Financial Scrutiny Unit Briefing
Scottish North Sea oil and gas industry
23 April 2014
14/28

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This briefing is produced to assist the Economy, Energy and Tourism Committee in their inquiry into Scotland’s Economic Future Post-2014. It provides a summary of key statistics at a pivotal moment in the economic history of the industry, when both record investment levels and continued production decline have been witnessed in recent years. The briefing also considers the impact of the industry on the Scottish economy and the UK public finances since 1976, and discusses some of the policies and forecasts which will inform the political debate surrounding the sector over the coming months and years.
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INTRODUCTION

The discovery and exploitation of North Sea oil and gas has been ‘one of the most important episodes in the post-Second World War economic history of the UK’ (Kemp, 2013). After more than four decades the industry continues to invest and produce at levels unimaginable to most early forecasters. Indeed, Department of Energy economists in the 1970s calculated total reserves of between 8.5 and 14 billion barrels on the UK Continental Shelf. So far almost 42 billion boe (barrel of oil equivalent) have been recovered, with estimates of remaining reserves ranging between 15 and 24 billion boe (Kemp, 2013). Professor Alex Kemp of the University of Aberdeen predicts that oil and gas extraction could continue on the UK Continental Shelf (UKCS) beyond 2040.

The contribution oil and gas have made to the economy and the public finances of the UK, as well as its impact on the political culture of Scotland, continue to be debated. This briefing aims to assist the on-going debate, particularly in light of the Economy, Energy and Tourism Committee’s decision to hold an inquiry into Scotland’s economic future post-2014. It is hoped that this summary of key figures and policies will assist Members of the Scottish Parliament to understand the past, present and future of one of Scotland’s most successful industries, particularly at this pivotal moment when both decreasing production and record levels of investment are seen on the UKCS.
HISTORY

Onshore gas discoveries during the 1940s and 1950s – mainly in Dorset, the East Midlands and Groningen in the Netherlands - led geologists to conclude that the UK continental shelf (UKCS) under the North Sea probably contained a substantial volume of hydrocarbons. Subsequent seismic surveying throughout the 1960s yielded initial fruit in the form of the Southern North Sea gas province (in the seas off Great Yarmouth). Exploration continued northwards and, in December 1969, Phillips Petroleum discovered oil at Ekofisk, within the Norwegian sector of the central North Sea. This was followed by the discovery of the Montrose oil field, 135 miles east of Aberdeen, in December 1969, as well as BP’s Forties field in October 1970. Further discoveries were made in 1971 and 1973, with the discovery of the massive Brent oil field, east of Shetland, and the Piper field, east of Orkney (Kemp, 2013).

The development of the North Sea as an oil producing province required capital investment rarely seen in Britain since the 19th Century. In 1976, for example, investment in the UKCS was £13 billion (in 2013 prices), the equivalent of 33% of all UK investment in the manufacturing sector that year (Kemp, 2013). In 1972, Shell Exploration and Production Limited estimated the cost of developing a field over a ten year period to be around £250 million in the money of the day (£2.4bn in today’s money) – ‘as much as a space shot to the moon’ (SCDI, 1972). The environment in which fields were discovered and developed made the achievements of the engineers, drillers, geologists and rig operators all the more impressive. Oil first flowed ashore from the Argyll field in June 1975 and, within a decade, 2.6 million barrels of oil per day were being extracted from 29 fields.

As well as being one of our most capital-intensive industries, the oil and gas industry has also been a major employer in Scotland since the late 1970s, particularly in and around Aberdeen, the ‘Oil Capital of Europe’. According to the Scottish Council for Development and Industry (SCDI), the sector supports over 200,000 jobs in Scotland (SCDI, 2013). The safety of those employed in the sector came into sharp focus after the Piper Alpha disaster of July 1988, when 167 men lost their lives in the world’s worst off-shore disaster. The subsequent Cullen Inquiry into the disaster presented a number of recommendations, including the transfer of offshore safety regulation to the Health and Safety Executive (HSE). On average, off-shore workers are now less likely to suffer serious injury than those employed in transport, construction, manufacturing or retail sectors (HSE 2013) Nevertheless, the health and safety implications of a workplace – described by one senior HSE official as a heliport, on top of a hotel, on top of a power station, on top of a process plant on top of an oil well, in the middle of the North Sea – are immense (HSE, 2013).

If Piper Alpha saw a rethinking of offshore safety, the Brent Spar episode of 1995 highlighted the environmental impact of an industry starting to deal with ageing infrastructure. Shell UK, with Department of Trade and Industry approval, intended to sink a 147 metre high storage tank containing tonnes of toxic chemicals in the North Atlantic (Harvie, 1995). Greenpeace and other environmentalists across Europe launched a high-profile, and ultimately successful, campaign, forcing Shell to reverse its decision. The company then opted to dismantle the Spar in Norway at a cost of £43m compared to the dumping option, which would have cost the company £4.5m (BBC 1998). With decommissioning costs estimated at £40 billion between now and 2040 there are serious implications for the industry and government, some of which are discussed in more detail in the final chapter of this briefing.
PRODUCTION HISTORY

In 2012, the UK was the largest oil producer and second largest gas producer in the European Union, or the 23rd largest in the world for oil and gas combined (22nd for oil, 21st for gas) (DECC, 2014a). Nevertheless, it is accepted that total North Sea oil and gas production on the UKCS peaked in 1999 and has been declining each year since. Chart 1 shows crude oil extraction levels, as measured by millions of barrels, for each year since 1976. In 1985, production of crude was averaging 2.6 million barrels of oil per day and in 1999 - the year of peak production – production rates were even higher, at 2.8 million barrels per day.

