highly mobile workforce, country borders do not represent the same barrier they once did. This part of the report assesses the competitiveness of the UKCS against other comparable basins across the world using data provided by Wood Mackenzie.

There is no one metric that uniquely measures the competitiveness of an oil and gas province. Prospectivity, materiality and ability to access hydrocarbon resources are fundamentally important factors. Metrics such as finding, development, operating and decommissioning costs characterise the financial competitiveness and, when combined with the fiscal and regulatory regime, help determine the overall economic attractiveness of the opportunity to the investor. The maturity and capability of the supply chain are also an important consideration, as is the strategic fit within an investor's portfolio.

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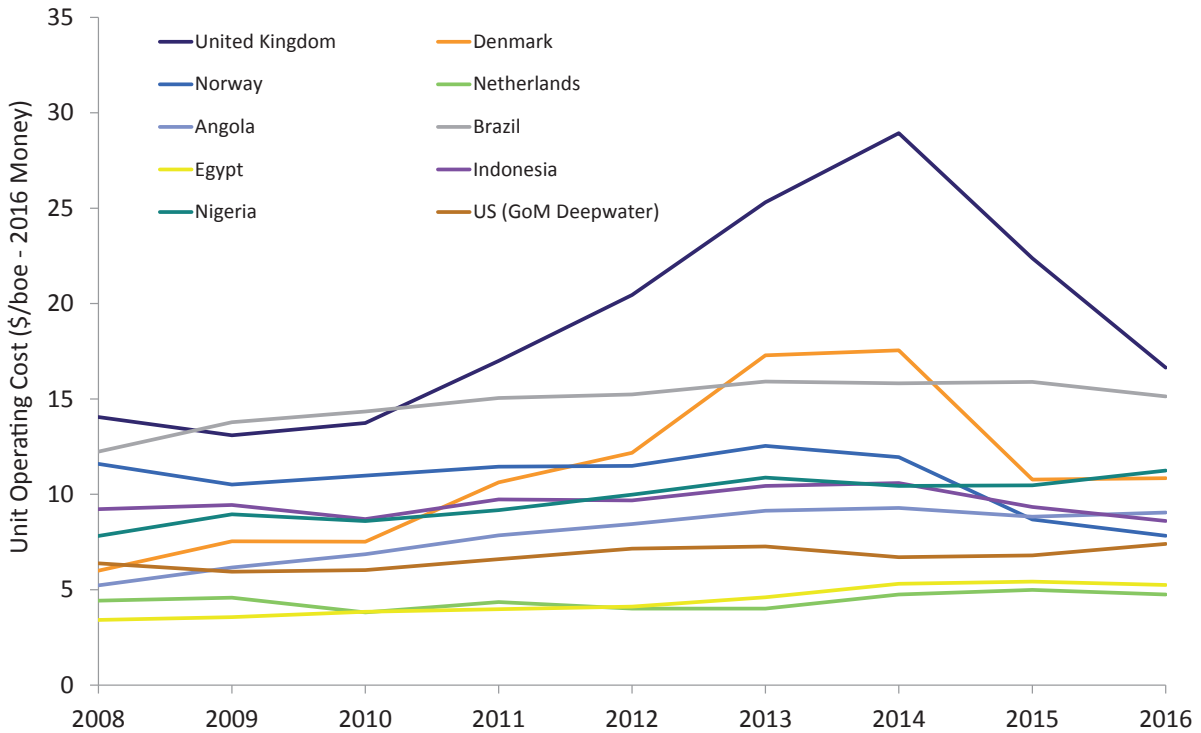
<sup>22</sup> Oil & Gas UK's *Decommissioning Insight* is available to download at [www.oilandgasuk.co.uk/decommissioninginsight](http://www.oilandgasuk.co.uk/decommissioninginsight)

Economic criteria ultimately drive investment decisions, particularly when capital is in short supply. Commonly used criteria include:

- i) Net Present Value – post-tax (NPV) and Expected Monetary Value (EMV)
- ii) Internal Rate of Return (IRR)
- iii) Capital Intensity (P/I) – (calculated as NPV post-tax/investment pre-tax)
- iv) Payback – the time taken to recover the initial investment.

In a mature oil and gas business the costs of operations are one of the more important measures when looking at the financial health of a portfolio. With UOCs almost halved since 2014, the UKCS has improved its competitiveness more than any other comparable basin. The cost reductions have been greatest across drilling, wells and logistics, where they have greatly outpaced the global average. Nevertheless, the basin remains the most expensive to operate in, on average, as shown by Figure 22.

**Figure 22: Unit Operating Costs in Offshore Oil and Gas Producing Regions**

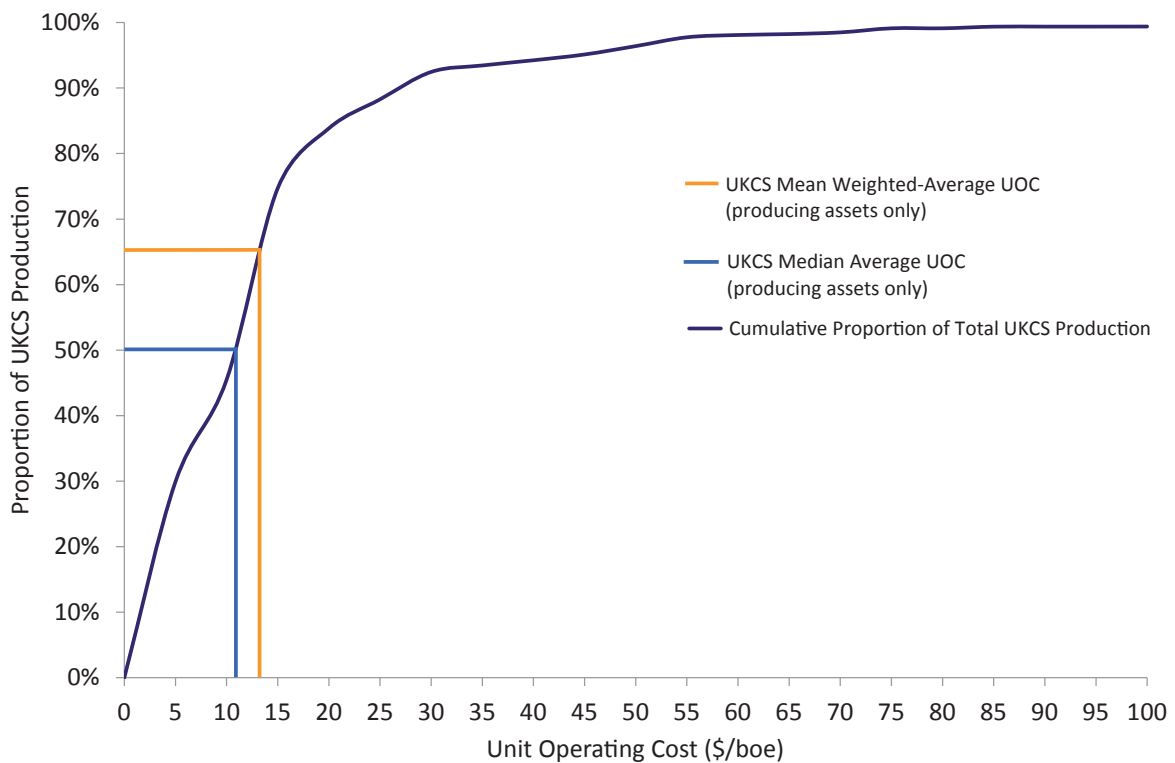


Source: Wood Mackenzie



Although the average UOC appears relatively high in the UK at \$15.30/boe, this includes the cost of operating an extensive network of midstream infrastructure and onshore terminals that generate a much higher component of operating expenditure than in other less complex basins. When looking solely at producing fields, the weighted-average UOC of the UKCS was \$13.20/boe in 2016. The median average field UOC is even lower, at just over \$10/boe, indicating that a small number of assets with a very high UOC skew the mean. Indeed, over two-thirds of UKCS assets, accountable for almost three-quarters of production, were operating at under \$15/boe in 2016.

