Introduction

1. I am an economist who has specialised in the oil and gas industry for over 40 years. I ran an economic consultancy Mackay Consultants for over 30 years, which specialised in energy economics. We had three offices in Scotland – in Inverness, Aberdeen and Stirling – and various overseas offices.

2. Our main clients were international oil companies such as Saudi Aramco, Shell and BP. We also did many studies for Scottish businesses involved in the oil industry, as well as work for international bodies such as the World Bank and European Commission/Union (EU).

3. Our company produced monthly and annual reports on the Scottish economy, as well as other reports on *Prospects for Scotland’s Energy Industries* and *Prospects for the Scottish Economy*. The most recent editions of the latter reports were published in 2017.

4. Before setting up the consultancy business I spent twelve years on the economics staff of Aberdeen University. I am the joint author of two very well-known books, *The Political Economy of North Sea Oil* and *Norwegian Oil Policies*, as well as the author of many academic articles and other publications on energy economics.
What challenges does Scotland’s oil and gas industry face, and how can they be addressed?

5. This is a wide ranging question and therefore difficult to answer. Some detailed comments are given below in response to the other questions.

6. The challenges include:
   - declining production and recoverable reserves
   - fluctuations in world oil prices
   - relatively high costs in comparison with other oil and gas provinces elsewhere in the world.

7. The oil and gas industry has been one of the most important in Scotland for many years....since the 1970s.....and will continue to be important for probably another 20 years. I believe it has been a big “success story” on the whole and made huge contributions to both the Scottish and UK economies. However, it has declined significantly in recent years and there is unlikely to be a significant revival in the future.

8. There are two main reasons for the recent decline:
   - depletion of oil and gas reserves
   - the collapse in world oil prices in 2015.

9. Oil and gas reserves are finite resources and therefore cannot be reproduced after they have been used. The average productive life of a North Sea field is probably about 25 years, although there are big variations. Those variations are normally related to the size of the recoverable reserves, which can range from billions of barrels to less than 50 million.

10. There has been oil and gas production from the UK Continental Shelf (UKCS) since the late 1960s....nearly 50 years ago......so many of the early field discoveries have been depleted and have ceased production. Examples include “famous” oil fields such as Brent and Forties.

11. I believe that it is reasonable to assume that most of the commercial fields, including the biggest, on the UKCS have already been found, developed and ceased production. However, there continue to be new discoveries.

12. In my opinion there are three main reasons for the latter which are very significant for the Scottish Affairs Committee’s inquiry:
   - activity in previously unexplored areas, notably West of Shetland and the Atlantic Margin area
   - improvements in technology
   - periods of high oil prices.
13. Not all of the UKCS has been explored. Initially the industry concentrated on the shallow waters of the Southern North Sea, before moving steadily northwards unto the deeper and more hostile waters of the Central and Northern North Seas. The latter are legally defined as Scottish waters. There has also been increasing activity in the West of Shetland area and elsewhere off the West Coast.

14. In 1999, at the height of our production, the UK produced 4.6 million barrels of oil equivalent per day. In 2016 it was only about 1.6m barrels per day. Professor Alex Kemp of Aberdeen University (and a former colleague of mine) has forecast it will fall further to 1m by 2030; 500,000 in 2040; and 200,000 barrels by 2050.

15. Oil and Gas UK (OGUK), which is the industry’s main representative body, publish some excellent reports on the industry, including an annual Business Review. The 2018 edition was published earlier this year and I assume that OGUK will submit this report to the Committee, so there is no point in discussing it in my submission.

16. Very briefly, OGUK forecast that production will remain at about the current level until 2020 before the decline resumes. Their forecasts are probably more optimistic than those of most independent commentators, including Alex Kemp and myself, but I do not believe that the differences are significant for the Committee’s inquiry.

17. Oil prices have fluctuated enormously in recent years. The price of Brent crude reached a peak of about $140 a barrel in 2008, before collapsing to $35 in 2009; then it rose again to about $125 in 2012, before falling again to a low of $25 in 2016. The latest price (June 7) was $77.30 a barrel.