Barrel of oil equivalent per day (boepd) levels are now about 30% of what they were 14 years ago with DECC figures showing the most dramatic annual reductions taking place in 2010 and 2011. Even before 2010 production had been falling by between 5 and 10 per cent annually over the decade. Recently published figures for 2013 show that production continued to decline during 2012 and 2013 with an average of 1.43 million barrels of oil equivalent per day (boepd) produced in 2013, eight per cent lower than in 2012 (Oil & Gas UK, 2014). Despite this, production from the UK Continental Shelf (UKCS) still met 62% of the UK’s oil demand and 50% of its gas demand in 2013 (DECC, 2014b).

Chart 1: Barrels of crude oil per year (million)

![Chart showing barrels of crude oil per year (million) from 1976 to 2011. Source: DECC 2013](chart.png)

How much of this production has taken place on the Scottish section of the UKCS since 1976 depends on the demarcation method used to determine the offshore border. Accepting the ‘median line’ demarcation as preferred by the Scottish Government (see map and explanation in Annex 1), oil/natural gas liquids (NGL) production on Scotland’s section of the UKCS averaged 93% of the UK total over the previous fifteen years, in terms of both volume and total value (Scottish Government, 2013a) Gas production on the Scottish UKCS averaged 54% of the UK total over the same period, with Scotland’s section of the UKCS responsible for 46% of total UK gas production in 2012 (Scottish Government, 2014a).
TAX REVENUES FROM UKCS SINCE 1980

Table 1 shows the value of tax receipts from oil and gas activities on the UKCS each year since 1975 in 2012-13 prices. Revenues peaked in 1984-85 (in real terms) and fell dramatically during the late 1980s, remaining relatively low throughout the 1990s. Since 2000-01 revenues remained above the £5bn mark, rising to over £10bn during four of the last ten years prior to 2013-14. In total, over the past four decades, corporate taxes from the UKCS have contributed over £300bn to the UK Treasury (in today’s money). This sum includes Petroleum Revenue Tax (PRT), Ring Fence Corporation Tax (RFCT) and Supplementary Charge (SC) revenue, as well as the Gas Levy (abolished in 1998) and Royalties (abolished 2003).

Table 1: Total UK receipts from UKCS since 1975

<table>
<thead>
<tr>
<th>Year</th>
<th>£m (2012-13 prices)</th>
<th>Year</th>
<th>£m (2012-13 prices)</th>
<th>Year</th>
<th>£m (2012-13 prices)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1975-76</td>
<td>147</td>
<td>1976-77</td>
<td>420</td>
<td>1977-78</td>
<td>1,085</td>
</tr>
<tr>
<td>1976-77</td>
<td>147</td>
<td>1977-78</td>
<td>420</td>
<td>1978-79</td>
<td>1,085</td>
</tr>
<tr>
<td>1977-78</td>
<td>1,085</td>
<td>1978-79</td>
<td>2,322</td>
<td>1979-80</td>
<td>8,149</td>
</tr>
<tr>
<td>1978-79</td>
<td>2,322</td>
<td>1979-80</td>
<td>8,149</td>
<td>1980-81</td>
<td>11,151</td>
</tr>
<tr>
<td>1979-80</td>
<td>8,149</td>
<td>1980-81</td>
<td>11,151</td>
<td>1981-82</td>
<td>17,651</td>
</tr>
<tr>
<td>1980-81</td>
<td>11,151</td>
<td>1981-82</td>
<td>17,651</td>
<td>1982-83</td>
<td>19,915</td>
</tr>
<tr>
<td>1981-82</td>
<td>17,651</td>
<td>1982-83</td>
<td>19,915</td>
<td>1983-84</td>
<td>21,455</td>
</tr>
<tr>
<td>1982-83</td>
<td>19,915</td>
<td>1983-84</td>
<td>21,455</td>
<td>1984-85</td>
<td>27,946</td>
</tr>
<tr>
<td>1983-84</td>
<td>21,455</td>
<td>1984-85</td>
<td>27,946</td>
<td>1985-86</td>
<td>25,019</td>
</tr>
<tr>
<td>1984-85</td>
<td>27,946</td>
<td>1985-86</td>
<td>25,019</td>
<td>1986-87</td>
<td>10,248</td>
</tr>
<tr>
<td>1985-86</td>
<td>25,019</td>
<td>1986-87</td>
<td>10,248</td>
<td>1987-88</td>
<td>9,392</td>
</tr>
<tr>
<td>1986-87</td>
<td>10,248</td>
<td>1987-88</td>
<td>9,392</td>
<td>1988-89</td>
<td>6,049</td>
</tr>
<tr>
<td>1987-88</td>
<td>9,392</td>
<td>1988-89</td>
<td>6,049</td>
<td>1989-90</td>
<td>4,236</td>
</tr>
<tr>
<td>1988-89</td>
<td>6,049</td>
<td>1989-90</td>
<td>4,236</td>
<td>1990-91</td>
<td>3,860</td>
</tr>
<tr>
<td>2000-01</td>
<td>6,009</td>
<td>2001-02</td>
<td>7,136</td>
<td>2002-03</td>
<td>6,563</td>
</tr>
<tr>
<td>2000-01</td>
<td>6,009</td>
<td>2002-03</td>
<td>6,563</td>
<td>2003-04</td>
<td>5,380</td>
</tr>
<tr>
<td>2002-03</td>
<td>6,563</td>
<td>2004-05</td>
<td>6,341</td>
<td>2005-06</td>
<td>11,351</td>
</tr>
<tr>
<td>2004-05</td>
<td>6,341</td>
<td>2006-07</td>
<td>10,490</td>
<td>2007-08</td>
<td>8,552</td>
</tr>
<tr>
<td>2005-06</td>
<td>11,351</td>
<td>2007-08</td>
<td>8,552</td>
<td>2008-09</td>
<td>13,917</td>
</tr>
<tr>
<td>2006-07</td>
<td>10,490</td>
<td>2008-09</td>
<td>13,917</td>
<td>2009-10</td>
<td>6,471</td>
</tr>
<tr>
<td>2007-08</td>
<td>8,552</td>
<td>2009-10</td>
<td>6,471</td>
<td>2010-11</td>
<td>8,863</td>
</tr>
<tr>
<td>2008-09</td>
<td>13,917</td>
<td>2010-11</td>
<td>8,863</td>
<td>2011-12</td>
<td>11,712</td>
</tr>
<tr>
<td>2009-10</td>
<td>6,471</td>
<td>2011-12</td>
<td>11,712</td>
<td>2012-13</td>
<td>6,530</td>
</tr>
<tr>
<td>2010-11</td>
<td>8,863</td>
<td>2012-13</td>
<td>6,530</td>
<td>2013-14</td>
<td>7,136</td>
</tr>
</tbody>
</table>