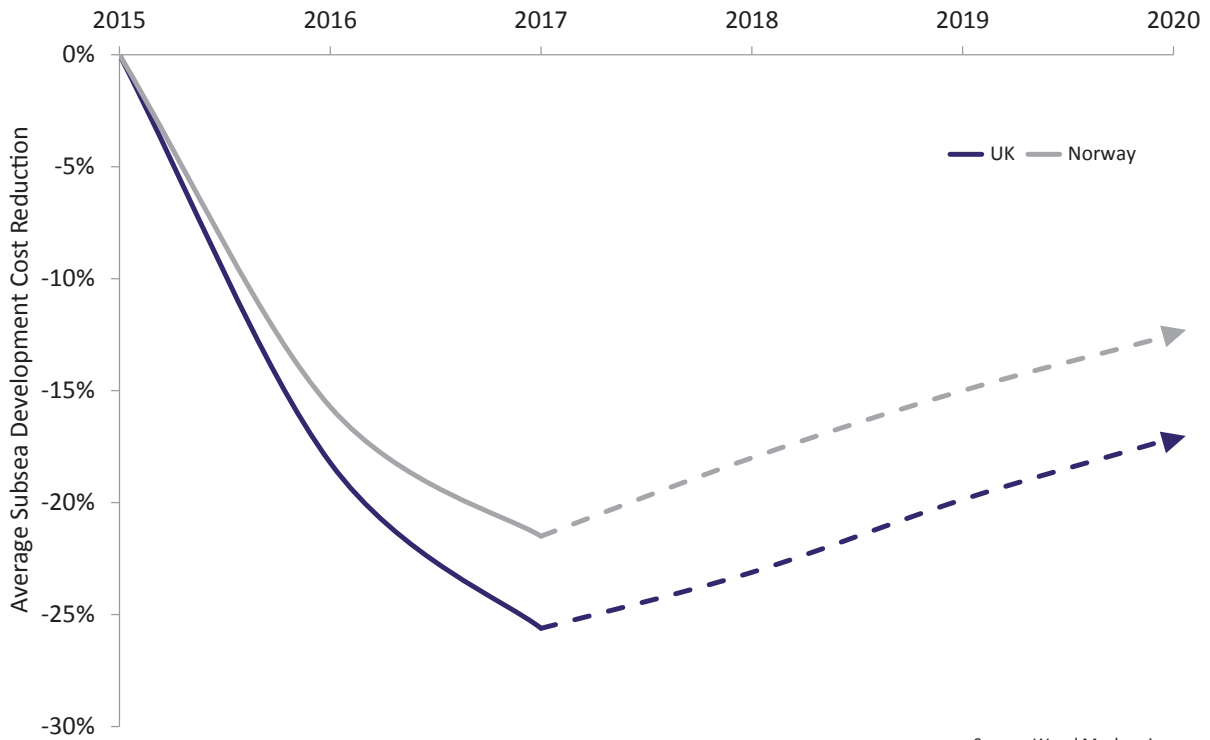
**Figure 23: UKCS Field Level Unit Operating Costs, Mean versus Median, 2016**



Source: Oil & Gas UK

Cost reductions have not only been commonplace for operational assets, but also for those under development. Again, the progress made in the UK has been greater than in other basins, with Figure 24 showing the expected trajectory of the UKCS versus the Norwegian Continental Shelf. Not only have UK costs dropped further, they also appear less prone to near-term inflation. Respondents to an international survey carried out by Wood Mackenzie felt that around two-thirds of UKCS cost reductions seen across subsea capital projects would be sustained out to 2020 even if the market picks up.

**Figure 24: Supply Chain Cost Trajectory for Subsea Developments**

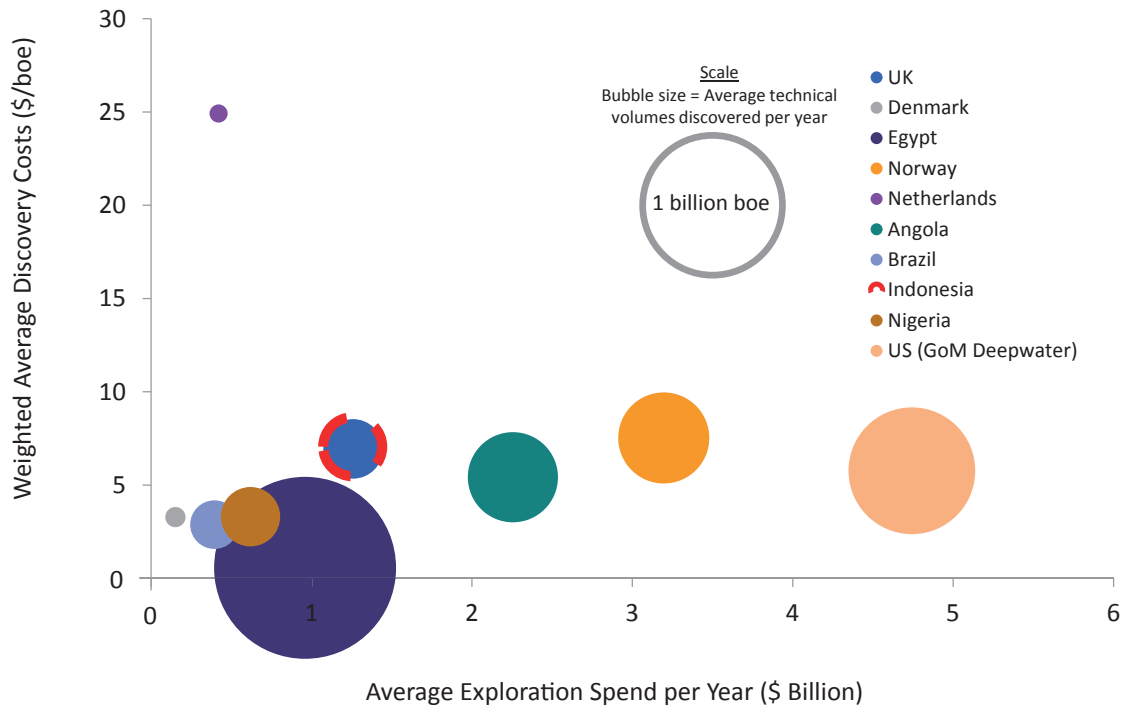


Source: Wood Mackenzie

Although the UK represents a more attractive destination for investors than it did two years ago, there is now less capital available to compete for. Revenue uncertainty created by the price downturn has caused investors to distance themselves from oil and gas opportunities. Wood Mackenzie estimates that over \$1 trillion has been cut from global upstream investment budgets between 2015-20. So, while the UK has improved its relative competitiveness, this has been offset by the fact that the appetite for oil and gas investment has shrunk globally.

Exploration has arguably been hit the most by the downturn with average global spend down by almost 40 per cent in 2014-16 compared with 2011-13 across the ten basins<sup>23</sup> examined as part of the study. Although exploration spend on the UKCS fell in line with the average over this period, it is one of only three basins where technical reserves discovered have increased, along with Egypt and the US Gulf of Mexico.

**Figure 25: Average Exploration Cost and Volumes Discovered, 2014-16**



Source: Wood Mackenzie

The relative maturity and complexity of the UK presents structural barriers to reducing costs further compared with other offshore provinces where larger producing fields offer greater economies of scale. However, the potential of the UK remains exciting, with opportunities such as the fractured basement plays west of Shetland; ultra-high-pressure high-temperature prospects in the central North Sea; and the carboniferous resources in the Southern Gas Basin. Although, these opportunities are not of the same scale as recent multi-billion barrel discoveries such as Johann Sverdrup (Norway, 2010) or Zohr (Egypt, 2015), and tend to come at a higher discovery cost, they can be easily brought to market and monetised.