18. These fluctuations have caused serious problems for the oil industry in Scotland and elsewhere in the world. There is also continuing uncertainty over future oil prices.

19. However, in my opinion the main reason for the decline in the North Sea oil industry is the reduction in reserves.

20. BP publish an excellent and very useful BP Statistical Review of World Energy, the latest edition of which was published in June 2017. It shows the UK’s remaining proved oil reserves as 2.5 billion barrels or 0.3 billion tonnes.

21. A key indicator is the reserves:production (R/P) ratio, which is estimated for the UK at 6.9. In other words, the UK could continue producing oil at the current (2016) level for just another 6.9 years.

22. The world average oil R/P ratio is estimated at 50.6. In other words, there are sufficient proved oil reserves to last for over 50 years at the current level of production/consumption.
23. The BP Statistical Review also gives their estimates of gas R/P ratios. The UK ratio is 5.0, implying that the country’s proved gas reserves will only last for about 5 more years at the current level of production/consumption. That is also well below the world average of 52.5.

24. It is to be hoped that continuing exploration on the UK Continental Shelf (UKCS) will increase the proved oil and gas reserves. However, it seems certain that UK oil and gas production will continue to decline on a long term basis.

25. The oil price collapse in 2015 resulted in massive job losses in the industry in Scotland, particularly in the Aberdeen area, and serious financial problems for many companies, some of which were forced out of business. Any significant revival seems very unlikely.

26. If the BP statistics are accurate, the decline will inevitably continue, with more business closures and job losses. Other companies will voluntarily withdraw from the North Sea.

27. The best responses in my opinion are:
   - increased involvement in overseas oil and gas markets
   - diversification into marine energy.

**How can Scotland maximise its expertise, technology and infrastructure in oil and gas industry to secure the industry’s future as reserves decline? What support is needed from Government to maximise these opportunities?**

28. As mentioned above, I believe it is very important to distinguish between the domestic North Sea market and overseas markets. The latter are now much larger and will inevitably become increasingly important. I also believe that much more can be done to encourage Scottish firms to diversify into other energy markets, notably marine energy.

29. I believe therefore that it is essential for the Scottish Affairs Committee to distinguish clearly between these three markets:
   - domestic North Sea oil and gas
   - overseas oil and gas
   - other energy markets, notably offshore wind and marine energy.

**North Sea oil and gas market**

30. I believe that most people accept that the domestic market is in long term decline. However, there are opportunities to slow down that decline, particularly from
   - further exploration and hopefully new discoveries
   - increasing recovery rates.

31. The main financial/economic factors are:
   - oil and gas prices
   - costs
- taxation/fiscal regime.

32. There is little or nothing that the UK and Scottish Governments can do to influence oil prices, so they and the industry have to accept them. The prices are set in US dollars $. There are two main marker crudes – Brent (North Sea) and West Texas Intermediate (WTI; USA). The latter is now the most important, despite the fact that the Brent oil field in the North Sea has actually ceased production.

33. Prices for oil from individual fields are normally determined by a relationship to Brent crude or WTI, taking into account factors such as the quality of the oil. At the time of writing (7 June) Brent was trading at $76.90 a barrel and WTI at $65.85.

34. However, these prices have fluctuated enormously in recent years, as is well known. Brent reached a peak of about $140 in 2008 and a low of $25 in 2016. It is very difficult for individual companies and the industry as a whole to cope with such fluctuations, which do not occur in other industries.

35. The Committee should also be aware of the implications of exchange rates, given that world oil prices are set in US dollars $. The £ sterling has fallen substantially since the UK Brexit vote to leave the European Union (EU). At the time of writing the £ was trading at $1.34, implying a Brent price of about £57.40 a barrel. However, recently it was trading at about $1.75, implying a price of about £44.

36. The £/$ exchange rate is therefore very important for the companies producing oil from UKCS fields. That exchange rate can obviously be influenced by UK Government policies, as shown by Brexit. The Scottish Government has no role at the present time, although that would obviously change under Independence.