Source: HMRC (2013a)

Illustrative geographic allocations of these receipts (i.e. how much an independent Scotland would receive) differ between two main estimates, one based on a model developed by Kemp and Stephens from the University of Aberdeen and used by the Scottish Government, and the other devised by HMRC which has only recently been published as an ‘experimental statistic’. These models are discussed in the SPICe briefing ‘Tax revenue estimates: a comparison of GERS and HMRC’ (SPICe, 2013), as well as the CPPR’s ‘Reflections on a post-independent fiscal landscape’ (CPPR, 2013). John McLaren and Jo Armstrong, writing in the latter, conclude ‘the reality is we would not know until after independence what share of North Sea taxes would accrue to a Scottish Treasury’.
OIL PRICES SINCE 1976

Chart 2 shows annual average Brent oil prices since 1976. Prices were relatively stable (and low) throughout the 1990s, and then rose steadily between 2001 and 2008. Unfortunately for the Treasury, peak production on the UKCS coincided with two years when oil prices were, on average, below $20 a barrel (1998 and 1999). Over the last three years, however, Brent has remained above $100 per barrel, averaging $111.26 in 2011, $111.67 in 2012 and $108.84 in 2013 (BBC, 2013). Oil & Gas UK believe ‘there has been notable consistency during the past two years in the price of Brent crude oil’ (Oil & Gas UK, 2013a). At the time of writing the most recent daily Brent spot price was $109.7 (for 22 April 2014), almost exactly the same as it was at the end of October 2011.

Chart 2: Brent oil prices since 1976 ($/bbl)

Source: BP (2013)

Various factors influence oil prices including political developments (e.g. sanctions) restricting the supply of oil and rising demand from emerging economies. Using 2012 as an example, increased EU and US sanctions against Iran created an upwards supply-side pressure on oil prices. This was partly offset by the recovery of Libyan production as well as increases from OPEC producers, including Saudi Arabia. On the demand-side, consumption grew during the year by 0.9%, mainly from non-OECD countries and Japan (BP, 2013).

Chart 3: World Oil Price Projections to 2040 (2012 $ per barrel, 2012 prices)

Source: EIA, 2013a
Despite recent stability, oil prices are among the most volatile commodities. According to the US Government’s Energy Information Administration (EIA) demand for crude oil and petroleum goods is forecast to increase by almost 30% between 2013 and 2040, to 115 million barrels per day. Almost all of this increase will be from non-OECD countries: ‘rapid economic development drives the increase in world consumption, as demand among the more mature economies of the OECD regions remains flat or declines’ (EIA, 2013b). As such, the EIA’s world oil price projections to 2010 show a range of possible trajectories, with the middle, or ‘reference’, forecast showing a slight reduction in price over the next few years followed by a gradual increase towards $150 per barrel over the longer-term (see Chart 3).

In a Barclays survey of 80 oil and gas operators conducted between May and July 2013, 18% of respondents felt the price of a barrel of oil would drop below $90 in five years’ time, 15% predicted prices between $90 and $100, 31% predicted $100 to $110, 19% predicted $110 to $120, and 18% predicted prices of over $120 a barrel (Barclays, 2013).
CONTRIBUTION TO SCOTLAND’S ECONOMY

The economic impact of an industrial sector can be measured by its gross value added (GVA, which measures a sector’s contribution to GDP), the level of employment and wages within it, its contribution to a nation’s trade balance and the extent to which its operations impact other industrial sectors. On all of these indicators the North Sea oil and gas industry has proven to be a central feature of Scotland’s economic landscape since 1970.

CONTRIBUTION TO SCOTTISH GDP

Gross Domestic Product (GDP) is the value of all goods and services produced by a country within a year. Scotland’s onshore GDP in 2012 was £126.1 bn (Scottish Government, 2014b). The Scottish Government’s ‘Government Expenditure and Revenue in Scotland (GERS) 2012-13’ and its Scottish National Accounts Project (SNAP) use Kemp and Stephen’s model to estimate Scotland’s geographical share of UKCS oil production at 96.0% and its geographical share of gas production 52.4%. Using these ratios the Government estimates Scotland’s geographical share of UKCS GDP in 2012 was £19.2bn, or 13.2% of ‘total’ Scottish GDP. To put this into context, the financial services and manufacturing sectors accounted for 20% and 10% respectively in 2012.