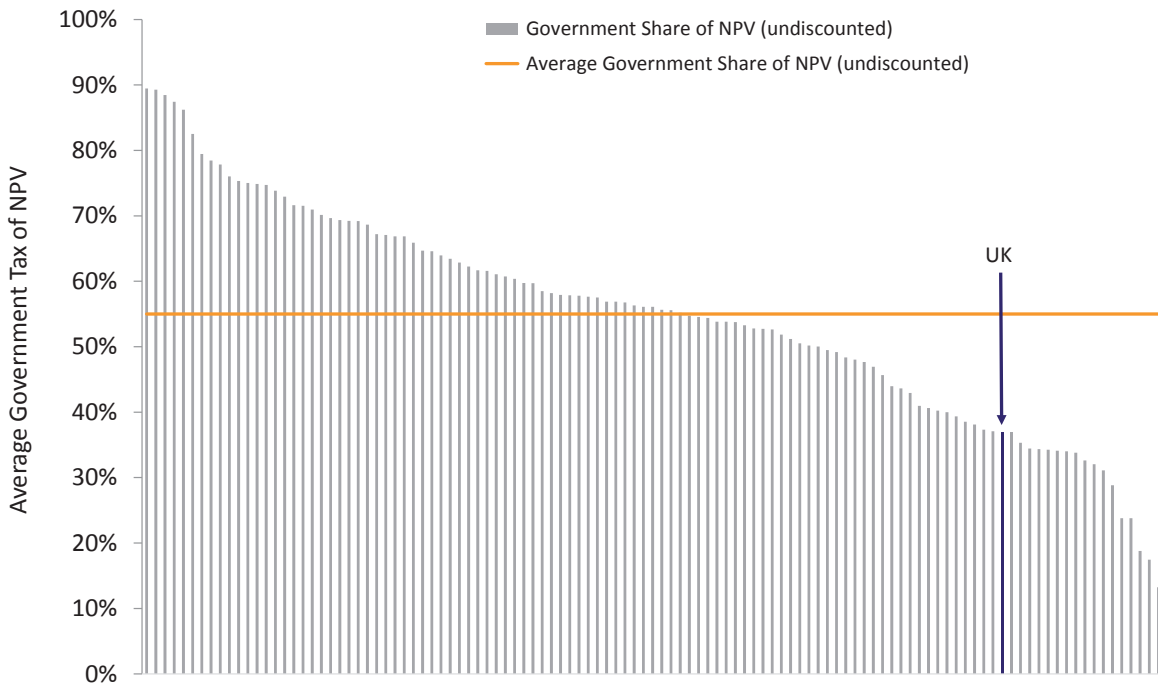
The UKCS needs to excel in the areas it can control and maintain a competitive advantage. Companies must continue to maximise value from near-field exploration where it has the advantage of being able to tie-in to existing infrastructure, as well as taking advantage of the exceptional geological understanding in the UK.

<sup>23</sup> UK, Denmark, Norway, Netherlands, Angola, Brazil, Egypt, Indonesia, Nigeria and US Gulf of Mexico.

The fiscal and regulatory terms must also remain attractive if the UKCS is to win capital over other basins. While many governments across the world have looked to counter the impact of falling tax receipts by increasing marginal rates of tax, in the UK, the opposite approach has been taken. Rates have fallen from as high as 81 per cent just five years ago, down to a maximum of 40 per cent in an attempt to attract fresh investment by maintaining post-tax materiality (see section 6.4 for more on fiscal policy). Without this intervention, many investors would not even consider the UK as a destination for investment.

Figure 26 shows the average marginal tax rate for oil opportunities across a mixture of concession and production sharing regimes. When comparing the fiscal attractiveness of oil and gas producing nations, the UK has moved from being below average in 2012 to being within the top quartile – a very positive sign for investors.

**Figure 26: Fiscal Attractiveness of the UKCS Compared with other Oil and Gas Producing Nations**



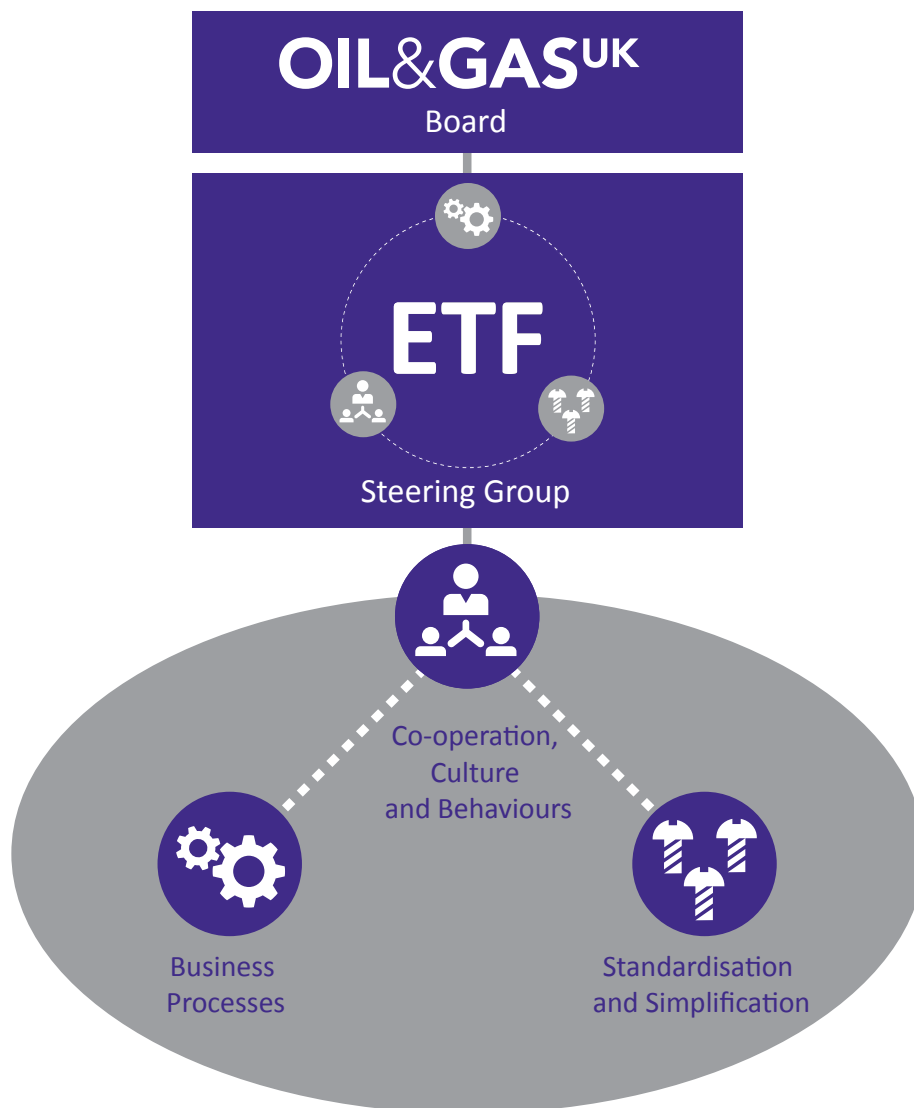
Source: Wood Mackenzie

### 6.3 The Efficiency Task Force

The concept of maximising efficiencies and driving continuous improvement has been a part of the oil and gas industry for decades. However, following the sharp oil price decline in 2014, the industry established its own Efficiency Task Force (ETF), led by Oil & Gas UK, to act as a pan-industry catalyst for sustainable change and be a vehicle to communicate progress and develop good practice. Since then, supported by strong leadership from the ETF, companies themselves and the industry overall have transformed their efficiency, significantly reducing costs, improving production efficiency and realising real increases in capital efficiency (see section 6.1 outlining industry KPIs). This fundamental change has put the industry’s future on a more secure footing.

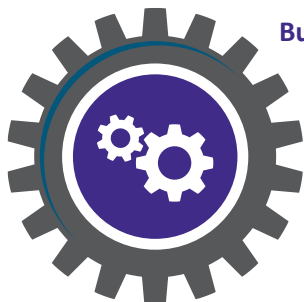
The ETF has a number of groups working across industry to identify potential efficiency improvement opportunities and realise savings aligned with three key themes: Co-operation, Culture and Behaviours; Standardisation and Simplification; and Business Processes.