37. Gas prices for the North Sea fields are determined by significantly different factors from oil prices. I can provide more information on the implications of gas prices if the Committee would like that.

38. Another key factor is obviously the taxation regime, which is determined by the UK Government and not the Scottish Government. UK Governments have set much higher tax rates on the oil and gas industry than the general level of corporation tax.

39. These taxes have generated enormous revenues for the UK Government in the past. That has been a subject of great debate with the Scottish National Party (SNP) but I assume that is not relevant to the Committee’s current inquiry.

40. The UK Government has reduced taxes on the oil industry recently following the collapse in world oil prices. That seems to have been very well received by the industry, as stated in various OGUK reports.
41. In May the Oil and Gas Authority (OGA) offered for award 123 licences over 229 blocks or part-blocks to 61 companies in the 30th Offshore Licensing Round.

42. The OGA website states that “These successful awards act as a strong platform for future exploration and production across the UK Continental Shelf (UKCS) and can help transform exploration activity levels....The OGA expects this round to lead very quickly to activity, providing a welcome boost to exploration. The new work programme commitments include eight firm exploration/appraisal wells, nine firm new-shoot 3D seismic surveys and 14 licences progressing straight to field development planning (second term licences).”

43. Further, “the round may help to unlock around a dozen undeveloped discoveries containing a central estimate of 320 million barrels of oil equivalent (boe) of resource in undeveloped oil and gas discoveries which were previously stranded but can now be progressed through further appraisal to field development. It is estimated the UKCS currently has around 1.5 billion boe of resource in potentially commercial undeveloped discoveries, many of which were previously considered to be too small or technically challenging. The 30th round alone effectively provides line of sight to the progression of 20% of these untapped reserves.”

44. Dr Andy Samuel, Chief Executive at the OGA, said: “The UKCS is back. Big questions facing the basin have been answered in this round. Exploration is very much alive with lots of prospects generated and new wells to be drilled. The results show a great diversity of active players from super-majors to new entrants, and the hard work promoting undeveloped discoveries is starting to pay off. I’m looking to industry to rapidly press ahead with these activities and maximise recovery from these great opportunities.”

45. “Together we are building on the good momentum and collective efforts of industry, OGA and government over the last three years, with four projects already sanctioned this year and a healthy pipeline of 50 projects under consideration.”

46. Dr Samuel may be exaggerating, of course, but the response to the 30th Offshore Licensing Round is certainly very encouraging.

47. Further changes in the tax regime could be made but personally I believe that is unlikely, given the fluctuations in world oil prices. I do not think that the Scottish Affairs Committee should give much attention to the tax regime and how that could be changed again.

48. However, an important issue for the Committee, in my opinion, is the decommissioning market, including the tax implications. I can expand on this if the Committee would find that helpful.

49. Decommissioning is basically the cessation of production and the removal of the production facilities, such as production platforms, pipelines and wellheads. The basic requirement is to remove all these facilities, in line with environmental regulations, although concessions can be made.

50. Decommissioning is an increasingly important part of the UKCS market and is predicted to account for about 30% of annual UKCS expenditure in 2025. However, most of the recent decommissioning work on fields in Scottish waters has gone overseas and to a lesser extent
to England. The Scottish share has only been about 20% and that is mainly accounted for by work done by oil company head office staff in Aberdeen.

51. I have done various studies recently for Shell on the economic and financial implications of the Brent Decommissioning Programme (BDP), which is estimated to cost at least £4.5 billion. It is therefore a very important market, as are other decommissioning programmes.

52. Shell recently awarded contracts for the decommissioning of the Brent Delta (D) platform. The removal contract went to Allseas of the Netherlands, who transported the platform topsides to the ABLE yard at Hartlepool on the River Tees in North East England.

53. No Scottish or Scottish-based company bid for the removal contract. There were Scottish bids for the onshore decom work but all were very uncompetitive.

54. Other important Scottish decom contracts have been won by Norwegian companies, despite their higher labour costs and small domestic market for the recycled equipment.