Table 2: Scottish GDP including geographical share of North Sea GDP since 2003

<table>
<thead>
<tr>
<th>Year</th>
<th>GDP Including a Geographical share of Extra-Regio (£m)</th>
<th>Geographic share of North Sea GDP (£m)</th>
<th>Geographic share of North Sea GDP (as % of total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>104,205</td>
<td>14,521</td>
<td>13.9%</td>
</tr>
<tr>
<td>2004</td>
<td>110,285</td>
<td>15,247</td>
<td>13.8%</td>
</tr>
<tr>
<td>2005</td>
<td>119,402</td>
<td>18,388</td>
<td>15.4%</td>
</tr>
<tr>
<td>2006</td>
<td>127,688</td>
<td>20,736</td>
<td>16.2%</td>
</tr>
<tr>
<td>2007</td>
<td>136,083</td>
<td>22,212</td>
<td>16.3%</td>
</tr>
<tr>
<td>2008</td>
<td>144,866</td>
<td>25,486</td>
<td>17.6%</td>
</tr>
<tr>
<td>2009</td>
<td>132,938</td>
<td>17,771</td>
<td>13.4%</td>
</tr>
<tr>
<td>2010</td>
<td>142,959</td>
<td>21,530</td>
<td>15.1%</td>
</tr>
<tr>
<td>2011</td>
<td>146,970</td>
<td>21,702</td>
<td>14.8%</td>
</tr>
<tr>
<td>2012</td>
<td>145,270</td>
<td>19,193</td>
<td>13.2%</td>
</tr>
</tbody>
</table>

Source: Scottish Government (2014b)

The fact that the value of North Sea output has more or less risen over the past ten years, whilst production has decreased dramatically, ‘reflects the sharp rise in wholesale prices which have occurred over this period’ (2014a).
The Centre for Public Policy and Regions (CPPR) based at Glasgow University believe there is a danger in focusing on the UKCS’s contribution to GDP: ‘The inclusion of North Sea activity significantly boosts Scottish GDP, and hence Scottish GDP per head ... however, this is more of a definitional increase as opposed to one that will be felt by Scottish households’ (CPPR, 2013). Most of the large operating companies on the UKCS are foreign-owned (see Box 1); as such, post-tax North Sea profits tend to accrue overseas.

**Box 1: Ownership and profits**

In 2012 the top ten operating companies on the UKCS were responsible for extracting 65% of total oil output. Gas extraction was even more concentrated with the top ten extracting over 80% of UKCS gas output. Of the companies listed in Table 3, only BP, BG and Centrica are headquartered in the UK.

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Country</strong></td>
<td><strong>Total Output (1H 2012)</strong></td>
</tr>
<tr>
<td>Nexen</td>
<td>11%</td>
</tr>
<tr>
<td>BP</td>
<td>9%</td>
</tr>
<tr>
<td>Apache</td>
<td>7%</td>
</tr>
<tr>
<td>Shell</td>
<td>7%</td>
</tr>
<tr>
<td>BG</td>
<td>6%</td>
</tr>
<tr>
<td>Suncor Energy</td>
<td>6%</td>
</tr>
<tr>
<td>Talisman</td>
<td>6%</td>
</tr>
<tr>
<td>Chevron</td>
<td>5%</td>
</tr>
<tr>
<td>TAQA</td>
<td>4%</td>
</tr>
<tr>
<td>Total</td>
<td>4%</td>
</tr>
<tr>
<td>Others</td>
<td>35%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>


**Some examples: Nexen and Total**

The largest oil extractor on the UKCS in 2012 was Nexen Petroleum Limited, based in Middlesex, with sales of £2.3 bn. Nexen paid UK corporation tax of £825m in 2011 and made post-tax profits of £483m (Hoovers, 2013). Nexen is a subsidiary of Nexen Inc, based in Canada, which is itself owned by China National Offshore Oil Corporation (CNOOC). CNOOC is 64% owned by the Chinese Government.

Looking at Total, one of the top three gas and top ten oil operations on the UKCS, we can see from its accounts that a subsidiary company, Total E and P Ltd (based in Aberdeen; E&P means ‘exploration and production’) had net sales of £1.5bn in 2011, costs of £850m and pre-tax profits of £629m. From these profits, Total E&P paid £514m in tax (not all in corporation tax), leaving it with £114m retained profit. This profit ultimately goes to the parent company, Total SA, based in Paris. Group profits are then distributed in the form of shares to shareholders, mostly ‘institutional shareholders’, based around the world. According to its 2012 annual report, 10% of Total SA shareholders are based in the UK, 29% in France and 30% in North America.
THE FLOW OF NORTH SEA OIL

Some of Scotland’s oil and gas infrastructure is shown in the following map. Crude is piped to four Scottish terminals: Kinneil (handling 41% of total UKCS crude in 2012), Sullom Voe (22%), Flotta in Orkney (7%) and Nigg Bay (less than 1%). Remaining crude - 26% of UKCS oil in 2012 - is loaded offshore, directly from production or storage facilities to tankers (DECC, 2013).

The Forties pipeline serves over fifty fields in the central North Sea area, joining the Scottish mainland at Cruden Bay, 25 miles north of Aberdeen. Crude continues its journey from there to the Kinneil Terminal in Grangemouth where it is either refined at the Ineos refinery, or transferred to tankers at Dalmeny on the Firth of Forth. Looking further north, crude from east and west of Shetland flows through pipelines to the Sullom Voe terminal on the North Mainland of Shetland, one of the largest oil terminals in Europe. Oil is then loaded onto tankers and transported to refineries around the world. Gas in the Scottish section of the North Sea is largely piped to the St Fergus processing facility near Peterhead.
In 2012, 44.6 million tons of crude oil and NLG were extracted from the UKCS. Of this, more than two-thirds (29.9m tonnes) were exported, primarily to the Netherlands, Germany and France (in total 73% of all UKCS exports by volume).

The top left corner of Chart 4 shows the flow of remaining UKCS crude (14.1m tonnes), refined at one of seven facilities around the UK, including the Ineos plant at Grangemouth. Scotland had around 13% of UK refining capacity in 2012. Refined products include petrol/diesel, aviation fuel, propane and naphtha and burning oil. Grangemouth also produces chemicals from methane, a by-product of the refinery process. The importance of the Grangemouth operation to Scotland’s economy came into sharp and sudden focus during the Unite/Ineos industrial dispute in October 2013, when the complex was temporarily closed. At the time, Strathclyde University’s Professor Brian Ashcroft used the Scottish Government’s Input-Output tables to calculate the possible impact of Grangemouth’s closure to the Scottish economy: ‘Closure of the whole site would lead to a 1.2% fall in Scottish GDP, the loss of 7,261 jobs - 0.3% of Scottish employment - and a loss of 0.5% of employee income … the impact of the closure of Grangemouth would be similar to the closure of Ravenscraig’ (Ashcroft, 2013).
IMPACT ON SCOTLAND’S BALANCE OF TRADE

Experimental figures published by the Scottish Government suggest that the total value of Scotland’s imports has been considerably higher than the value of onshore exports every year since 1998. There was, for example, a net trade deficit of £11.4 bn in 2012.