**Figure 27: The Efficiency Task Force Structure**



Industry must now ensure the gains made to date are built upon and sustained. An initial impact analysis shows that up to two-thirds of the cost reductions have the potential to be sustained, even if the oil market recovers and price improves. However, achieving this will take continued commitment from the entire sector.

This chapter focuses on how the ETF has progressed over the last year with delivery from each of the three work-streams. Regular updates on the ETF are available in the new Efficiency Hub on Oil & Gas UK's website<sup>24</sup>.

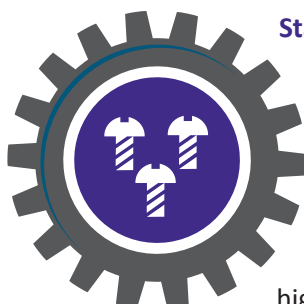


### Business Processes

Business process improvement has a long-standing, proven track record of driving outstanding business performance in many other industries, for example, in manufacturing and aerospace. Through the ETF, the Production Efficiency Task Force and the Maintenance Optimisation Group of Oil & Gas UK, industry experts and specialists have collaborated to produce a number of good practice guidelines to drive business improvement, which are available to download from the Efficiency Hub. These are:

- *Maintenance Optimisation Reviews – Shared Practice and Learnings*
- *Guidance for the Efficient Execution of Planned Maintenance Shutdowns*
- *Tender Efficiency Framework*
- *Guidelines to Maximise Compression System Efficiency*

Application of these guidelines can help companies drive more efficient working practices and improve collaboration throughout the supply chain.



### Standardisation and Simplification

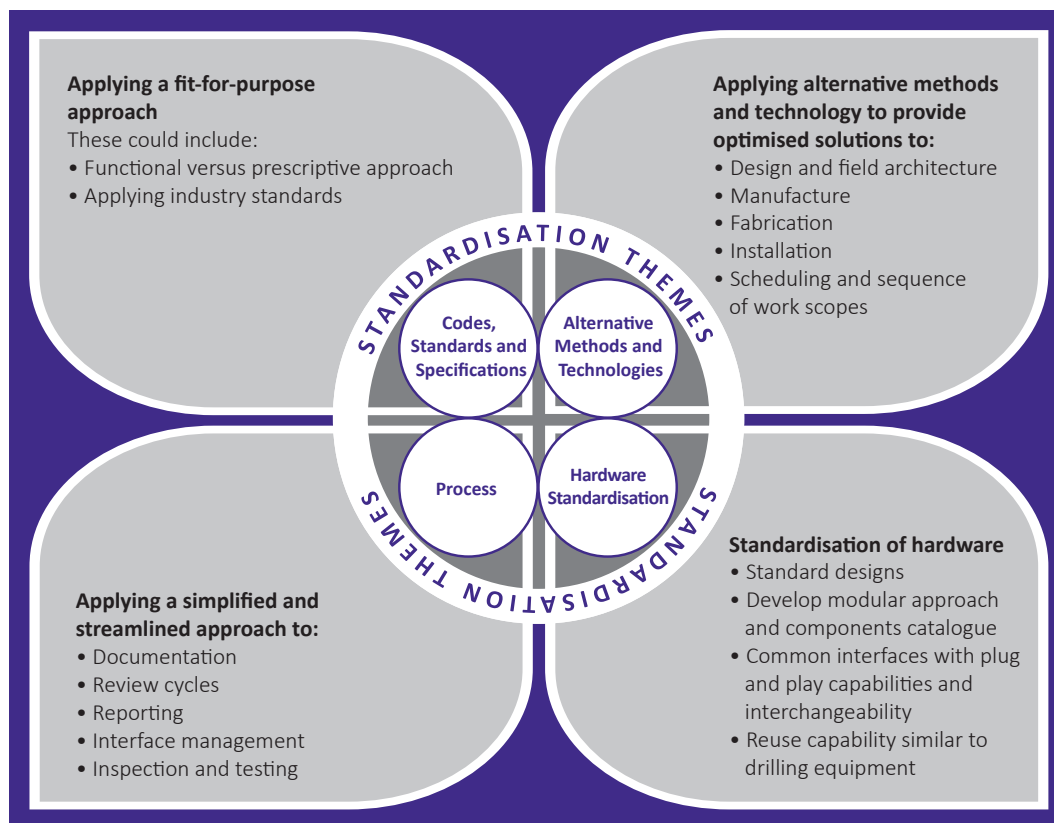
Two-thirds of fields approved over the last decade and the majority of future projects under consideration are expected to be developed via a subsea tie-back. The potential of these developments and other small pool reserves could be maximised by employing more cost-effective ways to create subsea developments. More than three billion boe are currently stranded in around 350 unsanctioned discoveries that are economically challenging to produce. Industry's current preferential bespoke approach contributes to higher costs and longer project schedules.

*Subsea Standardisation – Guidelines on Adopting a Simplified and Fit for Purpose Approach*<sup>25</sup> is the culmination of extensive work by the ETF's multi-disciplinary Subsea Standardisation Group, which involved over 70 industry experts and 30 companies. The group has demonstrated through real life case studies how subsea developments could be simplified and standardised to deliver savings of between 15 and 30 per cent and bring reserves into production more cost-effectively. Four key themes have emerged through which subsea developments could be made more competitive, as illustrated in Figure 28.

<sup>24</sup> See the Efficiency Hub at [www.oilandgasuk.co.uk/efficiency](http://www.oilandgasuk.co.uk/efficiency)

<sup>25</sup> The Subsea Standardisation Guidelines are available to download at <http://bit.ly/SubApp17>

Figure 28: Subsea Standardisation Themes



6

To apply the findings to a UKCS prospect, Centrica’s West Pegasus field – a three well tie-back in the southern North Sea – was chosen as a case study. Using a set of adopted assumptions during the concept select stage, the group identified savings of up to 25 per cent through the anticipated application of the subsea standardisation guidelines. This significantly improved the economics of the project and the prospect of progression to development, and offers the potential for cost optimisation for other similar projects.

Figure 29: Range of Potential Savings from Centrica's West Pegasus Project

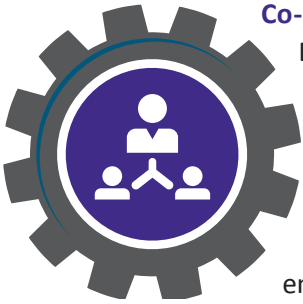
	Range of Potential Savings*	
Project Management and Engineering	20.4%	24.7%
Procurement, Manufacture and Fabrication	14.8%	28.3%
Transportation and Installation	16.3%	33.6%
Overall Savings	20.4%	24.7%

\*Dependant on selected field option

Source: Centrica, Oil & Gas UK

Chevron is also applying the standardisation principles to a future satellite subsea tie-back to its Captain field, as are other operators hoping to identify further cost-reduction opportunities within their portfolios.

Companies have also investigated how the subsea standardisation work could be applied to other areas of the industry. Amec Foster Wheeler, for example, is applying the principles across its asset life cycle business and embedding them within its business management system. While another ETF work group is applying the practices to engineered products, with a focus on valves. A new tool – *Guidelines for the Simplification of Engineered Products* – is due for publication later in the year.



### Co-operation, Culture and Behaviours

Driving cultural change across industry, to one with a relentless focus on efficient operations, is key to ensuring the progress made is sustained. Given that cultural and behavioural change is a key success factor right across the spectrum of ETF projects, the Task Force has developed a range of tools and initiatives to this end:

- **Industry Behaviours Charter** – a set of five high level principles to ensure that companies engage in an efficient and collaborative manner. More than 50 companies have signed up to the charter<sup>26</sup>.
- **Continuous Improvement Network** – connecting efficiency champions from across industry.
- **Collaboration Index** – in partnership with Deloitte, the index benchmarks successful collaboration across industry and shows it is increasing across the basin. However, there is still scope for improvement.
- **Efficiency Roadshows** – held within Oil & Gas UK member companies so that employees can hear about the ETF's work, find out how they can get involved and share their own achievements in driving continuous improvements. More than 500 people have attended these events so far in 2017.
- **Efficiency Hub** – a new online and interactive Efficiency Hub on the Oil & Gas UK website will keep industry up to date with the latest advances in improving efficiency. It is a one-stop gateway to initiatives, tools and best practice and includes company case studies, as well as the latest information about the ETF and its progress. Around 100 company case studies are included on the Hub, outlining innovative ways of working smarter and collaborating to improve efficiency and sustainability. Companies from across industry are encouraged to provide and download case studies to ensure that knowledge and experience is shared as widely as possible.