55. The Scottish Enterprise website has a section on the decommissioning market but it is embarrassingly poor and inaccurate. They do not seem to regard this as an important business opportunity for Scotland.....but it is!

56. Further, the Scottish Government recently invited tenders for a feasibility study of a deep water decom port, which could accommodate vessels like the Pioneering Spirit, which won the contract to remove the Brent Delta topsides. However, they rejected the best tender and awarded the contract to another company for “political” reasons. That seems typical of the Scottish Government and Scottish Enterprise now.

Overseas oil and gas markets

57. The UKCS now accounts for only a small proportion of the world oil and gas market. That share has declined in recent years and most people expect it to continue to decline, as set out above.

58. It seems obvious therefore that a sensible strategy would be to diversify into other oil and gas markets overseas. Many Scottish companies have successfully done that.

59. Also, many of the “supply chain” companies in Scotland are foreign-owned and some are part of international conglomerates, often based in the USA. That has made it easier for them to get involved in overseas contracts.

60. The main overseas opportunities were originally in deep water areas with similar conditions to the North Sea. However, that does not now appear to be so important.

61. Exports of Scottish expertise were badly affected by the collapse in world oil prices but there has been a modest revival recently. Development and production costs in most overseas
markets are significantly lower than in the North Sea, so they are less influenced by fluctuations in world oil prices.

62. Costs are another important factor. I have written many reports on the financial need to reduce these in the North Sea, which is inevitably a high cost area, particularly in the West of Shetland area. There has been some recent progress on this but overall it has been disappointing. However, it is largely up to the industry itself, particularly individual companies, and I believe that public bodies in Scotland and the UK can only play a limited role.

**Marine energy and other energy markets**

63. I believe that much more needs to be done to encourage and assist the Scottish supply chain to diversify into other energy markets, notably marine energy. I can expand on this issue if the Committee is interested but the following is just a brief summary of my views.

64. Alex Salmond, the former First Minister, once described Scotland as the “Saudi Arabia of marine energy”, although he probably regrets saying that now. In theory, Scotland could be a major international force in this industry, given the waters surrounding the country and our North Sea oil/gas history and expertise. In actuality, our performance to date has been very disappointing….to be polite.

65. The Scottish Government, mainly through HIE and SE, have invested hundreds of millions of pounds in marine energy companies and R&D. Much of that has been badly spent. Various companies, such as Aquamarine and Pelamis, have “gone bust”, with the loss of substantial public funds. R&D bodies such as Wave Energy Scotland have a very poor reputation, not only here in Scotland but also overseas.

66. I believe that it is very important for the Scottish Affairs Committee to consider the Scottish oil and gas industry in the context of wider energy policies, notably those intended to reduce carbon emissions and increase renewable energy. Both the Scottish and UK Governments are committed to various internationally agreed targets for these.

67. Oil consumption is the main source of carbon emissions (CO2) in the world. There is therefore some conflict between having policies to reduce those in Scotland at the same time as trying to increase or maximise oil production from Scottish fields.

68. There has been encouraging progress with renewable energy production in Scotland, notably from onshore wind farms. Progress offshore has been disappointing, however, although there are now some offshore wind farms in operation, others under development and more planned.

69. The biggest disappointments have been with marine energy, which is often subdivided into wave and tidal energy.
70. I have recently completed two detailed studies of marine energy developments in Scotland, so I believe I have a good understanding of what is going on in the industry. It should be an obvious diversification opportunity for the oil supply chain and a few companies have done that. An example is Global Energy who are building components for the Beatrice offshore wind farm at their Nigg fabrication yard on the Cromarty Firth.

71. However, progress with wave and tidal energy in Scotland has been very disappointing to date.

Scottish Enterprise

72. Business support is the responsibility of the Scottish Government rather than that of the UK. The two main development agencies are Scottish Enterprise (SE) and Highlands and Islands Enterprise (HIE). However, the Scottish Government has recently set up a plethora of new development bodies such as the Scottish Futures Trust and various City Region Deals.

