Contested perspectives on fracking in the UK

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Introduction

The recent identification of potentially large shale gas resources within the UK has generated a mixed response. On the one hand there are claims that the commercial development of these resources could play an important role in the UK's future energy mix, reduce dependency on foreign sources of energy and stimulate investment in new jobs and businesses. On the other hand many community groups have been campaigning to oppose future shale gas development by hydraulic fracturing (popularly known as fracking) because of a range of environmental concerns. With this in mind this article provides a brief description of the characteristics of shale gas and fracking, outlines the geography of potential resources within the UK, and reviews the contested benefits and risks associated with the possible exploitation of these resources.

Shale Gas and Fracking

Shale gas is natural gas, mainly composed of methane, found in organic rich shale beds often between 1,000 and 4,000 metres below the ground. Shale gas is released by fracturing the shale which involves drilling a borehole down into the earth and then pumping a mixture of water, sand and chemicals at high pressure into the shale, which creates a path for the gas to flow into the borehole and thence to the surface. Horizontal drilling from boreholes is also commonly used in shale gas exploration and development and it allows both drilling and fracking in several directions from a single borehole and permits drilling to less accessible locations.

The principle of fracking is not new. Explosive charges containing nitro-glycerine were first dropped down wells in the US in the 1880's to shatter hard rock to release gas or oil but hydraulic fracturing was first employed in Kansas in the 1940's. The fracking of shale gas dates from the 1970's but it was early in the 21st century before the technique was employed on a large scale commercial basis. Since then developments in drilling and exploitation technology have seen dramatic growth in the fracking of shale gas within the US. By 2012 shale gas was estimated to account for some 40% of total US natural gas production (US Energy Information Administration 2013a) and shale gas resources are now being exploited in West Virginia, Pennsylvania and New York State in the east across to Colorado and New Mexico and from Michigan in the north and as far south as Texas.

Globally the US Energy Information Administration (2013b) has estimated that the total technically recoverable shale gas reserves are some 2,066 trillion cubic metres with China, Argentina, Algeria, the US and Canada accounting for some 53% of this total. While the term technically recoverable reserves is used to describe the volume of shale gas that could be produced with current technology, three factors, namely the cost of drilling and establishing wells, the volume of gas produced from a well during its lifetime and the price received for the gas, affect the economics of recovery. China has the largest shale gas

resources in the world but many of these are located deep below the surface in mountainous rocky desert areas. The installation of production equipment and the construction of pipeline connections to the existing gas network seem likely to impede the commercial exploitation of these resources. Within Western Europe shale gas reserves have been identified in the Netherlands, France, Germany, Sweden and Norway, as well as in the UK, but KPMG (2011, p. 12) suggested that as reserves in a number of these countries *'tend to be close to populated areas and as European environmental laws tend to be quite strict, the potential for significant shale gas there in the near future seems unlikely.'*

Potential Shale Gas Resources in UK

Within the UK there are several areas where shale beds have the potential to produce shale gas (See Figure 1) including sizeable areas of north-west, central and eastern England, smaller parts of south and north east England, central Scotland and Northern Ireland. However detailed exploration of these resources is at an early stage and there are no national estimates of how much shale gas will be technically and economically recoverable. In June 2013 the British Geological Survey estimated that there was between 23.3 and 64.4 trillion cubic metres of shale gas in and around the Bowland Basin, in the North of England, and noted that these estimates were larger than the total ultimate recovery of gas from the UK's offshore fields, but stressed that further exploratory drilling and testing was needed to identify whether these reserves could be exploited commercially (British Geological Survey/Department of Energy and Climate Change 2013 , p. 46).

At the end of 2013 some 176 licenses had been issued for oil and gas exploration in the UK. A number of small energy companies, including Cuadrilla, Rathlin and Viking have drilled exploratory wells principally in West Lancashire and East Yorkshire and some larger companies namely Centrica and Total have bought a stake in some of these smaller companies. The Department of Energy and Climate Change will conduct a new round of licensing in 2014 covering large areas of northern, midland, eastern and southern England and an 80 kilometre wide diagonal belt running across central Scotland. Licenses in themselves do not give consent for exploratory drilling and companies wishing to do so must also obtain planning permission and the landowner's consent.

Potential Economic Benefits and Environmental Risks

Although KPMG (2103, p.2) have suggested that *'the UK is many years away from any kind of commercial shale industry'* the prospect of such future development is generating sharply contested claims about potential economic benefits and environmental impacts. On the one hand the Government and the business community have emphasized the opportunities for investment, job creation and tax revenues and the role that shale gas could play in reducing the UK's dependency on imported sources of energy. The Institute of Directors (2013), for example, has optimistically predicted that shale gas production could attract almost £4 billion per annum in investment, support over 70,000 jobs, often in regions currently with high unemployment, and almost halve dependency on imported gas by 2030, though other estimates of benefits are more conservative. The Coalition Government has introduced a package of benefits, including financial support, for

communities located close to exploratory wells and local councils in such areas will be able to keep 100%, as opposed to the existing 50%, of business rates from shale gas developments.

On the other hand there are concerns that the both exploration and development drilling for shale gas could generate a range of environmental impacts. At the local level these include noise and visual intrusion; pollution and associated health hazards; methane emissions from boreholes; substantially increased water demands; the need for wastewater treatment; damage to valued landscapes and ecologies; the risk of subsidence and more seriously of seismic activity. While the pressure group Gasfield Free Mendips (2013, webpage), for example argue that fracking *'threatens the safety, health, landscape and water quality for the people and livestock'*, a review by The Royal Society and Royal Academy of Engineering (2012, p.4) concluded that the environmental risks associated with fracking *'could be managed effectively in the UK as long as operational best practices are implemented.'*

More widely concerns have been expressed about climate change and the pressure group Friends of the Earth (2013, webpage) have suggested that *'exploiting shale gas poses major risks for climate change by perpetuating our dependency on fossil fuels rather than moving to low carbon alternatives.'* However a study for the Department of Energy and Climate Change (McKay and Stone 2013, p.37) concluded that *'with the right safeguards in place the net effect on UK greenhouse gas emissions from shale gas production in the UK will be relatively small'* and a review by AMEC (2013,p. 122) for the Department of Energy and Climate Change concluded that looking to the future *'domestic shale gas production and consumption could help reduce net greenhouse gas emissions associated with reduced imports of liquefied natural gas.'* At the same time the Government has looked to frame shale gas as the *'cleanest fossil fuel'* (Department of Energy and Climate Change 2013a, p.10) which would help, as part of a diverse energy mix, to act as a bridge in the transition to a low carbon future.

Conclusion

The development of shale gas resources is at the exploratory stage in the UK. However if development pressures increase, particularly in view of the new round of licensing, then many local planning authorities may receive growing numbers of applications for shale gas exploration, and eventually, for development. In determining these applications planning authorities will have to tread a difficult path in attempting to reconcile competing local and national interests. On the one hand they will have to assess the environmental impact of future development and look to ensure that such development does not have an adverse impact on the natural environment or on human health. On the other hand the UK's National Planning Policy Framework, introduced in 2012, emphasises that *'the purpose of planning is to help achieve sustainable development'* which is *'about positive growth - making economic, environmental and social progress for this and future generations'* (Department for Communities and Local Government 2012,p. i).

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