The ETF will continue to move the efficiency agenda forward throughout the rest of 2017 and into next year, with increased focus on communicating progress across industry and ensuring that the Task Force's outputs are used to maximum effect and embedded within day-to-day working practices.

<sup>26</sup> Find out more about the Industry Behaviours Charter at [www.oilandgasuk.co.uk/cultural-change-tools](http://www.oilandgasuk.co.uk/cultural-change-tools)



## 6.4 Fiscal Policy

The changes to the UK upstream oil and gas tax regime introduced by Budgets 2015 and 2016 have helped create one of the most competitive fiscal regimes for upstream investment globally (see section 6.2). The recommitment to the *Driving Investment Plan* by the Chancellor in *Autumn Statement 2016* has sent a strong message to investors and companies alike. There are early signs of investor confidence returning with some high profile corporate deals announced this year already, as outlined later in this section.

### The Current Fiscal Regime

The current tax regime applicable to UK upstream oil and gas activities is bespoke and has evolved over more than 40 years. It is now made up of two main elements – Ring-Fence Corporation Tax and Supplementary Charge. A third tax, Petroleum Revenue Tax, has been permanently zero-rated with effect from 1 January 2016.

Companies that do not produce oil and gas but perform associated activities, for example downstream refining or supply chain services, are not subject to this bespoke upstream tax regime and pay mainstream Corporation Tax.

All companies, irrespective of whether they are in or outside of the production ring-fence, also pay the usual direct and indirect taxes, for example, capital gains, employment taxes, VAT, levies and duties. None of these tax payments are disclosed separately for oil and gas companies by Her Majesty's Revenue and Customs, but these payments are estimated to be in excess of £1 billion and contribute to the wider benefit of the industry to the UK economy.

**Ring-Fence Corporation Tax (RFCT)** – a tax on company profits similar to regular Corporation Tax, but at a higher rate of 30 per cent (previously up to 52 per cent). The rate of RFCT is set separately from the rate of mainstream Corporation Tax in the UK, which was at 20 per cent for 2016-17, and RFCT will not benefit from the currently anticipated decrease in Corporation Tax to 17 per cent by 2020.

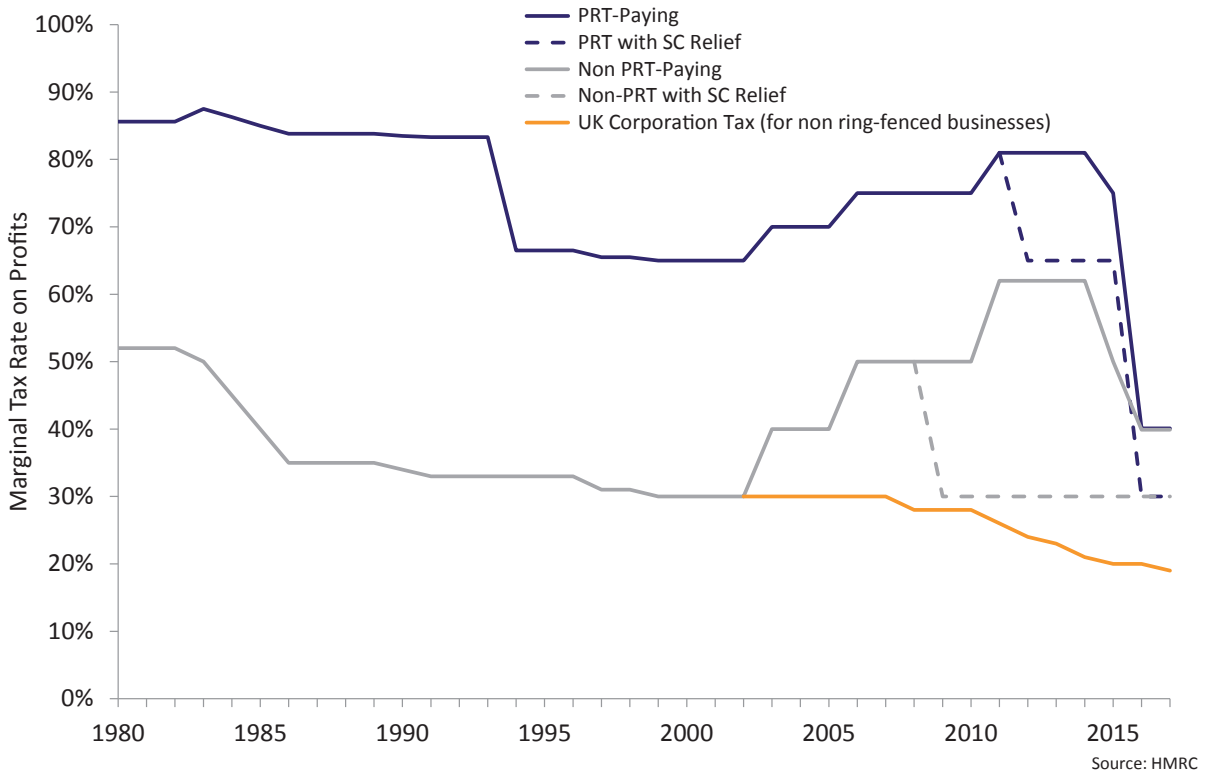
**Supplementary Charge (SC)** – an additional tax computed from company profits similar to RFCT, but finance costs are not deductible. This tax was introduced in 2002. The rate is currently 10 per cent, but was previously as high as 32 per cent. In 2015, the Investment Allowance was introduced to alleviate this additional layer of tax that the UKCS pays relative to any other industry. The Allowance means companies who invest in the basin can recuperate capital and operating expenditure against their SC liabilities, so that only RFCT is levied on profits at a rate of 30 per cent.

**Petroleum Revenue Tax (PRT)** – a tax levied on fields that received development consent prior to 16 March 1993. With effect from 1 January 2016, PRT was permanently zero-rated.

The recent changes to lower the tax burden have created a backdrop against which new projects are being considered.

Specific features of the tax regime, including 100 per cent first-year Capital Allowances and the extended ability to carry back losses for decommissioning costs, provide investors with confidence and security as they navigate the irregular upstream cash-flow profile. Large capital investment is required both at the beginning of a field's life when it is being developed and at the end after production has ceased and the field is being decommissioned.