73. The local councils also have development responsibilities, although they have limited finances for them. The geography of the Scottish oil and gas industry shows that most of it is and has been concentrated in a few areas. Aberdeen City Council, Aberdeenshire Council and Shetland Islands Council in particular have played very important and useful roles in supporting the oil and gas industry.

74. I – and many other people - have been very disappointed by the recent work of Scottish Enterprise (SE) and Highlands and Islands Enterprise (HIE) for the North Sea oil and gas industry. Scottish Enterprise (previously the Scottish Development Agency, SDA) in particular used to have a good reputation in the industry but its contribution since the collapse in world oil prices has been very poor….to be polite.

75. I do not know all the reasons for that but I hope that the Scottish Affairs Committee will investigate them and recommend radical changes and improvements at Scottish Enterprise, which has let the Scottish oil and gas industry down badly in recent years.

76. I do not know the reasons for that in detail but some seem clear. For example, Scottish Enterprise has become very centralised in Glasgow in recent years. Their office in Aberdeen, which had some excellent staff with a good knowledge of the oil and gas industry, was downgraded. I believe that because the industry’s problems were mainly located in the North East of the country, senior SE staff in Glasgow gave insufficient attention to them.

77. The Scottish Government set up an Energy Jobs Taskforce, which was wound up recently. It did a poor job.

78. However, the SE website states that “the Taskforce has delivered an exceptional range of support for the industry and individuals working in the sector. This has included targeted help to 800 companies and assistance 4,200 people facing redundancy.” I believe that the Scottish Affairs Committee will find few people who agree with these conclusions.
To quote further, “the Taskforce has now fulfilled its mandate from industry members, which was to ensure a long-term vision, focused on securing sustainable change that addresses the sector’s structural challenges. The work of the taskforce will now be taken forward by the Oil and Gas Industry Leadership Group, co-chaired by Energy Minister Paul Wheelhouse. Under the guidance of the taskforce, oil and gas innovation spend almost trebled last year, with £15.9 million of Scottish Enterprise support for 82 companies to deliver 111 projects. In total, 800 companies have been advised in areas such as innovation, leadership, internationalisation, business resilience and diversification.”

This is a very misleading summary of the work of the Taskforce, which most people, including me, have found to be very disappointing.

Another example is market research on industry opportunities elsewhere in the world. The SDA/SE used to have an excellent reputation for producing market research reports, which many companies, particularly small ones, found very useful. That is not the case today.

The current Scottish Enterprise website has a series of reports including one entitled Business Opportunities in Global Oil and Gas. Unfortunately, it is very superficial, sometimes misleading and of little use to businesses. There is also a series of regional and country reviews but the general standard and relevance of those is also poor. I find it very difficult to understand why SE have allowed the usefulness of these reports to deteriorate so noticeably in recent years.

I know that the Scottish Affairs Committee will take evidence next week from Sir Ian Wood, who is chairman of Opportunity North East (ONE). This is a very important and interesting local initiative. I believe that one of the reasons ONE was set up was the disappointing response of SE and the Scottish Government generally to the recession in the oil and gas industry in the Aberdeen City and Aberdeenshire areas.

ONE is a private sector initiative funded by the Wood Foundation. Their website states that it “was launched in December 2015, following extensive consultation with the region’s business community and discussion with the public sector. It is the private sector’s response to the challenge of maximizing the oil and gas opportunity for the region long term and rebalancing the region’s economy to achieve sustainable prosperity.”

ONE has five sector bodies, including one for Oil, Gas and Energy. One of its main initiatives to date has been the establishment of the Oil and Gas Technology Centre (OGTC) in Aberdeen in 2016.

The North Sea oil and gas industry has been a very important part of the Highlands and Islands economy for many years. Many of the oil and gas fields are located in the waters around the region, notably around the Shetland Islands. Production from those fields has
been transported to various onshore terminals in the region, notably: Sullom Voe in Shetland; Flotta in Orkney; and Nigg on the Cromarty Firth.