Total sales from Scotland’s geographic share of the UK Continental Shelf (UKCS) were estimated to be worth £26.8bn in 2012 (Scottish Government, 2013b). Scottish Government statisticians and economists recently attempted to illustrate ‘the flows of crude oil, natural gas liquids (NGLs), natural gas, and refined petroleum products through the Scottish economy, including their import and export’ (Scottish Government, 2013c). Referring to this work in his most recent ‘State of the Economy’ update, the Scottish Government’s Chief Economic Adviser provided an estimate of Scotland’s total exports in 2012 including a contribution from the North Sea sector:

Table 3: Scotland’s exports including the North Sea (2012, £ million)

<table>
<thead>
<tr>
<th>Scotland’s exports</th>
<th>Rest of UK exports</th>
<th>International exports</th>
<th>Total exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onshore Scotland</td>
<td>47,700</td>
<td>20,900</td>
<td>68,700</td>
</tr>
<tr>
<td>Less</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exports of mining support to North Sea (already as an export from onshore)</td>
<td>5,700</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exports of oil and gas</td>
<td>10,700</td>
<td>13,800</td>
<td>24,400</td>
</tr>
<tr>
<td>Scotland including the North Sea</td>
<td>52,700</td>
<td>34,700</td>
<td>87,400</td>
</tr>
</tbody>
</table>

Source: Scottish Government (2013d)

Table 3 adds North Sea exports to Scottish onshore exports, increasing the total value of exports by almost £19bn to a total Scottish export figure of £87.4bn. The total value of imports in 2012 was £80.1bn (Scottish Government, 2014b); however, as UK regional accounts currently classify the UKCS as an extra-regio territory, crude flowing to Grangemouth from the North Sea is already included in the imports figure. Furthermore, imports into the UKCS (for example oil platforms, pipes, etc) from the rest of the UK or rest of the world, would in the case of independence, be seen as imports into Scotland. So it is not the case that Scotland has a hypothetical trade surplus of £7.1bn. Despite these caveats it is clear that the inclusion of North Sea exports has a positive impact on Scottish balance of trade figures, swinging the balance towards a trade surplus.

The oil services or ‘supply chain’ sector – which includes companies providing exploration, drilling, engineering and fabrication services - is also a major exporter, with 44% of its turnover being accounted for by income from international markets (Bank of Scotland, 2013). According to Scottish Enterprise, Scottish supply chain companies ‘now record sales in over 100 countries’. North America remains a key market, ‘with strong growth also occurring in West Africa, Brazil, Norway, Australia and the ASEAN (Southeast Asian) countries’ (Scottish Enterprise, 2012).
EMPLOYMENT AND SKILLS

The Oil and Gas Industry Leadership Group noted in 2012 that the industry supports around 440,000 jobs across the UK. Of these:

- 220,000 are employed in Scotland
- 32,000 are directly employed by oil and gas companies and major contractors
- 207,000 are in the wider supply chain
- 100,000 are supported by the economic activity of employees spending (indirect)

(AGCC, 2013)

A common misconception is that most people working in the oil industry are engaged in off-shore work. In fact, of those directly employed by operating companies only 12,500 work offshore, and a further 45,000 work off-shore for supply chain companies and contractors (Oil & Gas, 2013a).

The industry is very much male-dominated; in 2010 one survey found that female workers made up only 4% of the total UK oil and gas workforce. Women are particularly underrepresented in the engineering, technical and scientific professions, and relatively over-represented in onshore admin and secretarial jobs. Of all the women employed offshore in 2010, over 40% worked in catering (Opito, 2011).

The average age of North Sea offshore workers is 41 years. In recent years the number of younger workers has been increasing, indeed there are now two and a half times as many 23 to 28 year olds working offshore as there are 60 to 65 year olds (Oil & Gas UK, 2012). Nevertheless, in order to fully exploit the opportunities presented by record investment levels in 2012 and 2013, recruitment organisation, Oil Careers, believes ‘Aberdeen will need to find up to 120,000 oil and gas personnel to replace the mature workforce as they retire over the coming decade’ (Oilcareers.com, 2013). A survey by Bank of Scotland also found that ‘about 39,000 jobs could be created (across the whole UK) by the UK oil and gas industry in 2014’ (Bank of Scotland, 2013).

OPITO, an industry-wide organisation focusing on skills and training in the sector, surveyed 144 companies in 2010 and found that ‘attracting appropriately skilled and experienced staff and the resulting cost of employing such staff were the principal challenges facing virtually every sector of the industry’ (Opito, 2011). It is proving particularly difficult for operating companies to employ new engineers and managers, thus wages in these areas are pushed up. The sector is renowned for high salaries – one recruitment company produced survey results showing that average wages in the industry had risen by 15% between 2012 and 2013, to £73,600 (almost £50,000 higher than the Scottish average) (Oil and Gas People, 2013).
CURRENT TAX REGIME

‘It can be concluded that by and large the North Sea tax system has procured to the state a very substantial share of the economic rents emanating from North Sea oil and gas exploitation. But the process has been personified by very frequent changes and the introduction of devices in response to short-term Government budget problems rather than the incidence of economic returns from oil and gas production.’ (Kemp, 2013)

Oil & Gas UK, the main body representing the offshore oil and gas industry, argues that the production of oil and gas from the UKCS ‘is the most highly taxed business activity in the country’ (Oil & Gas UK, 2013). (Of course, few other industries so obviously deplete a nation’s finite assets.) The taxation regime for the upstream part of the industry is complex and has been designed in such a way that profits cannot be off-set by losses in other parts of a company’s operations. In this sense the production operations of a large company operating on the UKCS is treated as if it were a standalone business. ‘Ring-fenced’ profits are subject to up to three separate corporate taxes depending on the age and characteristics of the oilfield. Operations in older fields can, in theory, pay up to 81% on profits, and those in newer fields pay up to 62%. With the recent introduction of a number of field allowances it is possible that licensees in some of the smaller, newer fields may pay total corporate taxes of ‘only’ 30% (still above the current main rate of corporation tax paid by most non-oil businesses).