**Figure 30: Historic Upstream Tax Rates**

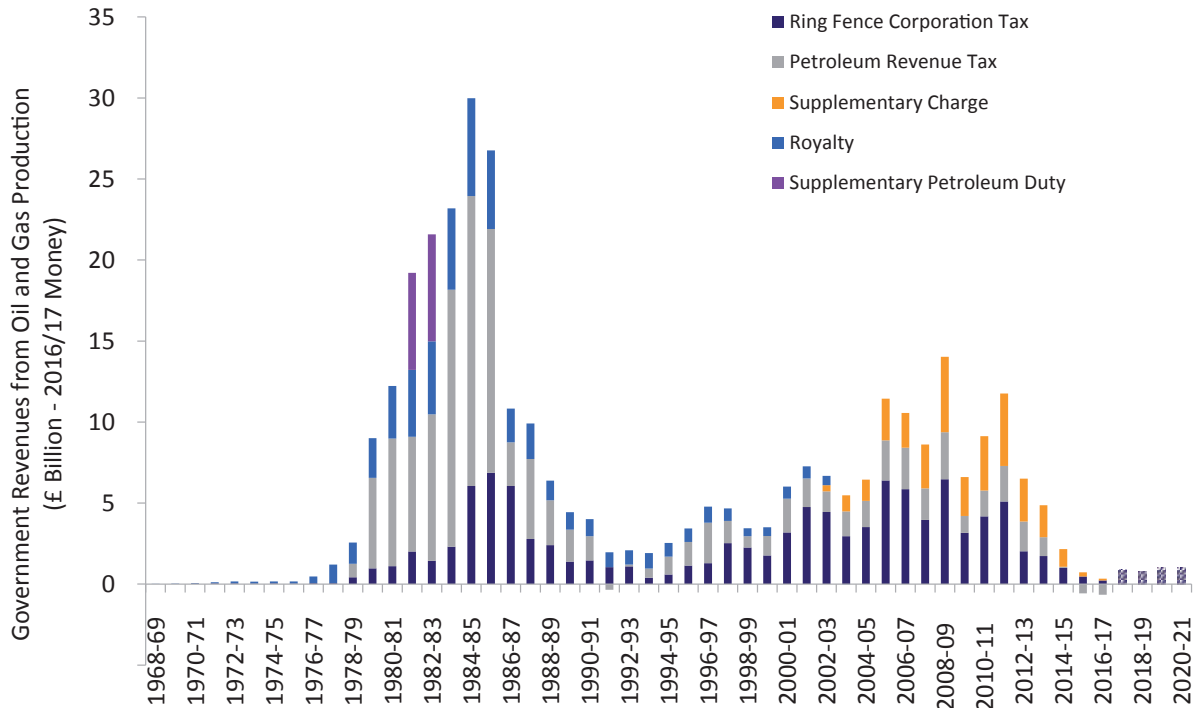


**UKCS Production Tax Payments**

The UKCS has entered a different, more mature phase, characterised by challenges around materiality of many projects, maintenance of key hubs and infrastructure, and emerging decommissioning activity. Low receipts from direct production taxes illustrate the tough time the industry has experienced over the last 24 months, as suppressed oil and gas prices have led to a sharp decline in profitability. The permanent zero-rating of PRT and the reduction in combined RFCT and SC were positive steps to promote investment in the basin and will lead to long-term gains.

While many, including HM Treasury in previous forecasts, expected production tax receipts to be negative in 2015-16, the efficiency drive led by industry was a major factor in making the outturn receipts for the year positive at £151 million. Receipts are expected to increase to around £1 billion per annum over the rest of the decade.

Figure 31: Government Revenues from Oil and Gas Production Taxes



Source: HM Treasury, Office for Budget Responsibility

### Facilitating Access to Decommissioning Tax Relief

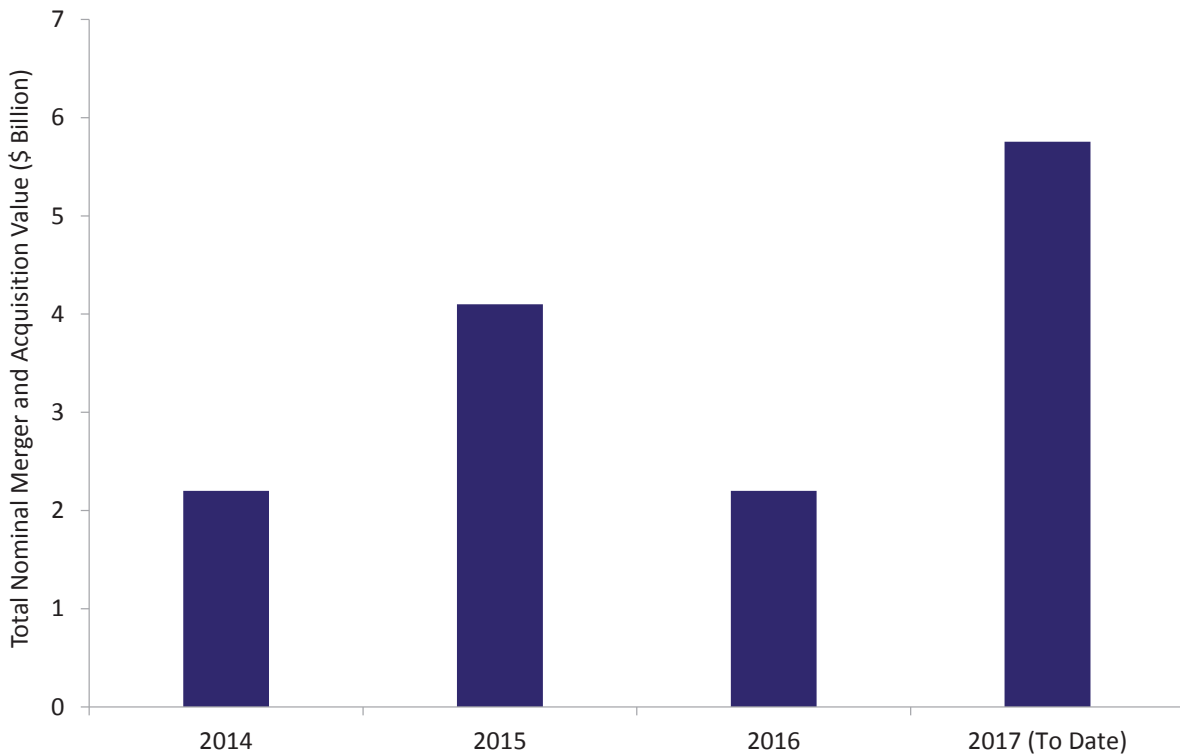
Further adjustments to the fiscal regime are still required to encourage capital investment over the longer term, as is clear from the measures announced in the 2017 Spring Budget. Specifically, the industry needs a mechanism to transfer tax history as part of the sale of oil and gas assets on the UKCS, so that a buyer can still obtain full relief for decommissioning liability at the end of the field’s life. The current inability to transfer tax capacity associated with an asset from a seller to the buyer has been a barrier to investment in the UKCS. This is because of the tax-based ‘value gap’ that arises from misalignment in asset valuation between a seller with a long tax history and access to full tax relief on decommissioning and a buyer with no such tax history. The result of this deal barrier is that late-life assets are less likely to be sold to new operators who bring fresh investment and business models to turn non-core into core assets.

Industry has been working collaboratively with HM Treasury for many years to identify an appropriate mechanism to transfer tax capacity. This positive engagement is being carried into the 2017 consultation on late-life oil and gas assets and the associated work of the specially formed advisory panel of tax experts. If the government were to provide certainty of a solution in Autumn Budget 2017, it would encourage further deal flow and promote new innovative business models in the UKCS at a time when urgent new investment is needed in the basin. The Exchequer would benefit from cash-flow advantages due to deferred decommissioning and the broader gain associated with fresh investment and activity.

## 6.5 Mergers and Acquisitions

History would suggest that an industry downturn is traditionally followed by a period of aggressive acquisition activity, with buyers looking to acquire cash-strapped sellers. However, there were limited examples of this over the last three years, with only \$8 billion worth of UK traded value in M&A deals (this excludes multi-national corporate deals such as the merger of Shell and BG Group which completed in early 2016).