87. However, most oil-related employment in the region was in a series of fabrication yards set up to build production platforms and modules for the North Sea fields. At peak these fabrication yards employed about 10,000 people in the region, which was a massive number. The main fabrication yards were at: Nigg, on the Cromarty Firth in Easter Ross; Ardersier, on the Moray Firth near Inverness; Kishorn in Wester Ross, on the West Coast; plus smaller yards at Arnish, near Stornoway in the Western Isles and Portavadie in Argyll.

88. Other oil-related facilities in the region include supply bases, pipeline fabrication and decommissioning.

89. The recent contribution of Highlands and Islands Enterprise (HIE) to the Scottish oil and gas industry has probably been worse than that of Scottish Enterprise. For example, HIE recently commissioned and published a report on the future of the Sullom Voe oil and gas terminal. A senior BP executive told me that the best use of the report was as toilet paper.... although those were not the actual words he used!

90. The Sullom Voe report is very poor but unfortunately typical of HIE’s recent involvement with the oil and gas industry. The agency’s directors and senior staff seem to have little interest in the oil and gas industry, and the staff who are involved with it do not seem to have the required expertise to do an effective job.

91. A particular disappointment with HIE is their poor work on diversification into marine energy, as mentioned elsewhere in this submission.

How can the economic return from Scotland’s oil and gas reserves be maximised?

92. I am unsure what the Committee means by “economic return” but give some comments below. The main economic indicator is gross domestic product (GDP), which is sometimes referred to as gross valued added (GVA). Other measures of economic return could include government revenue, business profitability and employment. It is possible that some actions or policies will increase all of these returns but that is not necessarily the case.

93. A simple answer to the question is to maximize production from the remaining oil and gas reserves in Scottish waters and elsewhere on the UKCS. That is the objective of the OGA’s Maximising Economic Recovery (MER) initiative. It is too early to comment on the effectiveness of that initiative but it seems to me to be exactly what the Committee wants to see happening.

94. The oil price is obviously very important but there is little or nothing that we in Scotland can do to influence that. Gas prices can be influenced, however.

95. Another important factor is the share of the expenditure won by the Scottish supply chain, which affects turnover, profitability and employment in Scotland, so the Committee may be interested in that. That share has fallen substantially in recent years.
96. For example, my company recently undertook a study of the UKCS decommissioning market. We estimated that the current UK share of that market was only about 25% and the Scottish share just under 15%. Over 75% of the recent decom market has gone overseas.

97. The UK used to have a body called the Offshore Supplies Office (OSO), one of whose responsibilities was to try to maximise the share of the work going to UK businesses. Their target was a 70% share and they were generally very successful in achieving that.

98. I had various disagreements with the OSO but overall they did a good job. However, they were wound up in 1999.

99. The Scottish Government, primarily through Scottish Enterprise, could and – in my opinion – should have pursued similar policies to the OSO but has not done so. Consequently, Scottish industry’s share of the Scottish/UKCS oil and gas market has declined steadily.

100. If that share could be increased again, then some of the economic returns could also be increased. However, that would require radical changes to Scottish Government and Scottish Enterprise policies and staff.

What action is the UK Government taking to support the long-term future of the oil and gas industry in Scotland, and how effective has this been?

101. The main UK Government body is now the Oil and Gas Authority (OGA).

102. Their website states that “The Oil and Gas Authority’s role is to regulate, influence and promote the UK oil and gas industry in order to maximise the economic recovery of the UK’s oil and gas resources. We seek to be a progressive and highly effective authority, doing all we can to attract investment and with that jobs, helping to anchor valuable skills and expertise in this country”.

103. “Created as one of the key recommendations of Sir Ian Wood’s 2014 Review of the UKCS, the OGA became an Executive Agency on 1 April 2015, which created operational independence from DECC (now the Department for Business, Energy and Industrial Strategy) to the fullest extent possible within the established boundaries, and gave us direct accountability for exploration and development decisions and approvals. On 1 October 2016 we became a government company, limited by shares under the Companies Act 2006, with the Secretary of State for Business, Energy and Industrial Strategy the sole shareholder. The OGA is largely funded by an industry levy introduced on 1 October 2015. We are headquartered in Aberdeen with another office in London”.