Details of the various corporate taxes paid by oil extractors are detailed below:

1. Petroleum Revenue Tax (PRT) - applies to individual fields given development consent before March 1993. It is levied at a rate of 50%. The fields within the charge to PRT are known as ‘taxable fields’ and those outside it are known as ‘non-taxable fields’. It is worth bearing in mind that many pre-1993 fields do not actually pay PRT, for example previously decommissioned fields which are subsequently recommissioned, or fields where assessable profit is too low.

To ensure that PRT is levied on only the largest and most productive fields, ‘Oil Allowances’ for each PRT field exempt from PRT certain amounts of oil and gas ‘which can be produced free of charge per tax period and for the life of the field’. Production above these amounts is subject to the usual 50% PRT rate.

HMRC figures for 2012-13 show that PRT receipts for the UKCS as a whole were £1.7 billion, or 27% of total UKCS tax revenues for that year (HMRC 2013b).

2. Ring Fence Corporation Tax (RFCT) is a tax on profits and is calculated in the same way as the corporation tax that applies to all companies, but with the addition of a ‘ring fence’ which prevents taxable profits from extraction activities on the UKCS being reduced by losses from other activities. Another major difference is that the rate of RFCT is set at 30 per cent, whereas the main rate of corporation tax currently stands at 23% (to be reduced to 20% in 2015).

The amount companies pay corporation tax on can be reduced by certain allowances. Capital expenditure on oil extraction activities is relieved under the appropriate Capital Allowances rules, and in almost all cases 100 per cent first year allowance applies. The

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1 For more information see HMRC guides [http://www.hmrc.gov.uk/oilandgas/index.htm](http://www.hmrc.gov.uk/oilandgas/index.htm)
2 ‘An “Oil Allowance” can be applied to fields with development consent on or before 31 March 1982 which makes the first 250,000 tonnes per six month period, up to a cumulative total of 5 million tonnes, PRT free. From 1 April 1982, for southern fields the amounts are 125,000 and 2.5 million tonnes and for all other fields 500,000 and 10 million tonnes respectively’ OGUK: [http://www.oilandgasuk.co.uk/2012economic_report/ukcs_fiscal_regime.cfm](http://www.oilandgasuk.co.uk/2012economic_report/ukcs_fiscal_regime.cfm)
capital cost of oil exploration and appraisal activity may be relieved in full in the year in which it is incurred under the Research and Development Capital Allowances code. Expenditure on the decommissioning of fields and assets which is capital in nature normally qualifies for immediate 100 per cent relief within the Capital Allowances code, and any loss attributable to decommissioning costs can be carried back against profits arising from the date of the introduction of the Supplementary Charge (17 April 2002). (HMRC, 2013b)

3. **Supplementary Charge (SC)** is an additional tax levied at the rate of 32% (it was originally set at 10% when introduced in 2002, increased to 20% in 2006 and increased again to the current 32% level in the March 2011 Budget). SCDI believe that the Supplementary Charge has ‘been widely seen as a disincentive to investment’ (SDCI, 2013b).

Not all licensees are required to pay the full 32%. In 2009, field allowances were introduced ‘to increase investment and production in fields that are economic but - for tax reasons - considered to be commercially marginal’ (HMRC, 2013b). Field allowances reduce the amount of taxable profits on which the Supplementary Charge is paid for companies operating in specific types of fields. In 2010, the UK Government extended the scope of the field allowances to include remote deep-water gas fields, such as those found to the west of Shetlands, and in September 2012 further extended the scope of field allowances to include a “brownfield allowance” for qualifying incremental projects in existing fields.

Fields which benefit from these allowances – which include most new fields and an increasing number of older fields – pay total corporate tax of 30% (the RFCT rate) plus whatever SC rate is applied once their field allowance has been used.

Total corporation tax - RFCT of £2.1 bn, plus SC of £2.7bn - amounted to £4.8bn in 2012-13, or 73% of total UKCS receipts for that year. Chart 4 shows how the share of total UKCS receipts by type of tax has changed since 2002.

**Chart 4: Government revenues from Oil and Gas production with totals (£m)**

![Chart 4](chart4.png)

Source: HMRC, 2013c
Oil & Gas UK have recently praised the Treasury’s allowance strategy. It is their belief that in 2013 ‘around half of the £14.4 billion of investment was in some way incentivised by an allowance and this proportion will almost certainly increase in 2014’ (Oil & Gas UK, 2014). In the 2012 UK Budget, for example, a deep-water allowance was announced that would ‘shelter’ up to £3 billion of West of Shetland production income from the supplementary charge. The Wood Review also praised the Treasury’s actions since 2011, believing that allowances have ‘significantly contributed to the current record level of investment’ (Wood Review, 2014).