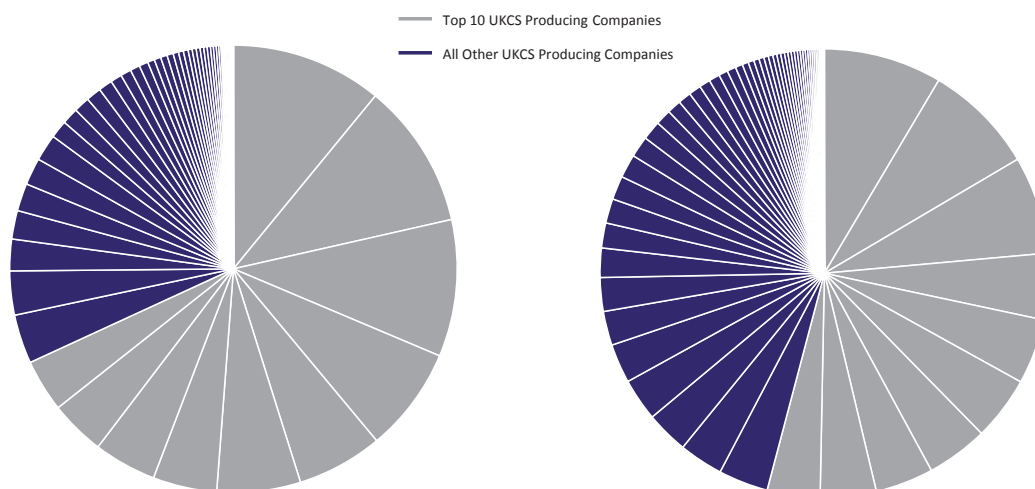
**Figure 32: Total UKCS Upstream M&A Activity**



Source: Wood Mackenzie, Oil & Gas UK

However, the asset and corporate trading market has become more liquid in 2017. There have been many high profile upstream acquisitions announced over the first half of this year with an estimated UK traded value of nearly \$6 billion combined. The rationale behind the activity has varied, but few deals would fall under the category of financial distress. More commonly, the transactions are driven by diverse types of investors, most notably private equity-backed companies, looking to enter the market at what they consider to be an optimal time. On the seller’s side, there has been a mixture of smaller companies looking to leave the basin and focus on overseas opportunities and majors whose incentive to sell is driven by portfolio rationalisation and consolidation. It is important to note that the majors do remain committed to the UK with a focus on their larger-scale assets, typically found west of Shetland. An increasing percentage of production interest is likely to continue being sold to smaller companies with a diverse mix of funding.

**Figure 33: Total Working Interest Production by Company**



Source: Wood Mackenzie, Oil & Gas UK

In 2007, of 61 companies active in the basin, the biggest 10 producers owned 68 per cent of production

In 2017, of 68 companies active in the basin, the biggest 10 producers owned 58 per cent of production

There are a number of reasons behind the upturn in M&A activity seen so far this year. Primarily, the valuation gap between potential buyers and sellers has closed, enabling deals to happen. Although uncertainty over the oil price still exists, the market appears clearer than it has been over the last couple of years. Furthermore, companies have been willing to put more flexible deal structures in place, mitigating downside risk for buyers and creating upside potential for sellers. A typical example of this would be a contingency payment written into the deal, only payable by the buyer if a certain oil price or project milestone is reached. Decommissioning liabilities have also been tackled using complex structures, and this will play an increasing role within future M&A deals as the UKCS continues to mature. An expert tax panel will advise government on how this could best be dealt with through the tax system rather than through complex and time-consuming commercial agreements (see section 6.4 on fiscal policy).

Further upstream M&A activity is expected over the remainder of this year and into 2018. Major operators are likely to take strategic acquisitions to reshape their portfolios and to divest non-core assets. This will offer fresh prospects for growth to smaller companies looking to capitalise on market opportunities.

The acquisition of infrastructure interests by infrastructure funds and other new buyers has also continued over the last year. For example, Ancala’s 30.28 per cent acquisition of the Scottish Area Gas Evacuation System and 60.56 per cent interest in the Beryl pipeline from Apache is just one example of the transition from historically operator-owned infrastructure to mid-stream concentrated companies.

Large-scale mergers and acquisitions have not been limited to the upstream business, with a number of oilfield service companies announcing deals over the last 18 months. Again, the type of deal has varied. Some companies have been acquired after struggling to adjust to the current price environment. Other deals have been driven by the desire to vertically integrate to offer a wider ‘one-stop-shop’ solution. Some mergers have been incentivised by the synergies offered by consolidating two businesses into one. One common theme for most deals is that the new entity is able to offer more innovative solutions at a lower cost with improved execution; this is critical to the future of the UKCS.

## 6.6 Investor Case Studies

### Chrysaor

#### The company

Chrysaor is a privately-funded independent UK oil and gas company. It was established in 2007 and focuses on developing and commercialising oil and gas incremental resources primarily on the UKCS. Through its transaction with Shell, the company is set to become one of the leading independent exploration companies operating on the UKCS.

#### Details of the investment

Chrysaor is buying a diverse package of operated and non-operated assets in the central and northern North Sea and west of Shetland from Shell for \$3 billion. In 2016, production from the assets exceeded 115,000 boepd, while the five-year average UOCs from the assets are less than \$15/bbl. Furthermore, the deal is expected to add proven and probable reserves of around 350 million boe to Chrysaor's existing reserves base and brings with it some highly competent and skilled staff from Shell. The deal is expected to complete during the second half of 2017, after the formal regulatory approvals are in place.

#### How is the company financed?

The deal is being funded by an investment of up to \$1 billion from Harbour Energy, an investment vehicle of EIG, as well as from funds managed by EIG, junior debt financing from Shell, and a Reserves Based Loan of up to \$1.5 billion from a syndicate of leading international banks with considerable North Sea experience. EIG is one of the oldest private equity firms exclusively focused on the energy sector, specialising in private investments in energy and energy-related infrastructure around the globe.

#### Why is the UK an attractive place to invest?

Chrysaor believes there is significant overlooked remaining potential on the UKCS. Combined with a politically robust environment, the UKCS is an attractive place to build a large-scale exploration and production business. Chrysaor believes in the UK North Sea and the future of the basin and has been very focused over the last few years on acquisition opportunities. The diverse set of material assets included in the package from Shell represents an ideal set of assets upon which to grow the business.

#### What are the next steps?

Chrysaor aims to be a leading independent exploration and production company in the UK and is committed to a growth strategy in the North Sea, a testament not only to the potential that remains on the UKCS but also to the skills and experience built up in the UK's energy industry over the past 40 years.

The company's immediate priority is the successful completion of the deal with Shell and safe transition to operatorship. Following this, Chrysaor aims to extend the production life of the assets in many ways, including enhanced recovery techniques, exploring near-field opportunities that lie around the portfolio, and additional bolt-on acquisitions. Chrysaor aims to sustain both its production levels and reserves base at current levels, focusing on exploration, appraisal and development drilling to exploit the opportunities offered by the UKCS and surrounding geographies.

## Zennor Petroleum

### The company

Zennor Petroleum Limited is an independent UK oil and gas company committed to the exploration, appraisal, development, and production of offshore hydrocarbons in the North Sea. Originally founded in 2006 as MPX E&P, the company focuses on appraisal and development of existing discoveries. Zennor currently has interests in the central and northern North Sea with oil and gas production of 2,500 boepd.

### How is the company financed?

In August 2015, the company was acquired by Kerogen Capital, a Hong Kong-based private equity fund manager focused on the international upstream oil and gas sector. Kerogen made an initial commitment of \$100 million to develop Zennor Petroleum's existing asset base (including the licence containing the Finlaggan Discovery). The funds also allowed the company to expand the portfolio through further acquisitions, farm-in opportunities and licensing rounds. Kerogen has since increased its total commitment to \$300 million.

### Details of the investment

Zennor Petroleum has made rapid progress since its acquisition by Kerogen. In March 2016, the company purchased a package of assets from First Oil Expro Limited that included non-operated interests in four producing fields: Mungo, Monan, Bacchus and Cormorant East. In April last year, Zennor also successfully drilled the Finlaggan appraisal well and was awarded block 2/5b in the 29th Licensing Round in March 2017, which includes the South West Heather accumulation.

### Why is the UK an attractive place to invest?

Zennor Petroleum sees numerous opportunities to exploit appraisal and development potential from existing oil and gas discoveries on the UKCS. It also considers accessibility to subsurface data and an attractive regulatory environment as important for companies to move forward and develop projects quickly.

The efforts of the UK Government in making old databases available to the industry through Common Data Access Limited (CDA) have also paid off. Finlaggan, which was discovered by ConocoPhillips in 2005, is an example of where Zennor Petroleum has been successful at taking old seismic data and applying new technology through reprocessing to identify its full potential.

### What are the next steps?

Following the successful appraisal of Finlaggan in April 2016, the company expanded its internal development project team. They have confirmed that Finlaggan is a robustly economic subsea development that can be tied back to neighbouring infrastructure with appropriate processing capability and capacity already in place. The company has already entered into a period of exclusivity with its preferred infrastructure host and aims to have the route finalised this year, along with internal project sanction and OGA Field Development Plan approval. The target for first gas is 2020.