104. The Oil and Gas Authority (OGA) is a relatively new body but seems to have established a good reputation in the industry. The latest licensing round attracted an excellent response, as mentioned earlier, which is very encouraging.

105. The UK Government also recently made changes to the taxation regime, which have been welcomed by OUK.
How well do the different stakeholders (UK Government, Scottish Government, companies) work together? Does the current devolution settlement enable all stakeholders to support the sector?

106. The stakeholders will presumably give their answers to this question so I can only give a few brief comments as an “outsider”.

107. I believe that there is a very good relationship between the Oil and Gas Authority (OGA) and Oil and Gas UK (OGUK), which is the main representative body of the UK industry. Both have their headquarters in Aberdeen and seem to work closely together.

108. In contrast, I do not believe there are similarly good relationships between the Scottish Government and its bodies such as Scottish Enterprise and their UK counterparts. The OGA and OGUK may give different answers, in order to be polite, but in reality I believe that my views are objective and reasonable.

109. The licensing and taxation systems are currently the responsibility of the UK Government. I do not know what discussions there have been on these key issues between the Scottish and UK governments but my perception is that Scottish involvement and influence have been on a small scale.

110. I do not believe that the “current devolution settlement” is a significant issue.

How can Scotland maximise its expertise, technology and infrastructure in oil and gas industry to secure the industry’s future as reserves decline? What support is needed from Government to maximise these opportunities?

111. This is another “wide-ranging” question which is difficult to answer.

112. As stressed above, I believe that we have to accept that the North Sea oil industry is in a long term decline, which cannot be reversed but may be slowed down. I have also stressed that important opportunities for the industry in Scotland are (a) overseas and (b) diversification into marine energy.

113. With regard to expertise and technology, many Scottish or Scottish-based companies already export this to other countries. For some the UKCS market is already only a small proportion of their annual turnover.

114. The best known examples are large companies such as the Wood Group. However, there are many smaller businesses now doing most of their work overseas.

115. There are various research facilities and organisations in the Aberdeen area and a few elsewhere in Scotland. As an economist, I can only comment briefly on their contributions and beneficial impacts.

116. These bodies include the Oil and Gas Technology Centre (OGTC), which was set up in 2016 by ONE, which is financed by the Wood Foundation.
117. There seem to be plenty of relevant research bodies and adequate funding from both the Scottish and UK Governments but I cannot usefully comment in detail on their work and future roles. However, I must say that from an economic perspective I have been disappointed with some of the work of some of these bodies, such as ORE Catapult, Elevator and Wave Energy Scotland.

118. Because of that I believe that a review of the effectiveness of these R&D bodies would be beneficial. Some reorganisation seems to be required.

Summary of conclusions

119. I believe that there are three key issues for the Committee to consider in its inquiry:
(1) the responses to the long term decline in the North Sea oil and gas industry
(2) diversification into overseas oil and gas markets
(3) diversification into alternative energy markets, notably marine energy.

120. Re (1), I believe that the relevant bodies, notably the Oil and Gas Authority (OGA), are doing a good job and that there is no need for any significant changes. However, the recent responses of Scottish bodies to the recession/downturn in the industry have been very poor, particularly those of Scottish Enterprise (SE) and Highlands and Islands Enterprise (HIE).

121. In contrast, the Opportunity North East (ONE) initiative seems to be an excellent example of what is required. This is a private sector initiative funded by the Wood Foundation. Its approach needs to be replicated elsewhere in Scotland.

122. Re (2), many Scottish-based companies have successfully diversified into overseas oil and gas markets, which will become increasingly important in the future because of the decline in the North Sea. However, the support from Scottish Enterprise has been very disappointing and could be improved substantially.

123. Re (3), this diversification has also been very disappointing to date. I believe that there need to be radical improvements in the policies of and support from the Scottish Government bodies involved.

Tony Mackay

Professor of Energy Economics

Inverness, 7 June 2018

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