THE FUTURE OF THE INDUSTRY

INVESTMENT

As already alluded to, the industry has reported record investment levels in the North Sea over the past three years. Oil & Gas UK's 2013 Economic Report saw capital expenditure rising to £11.4 billion in 2012, which, added to operating costs and exploration spend, amounted to total expenditure of over £20bn (the first time in the history of UKCS, even accounting for inflation). More recent figures from Oil & Gas UK show that the sector invested over £14bn in 2013 (Oil & Gas UK, 2014). Nevertheless, there is a feeling amongst some commentators that investment levels have now peaked. Consultants Wood Mackenzie believe that capital investment is ‘unlikely to be sustained at the current high levels beyond 2015’ (Wood Mackenzie, 2013), and the Wood Review reports that ‘industry anticipates that this (high investment levels) will at least halve in the second half of the decade unless new developments are matured’ (Wood review, 2014). New capital expenditure is eligible for a 100% first-year allowance, a factor which may help explain some of the reduced tax receipts from the sector recently.

Chart 5: Capital investment in UKCS since 1970 (2012 prices)

A recent Barclays survey found that high oil prices and the availability of new technologies are the key drivers for capital expenditure in the UKCS. Of the 80 companies surveyed, over 85% stated that current and future investment will be targeted at exploring enhanced oil recovery programmes and deep water developments, whilst a third were also investing in maintenance of existing infrastructure (Barclays, 2013).
Exploration drilling is at a record low with only 15 exploration wells drilled in 2013. This, according to Oil & Gas UK, is ‘continuing a steep downward trend since 2008 when 44 exploration wells were drilled’. Wood Mackenzie is also concerned about the longer term outlook with ‘only 79 million boe of recoverable reserves discovered in the UK in 2013.’

REMAINING RESERVES

Oil & Gas UK believe there ‘is still a significant resource of some 15 to 24 billion barrels of oil equivalent (boe) left to be developed’ (Oil & Gas UK, 2013). Of this just over 7 billion boe will come from known reserves, i.e. existing fields and projects which have already been sanctioned. These reserves alone should guarantee that the ‘industry will be active for (at least) another 15 to 20 years’.

Up to 4 billion boe of ‘probable’ reserves remain in fields that have a good chance of being developed, and 2.5 billion may be in ‘possible’ reserve fields which currently are unlikely to be developed in the near future. Extracting these hydrocarbons very much depends on the economic viability of developing new fields, and this in turn depends on investment costs, technical improvements, operating costs, fiscal and environmental policy, available infrastructure, and, fundamentally, international oil prices.

In addition, Oil & Gas UK quote Department of Energy and Climate Change (DECC) figures for ‘potential additional resources’ (PARs) – undeveloped discoveries with no current plans for development – of between 1 and 7 billion barrels, and yet-to-find resources (YTF) of 6 to 17 billion boe (Oil & Gas UK, 2013). However, the trade body urges caution when taking these PAR and YTF figures into account.

![Chart 6: UKCS projected reserves/resource (billion boe) 2012](chart)

Source: Oil and Gas UK, 2013 and Scottish Government, 2014a

Professor Kemp and Linda Stephen estimate that 99% of oil production and 60% of total gas production on the UKCS over the next thirty years will take place in the Scottish section of the North Sea (Kemp and Stephen, 2013). Using financial simulation modelling and extensive field data, and assuming $90 per barrel (a ‘realistic assumption’), Kemp and Stephen forecast considerable growth in oil production in the West of Shetland area after 2017, as well as the
gradual decline in production taking place in the Central North Sea/Moray Firth (Forties) area. However, the area West of Shetland, including the Schiehallion, Laggan and Clare fields, are, according to Total ‘characterised by extreme environmental conditions such as wind, wave, temperature and water depth’ as well as a lack of established infrastructure (Total, 2013).

Chart 7: Potential total hydrocarbon production by area of UKCS (at $90/bbl and 55p/therm) 2011 to 2043 (thousand boe per day)

Summarising his forecasting work during a BBC webcast in April 2013, Professor Kemp stated ‘there is very substantial potential, though there are lots and lots of challenges – producing at very high cost, heavy oil fields, high pressure/high temperature fields, stranded gas fields away out in the Atlantic Ocean and lots of very small fields. But we [Professor Kemp and his colleagues at the University of Aberdeen] are satisfied that 16 or 17 billion (boe) can be produced by 2050, and there will still be something remaining’ (BBC, 2013).

OPERATING COSTS

Consultants Wood Mackenzie refer to the ‘spiralling costs’ of operating in the North Sea in their most recent annual UK upstream review (Wood Mackenzie, 2014). These are associated with the costs of maintaining ageing infrastructure (over a third of platforms are more than thirty years old), the shortage and high cost of exploration rigs and the costs of attracting and retaining experienced staff. Because of a steady decline in production over the decade, unit operating costs continue to rise, indeed total operating expenditure rose by 15.5% during 2013 ‘to an all-time record of £8.9bn.’ Chart 8 shows that over a period when production has halved, operating costs have more than doubled (since 2002). It now costs on average £17 to extract a barrel of oil in the North Sea. These rising costs influence operators decisions on what are deemed ‘recoverable reserves’, as higher costs make some reserves less economically unviable to exploit. According to Oil & Gas UK, during 2013 ‘around 300 million BOE of reserves are no longer considered recoverable as a result of operating cost increases’ (Oil and Gas UK, 2014).
THE WOOD REVIEW

In June 2013, the Secretary of State for Energy and Climate Change, Ed Davey, asked Sir Ian Wood to lead a review into arrangements for maximising economic recovery (MER) of the UK’s offshore oil and gas resources. The Wood Review presented its final report on the 24th February 2014 calling for a ‘coherent tripartite strategy’ between the regulator, HM Treasury and the industry. Perhaps its most radical recommendation is to form a new ‘arm’s length body’, effectively a new regulator separate from the Department of Energy and Climate Change (DECC), that will be ‘more involved and demanding of industry’.

Currently DECC’s Energy Development Unit (EDU), with offices in London and Aberdeen, is responsible for the following:

- promoting the exploration for oil and gas resources over the maximum extent of the UKCS by means of an appropriate licensing regime which pays due regard to the environment and to the interests of other land and sea users
- regulating and promoting oil and gas developments which are technically, economically and environmentally sound
- promoting open competitive markets and strong companies in the UK and to influence EU policy formulation and international discussions
- collecting, analysing and disseminating data relating to the UK’s hydrocarbons reserves in order to assist planning and decision taking in Government and the industry.