### How could the UKCS become a more attractive investment destination?

Zennor believes the industry needs to continue to release seismic data. The government could compel companies to release seismic field tapes when they exit the basin and the industry could make greater use of the data available from CDA's online portal. Its database should act as a central repository for the UKCS.

## Siccar Point Energy

### The company

Siccar Point Energy was established in 2014 with the aim of building a leading UK independent, full cycle, exploration, development and production company. Its strategy is to build a portfolio of assets where it can use its extensive North Sea experience to create value through follow-on investment and grow reserves through infill drilling, life extension, new developments or exploration.

The business now includes interests in three of the largest UK assets by remaining reserves (Schiehallion, Mariner and Rosebank), as well as a portfolio of additional material development and exploration opportunities, many of them operated. With around 400 million boe of discovered resources, it is the seventh largest resource holder on the UKCS, has one of the largest resource holdings in the west of Shetlands, and a production profile through to the 2050s.

### Details of the investment

Siccar Point Energy completed two significant acquisitions during the last 12 months. Firstly, an interest in the Mariner field, and then in January this year, it acquired Austrian national oil company OMV's entire UK business.

### How is the company financed?

The company is financed through a combination of funds from shareholders, Blue Water Energy and Blackstone Energy Partners, as well as a Reserves Based Loan from a syndicate of leading international banks.

Founded in 2011, Blue Water Energy is a global, middle market energy private equity firm based in London. The firm primarily targets private equity investments in the global energy supply chain, while partnering with management teams and using a network of investment and operating professionals.

Blackstone Energy Partners has a record built on its industry expertise and partnerships with management teams. It has invested over \$8 billion of equity globally across a broad range of sectors within the energy industry.

### Why is the UK an attractive place to invest?

There is still substantial potential in the UKCS and Siccar Point's portfolio is geographically focused on where it sees the greatest growth potential and longevity. This combined with a relatively stable and low risk political climate has clearly demonstrated that global capital can be attracted to the region.

### What are the next steps?

Following the OMV deal completion in January, the company has fully integrated both businesses and located the whole team in Aberdeen. The company is going through a rapid growth phase with Schiehallion recently returning to production and Mariner due to commence production in 2018. The company will be investing around \$500 million over the next two years in these opportunities, as well as progressing additional growth opportunities in the portfolio. These include drilling an appraisal well in Cambo in 2018 prior to development sanction; progressing Rosebank to project sanction; and unlocking the potential of its exploration portfolio.



## 7. Glossary

<b>bbl</b>	Barrel (of oil) (one barrel = 0.16 m <sup>3</sup> and 7.55 barrels = one tonne)
<b>bcm</b>	Billion cubic metres (one metre <sup>3</sup> = 35.3 cubic feet)
<b>BEIS</b>	Department for Business, Energy & Industrial Strategy
<b>boe</b>	Barrel of oil equivalent – this includes oil, gas and other hydrocarbons and equates these with oil, in energy equivalent terms, so that a common measure can be made of any of them
<b>boepd</b>	Barrel of oil equivalent per day
<b>Brownfield</b>	An oil or gas field already in production
<b>Brent</b>	As applied to trading, the standard quality of oil in Europe and elsewhere comprising a blend of four North Sea crudes from the Brent, Ekofisk, Forties and Oseberg fields
<b>Brexit</b>	Brexit is the popular term for the UK's intended withdrawal from the European Union
<b>Bull market</b>	A market in which share prices are rising, encouraging buying
<b>Capital Allowances</b>	A term used to describe the availability of an immediate deduction against RFCT and SC payments for almost all investment expenditure incurred on the UKCS
<b>Carbon price</b>	The amount that must be paid for the right to emit one tonne of CO <sub>2</sub> into the atmosphere
<b>CCS</b>	Carbon, capture and storage
<b>CDA</b>	Common Data Access Limited (a subsidiary of Oil & Gas UK)
<b>Cost-plus contracts</b>	A contract where a contractor is paid for all its allowed expenses to a set limit plus additional payment to allow for profit
<b>CO<sub>2</sub></b>	Carbon dioxide (one of the six greenhouse gases under the Kyoto protocol)
<b>CO<sub>2</sub>e</b>	Carbon dioxide equivalent
<b>CoP</b>	Cessation of production
<b>CT</b>	Corporation Tax (see also RFCT)
<b>Cushion gas</b>	The minimum volume of gas required in a storage reservoir to provide the necessary pressure to deliver gas to customers when required
<b>Direct employment</b>	Those employed by companies operating in the extraction of oil and gas and associated services
<b>EMV</b>	Expected Monetary Value
<b>Enhanced loss flexibilities</b>	Enhanced ability to carry back or carry forward losses, especially with regard to decommissioning losses, to generate a repayment of tax

<b>ETF</b>	Efficiency Task Force
<b>EU</b>	European Union
<b>FDP</b>	Field Development Plan
<b>FID</b>	Final Investment Decision
<b>FPSO</b>	Floating, production, storage and offloading vessel
<b>GDP (Gross Domestic Product)</b>	A measure of an economy
<b>GHG</b>	Greenhouse gas
<b>IEA</b>	International Energy Agency
<b>Indirect employment</b>	Employment as a result of supply chain effects caused by oil and gas sector activity. For these companies, extraction of oil and gas and associated services will be one part of a wider business
<b>Induced employment</b>	Employment supported by the redistribution of income from the oil and gas sector
<b>Investment Allowance</b>	A basin-wide capital investment-based allowance against a company's SC liability
<b>IRR</b>	Internal Rate of Return
<b>Jack-up rig</b>	Self-contained combination drilling rig and barge with legs that can be raised and lowered independently onto the seafloor
<b>M&amp;A</b>	Mergers and acquisitions
<b>million boepd</b>	Million barrels of oil equivalent per day
<b>MER UK</b>	Maximising economic recovery from the UKCS (ref. the Wood Review)
<b>mtoe</b>	Million tonnes of oil equivalent
<b>NBP</b>	National Balancing Point (fictional location in Britain where the NTS is notionally in balance and at which the trading of gas takes place)
<b>National Transmission System</b>	High pressure gas transmission system in Britain operated by National Grid – the 'motorway' network for gas
<b>OGA</b>	Oil and Gas Authority
<b>OGTC</b>	Oil & Gas Technology Centre
<b>OPEC</b>	Organisation of Petroleum Exporting Countries
<b>P&amp;A</b>	Plugging and abandonment (of wells)
<b>Production efficiency</b>	The total annual production divided by the maximum production potential of all fields on the UKCS
<b>PRT</b>	Petroleum Revenue Tax
<b>p/th</b>	Pence per therm (for gas)
<b>Reserves</b>	Hydrocarbons that are anticipated to be recovered from known accumulations from a given date forward

<b>Resources</b>	Productive potential assuming no economic or time constraints
<b>RFCT</b>	Ring Fence Corporation Tax (as applied to upstream oil and gas production in the UK)
<b>SC</b>	Supplementary Charge (a corporate tax applied to upstream oil and gas production in addition to RFCT)
<b>Semi-submersible rig</b>	Used for deepwater drilling. They have ballasted columns to remain on location by either mooring lines or dynamic positioning systems. Used for exploration and development drilling.
<b>Small pools</b>	Fields in the size range of 0 to 50 million boe for which there is no plan nor intention to develop a plan by operators
<b>Subsea tie-back</b>	Subsea tie-backs usually connect small reservoir accumulations, developed using subsea trees and manifolds, back to a host platform for onward processing and or transportation
<b>UKCS</b>	UK Continental Shelf
<b>Unconventional resources</b>	Resources that are produced or extracted using techniques other than the conventional method
<b>UOC</b>	Unit operating cost
<b>US Lower 48 States</b>	All the states in the United States that are adjoining
<b>Wildcat well</b>	Exploring for oil and gas in an unproven area
<b>WTO</b>	World Trade Organization







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