(HMRC, 2013d)

However, the Wood Review voiced concerned that of DECC’s total 1,600 staff only 50 work in the Licensing, Exploration and Development team, meaning at the moment oil and gas must ‘compete for attention within such a wide ranging and high profile portfolio’. Moreover the
current regulator has halved in size since the 1980s and, according to the Wood Review, is ‘clearly struggling to perform a more demanding stewardship role’.

Wood argues that the corporate profile of the North Sea has changed dramatically since the mid-1980s. In the 1970s and 1980s most production was conducted in a small number of giant fields (Brent, Forties, etc) by a handful of large operators (such as Shell and BP). Today ‘production comes from more than 300 fields operated by an increasingly diverse mix of companies’. As such, there is more of a need to coordinate activity and encourage collaboration between operators. The new regulator will ensure that operators fulfil their obligations to ‘maximise economic recovery under their licenses and with consideration to adjacent resources’. Part of this will be a requirement to work together with the regulator to develop regional strategies, whereby all licence-holders in a region ‘work on all aspects of field and cluster development, from exploration through to decommissioning’.

The recommendations of the Wood Review were immediately accepted by both the UK and Scottish Governments, with Finance Secretary John Swinney believing that a ‘shadow body should be set up without delay’ in Aberdeen (Scottish Government, 2014c).

DECOMMISSIONING COSTS AND TAX IMPLICATIONS

The aim of any oil and gas operation is to extend, for as long as is economically and technologically feasible, the production phase of a field’s life. Once infrastructure becomes redundant, however, oil and gas companies are legally obliged to decommission their equipment in accordance with the Petroleum Act 1998 and OSPAR convention. The process is regulated by DECC. Oil & Gas UK estimates that 470 installations, 25,000km of pipeline and 5,000 wells will have to be decommissioned by 2040, at a cost of £41 billion (in 2013 money) (Oil & Gas UK, 2014).

Decommissioning costs are deductible costs for tax purposes though the rate of relief is restricted to 20% rather than 32% in the case of the supplementary charge. For companies with insufficient current profits to get full tax relief, special arrangements apply allowing costs to be carried back against past profits resulting in refunds of tax already paid. In a move warmly welcomed by the industry, the 2013 UK Budget saw the introduction of legislation allowing for Decommissioning Relief Deeds, contracts between the UK Treasury and oil companies, guaranteeing that future governments are legally obliged to pay relief at 2013 levels regardless of subsequent changes to the tax regime. According to the Institute of Fiscal Studies (IFS), providing companies with this guarantee is ‘forecast to raise revenue solely by increasing investment in and production of oil and gas’ (IFS, 2013).

Tax relief of between 50% to 75% on total decommissioning costs of up to £40 billion will have a significant financial impact on any future UK or independent Scottish Government. The Scottish Government’s Scotland’s Future white paper states that the current Scottish Government is committed to providing decommissioning relief ‘in the manner and at the rate currently provided through the current fiscal regime … Responsibility for decommissioning tax relief will be the subject of a negotiation between the Westminster and Scottish Governments.’ (Scottish Government, 2013e)
CARBON EMISSIONS TARGETS AND THE CARBON BUBBLE

The Scottish Government is working towards reducing Scotland’s carbon emissions by 42% by 2020. As we have seen, it is also committed to the Wood Review’s aspiration to maximise recovery of hydrocarbons from the North Sea. Minister for Energy, Enterprise and Tourism Fergus Ewing believes ‘no contradiction exists’ (Scottish Parliament, 2014) between these two policies, therefore suggesting that fossil fuels from the UKCS will be extracted, exported and primarily burnt elsewhere (unless carbon capture methods are developed and adopted soon in Scotland). The Scotland’s Future white paper states ‘as we increase our use of renewable energy sources, we also have a duty to minimise carbon emissions in line with our world-leading climate change targets.’

The Cancun Agreement of 2010 committed governments to ‘clear objectives for reducing human-generated greenhouse gas emissions over time to keep the global average temperature rise below two degrees’ (UNFCC, 2010). Some climate change scientists and economists, such as Nicholas Stern of the London School of Economics, believe that much of the world’s fossil fuel reserves will have to remain unburnt for the Cancun objectives to be met: ‘Between 60–80% of coal, oil and gas reserves of publicly listed companies are ‘unburnable’ if the world is to have a chance of not exceeding global warming of 2°C’ (Carbon Tracker, 2013). Therefore stock markets may have ‘inflated’ the value of fossil fuel extractors, leading to a ‘carbon bubble’. This subject was covered recently in a House of Commons Environmental Audit Committee inquiry into Green Finance, which concluded that the ‘Financial Policy Committee of the Bank of England should regularly consult with the Committee on Climate Change to help it monitor the risks to financial stability associated with a carbon bubble’ (House of Commons, 2014).
ANNEX 1: THE BOUNDARY ISSUE

The University of Aberdeen’s Alex Kemp and Linda Stephen have attempted to apportion an illustrative Scottish share of UKCS tax revenue using the median line principal, whereby the land border continues into the North Sea with all points on the median line equidistant between the nearest point in Scotland and the nearest point in England. This line has been employed since 1999 to ‘determine the boundary between Scotland and the rest of the UK for fishery demarcation purposes’. For example, the Scottish Government has used this boundary as the foundation for most of its calculations on Scottish revenue from UKCS, however it does accept that ‘other alternatives are possible’ (Scottish Government, 2013f).

Professor Alex Kemp, in recent evidence to the House of Lords Select Committee, stated that ‘the boundary between Scotland and the rest of the UKCS would initially be subject to determination by negotiation between the two governments with the possibility of referral to the International Court in the absence of an agreement’ (House of Lords, 2013).
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