The contested future of fracking for shale gas in the UK:

Risk, reputation and regulation

Abstract

Large shale gas reserves have recently been identified under many parts of the UK and the development pressure for detailed exploration, and possibly the commercial exploitation of these reserves by hydraulic fracturing, popularly described as fracking, is growing rapidly. Although exploration for shale gas is still at an early stage in the UK, the possible future development of shale gas by fracking has generated a wide range of environmental concerns. Two linked factors, namely the presence of a robust regulatory regime and the need for the gas industry to control reputation risk, seem to be important in addressing these concerns and arguably in facilitating the future development of shale gas resources within the UK. With this in mind this paper describes the characteristics of shale gas and the process of fracking, outlines some details on current estimates of the distribution and volume of shale gas and of its commercial recovery within the UK, provides a short commentary on the environmental risks associated with exploration and development and rehearses some of the arguments on the role of the regulatory planning framework and on campaigns to win public opinion and to manage reputation.

Keywords Shale Gas Resources; Hydraulic Fracturing (Fracking); Reputation: Planning Framework.

Introduction

The UK Government is committed to '*increasing the deployment of renewable energy'* (Department of Energy and Climate Change 2011, p.5), which will help to *'make sure the UK has a secure supply of energy, reduce greenhouse gas emissions to slow down climate change'* and *'stimulate investment in new jobs and businesses'* (Gov. UK 2013a, webpage). At the same time there is growing interest and excitement in Government circles and amongst energy companies about the identification of potentially large scale shale gas reserves within the UK and the Government *'believes that shale gas has the potential to provide the UK with greater energy security, growth and jobs'* (Gov. UK 2014a , webpage). Despite this interest exploration for shale gas is still at an early stage in the UK and there are currently no definitive or meaningful estimates of the likely shale gas reserves in the UK or of what proportion, if any of the potential reserves will ever be practically and commercially recoverable. However the possible future commercial development of the shale gas reserves, by hydraulic fracturing popularly referred to as fracking, has generated concerns about a wide range of environmental risks.

Two linked factors seem to be important in addressing these concerns and arguably in facilitating the future development of shale gas resources within the UK. On the one hand the Government has emphasized its commitment to a regulatory regime designed to

protect the environment and ensure public safety. On the other hand there is a commercial consensus that *'the industry needs to control reputation risk'* and that *'negative public opinion about environmental safety of the hydraulic fracturing process could undermine the development of this industry'* KPMG (2011, p.19). With this in mind this paper describes the characteristics of shale gas and the process of fracking, outlines some details on current estimates of the distribution and volume of shale gas and of its commercial recovery within the UK, provides a short commentary on the environmental risks associated with exploration and development and rehearses some of the arguments on the role of the regulatory planning framework and on campaigns to win public opinion and to manage reputation. The paper does not set out to provide a comprehensive or definitive examination and review of what is a complex and dynamic situation rather to give a flavour of the nature of the issues surrounding the possible development of what may be an important new element in the UK's energy mix. As such the paper provides some simple empirical illustrations of what Jiusto (2009, p.534) described as *'contesting the next energy revolution'* and of *'contemporary energy dilemmas–such as determining whether, how and for whom particular landscapes should be valued for their energy generating potential, or deciding on the geographical scale at which trade-offs between energy security and environmental impact should be made'* (Bridges 2012, p.7).

Shale Gas and Fracking

Shale gas is natural gas, mainly composed of methane, found in organic rich shale beds often located between 1,000 and 4,000 metres below the ground. Traditionally within the UK shale has not been seen as a reservoir rock rather as a source rock in which gas, and oil, are stored before migrating into sandstone or limestone where it has been commercially exploited in the conventional manner. Indeed gas and oil produced from shale are often technically referred to as 'unconventional hydrocarbons.' 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 in permitting drilling to less accessible locations. Essentially the development of shale gas reserves includes three distinct stages namely exploration; production; and decommissioning. During the first stage two or three wells are normally drilled and fractured, using a 25 metre high structure known as a 'well over rig', and flow tested, to determine the incidence of shale gas reserves and this process normally takes up to two weeks. Production involves the commercial development of these reserves which may, depending on the size of the reserve, continue for up to 20 years. When the shale gas reserve reaches the end of its lifespan decommissioning involves filling the well with cement, to prevent further gas flowing into watercourses or up to the surface, and capping and landscaping the well head.

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. Hydraulic fracturing dates from the late 1940's, initially on an experimental basis on a gas field in Kansas in the US and then on a commercial basis in Oklahoma and Texas. The fracking of shale gas first took place on a demonstration basis in the 1970's but it was early

in the 21st century before the technique began to be 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 to have transformed the energy landscape within the US. 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. In summarizing trends within the US KPMG (2013, p/2) suggested that the commercial development of shale gas reserves will continue *'for the foreseeable future.'* At the same time KPMG (2013, p.8) reports that *'inconsistent environmental regulations'* have *'led investors to shun certain states (such as New York) in favour of those which are more supportive of development (such as Texas, North Dakota, Pennsylvania and West Virginia.'*

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 Reserves in the UK

While a number the UK Government, a number of energy companies and some sections of the British business community have been very sanguine about the prospects of widespread commercial development of shale gas and of the commercial benefits that may accompany such development. In January 2014 David Cameron, the UK Prime Minister, for example, claimed that *'we're going all out for shale. It will mean more jobs and opportunities for people, and economic security for our country'* (Gov. UK 2014b, webpage)and Edward Davey, Secretary of State for Energy and Climate Change has argued that shale gas is *'a national opportunity'* and more specifically *'an opportunity for investment, jobs and tax revenues'* (Gov. UK 2013b, webpage). In a similar vein The Institute of Directors (2013, p.2) suggested that *'shale gas could represent a multi-billion pound investment, create tens of thousands of jobs, reduce imports, generate significant tax revenues and support British manufacturing.'*

Within the UK there are several areas where Carboniferous and Jurassic shale beds have the potential to produce shale gas 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. The geological conditions are complex in that many of the shale basins are not large continuous structures, such as those found in many North American shale regions, but more typically comprising small fault-bounded sub-basins (Advanced Resources International 2013). At the same time the exploratory process is costly with some estimates suggesting that the average cost of drilling an exploratory well in the UK is some £6 million compared to £2.4 million in the US (Ratcliffe 2014).

In June 2013 the British Geological Survey published a study which included *'a preliminary in-place gas resource calculation to be undertaken for the Bowland-Hodder (Carboniferous) shale gas play across a large area of central Britain'* (British Geological Survey/Department of Energy and Climate Change 2013, p,1). This calculation estimated that there was between 23.3 and 64.4 trillion cubic metres of shale gas within the study area but the British Geological Survey stressed that *'not enough is yet known to estimate a recovery factor'* nor to estimate *'how much gas may be ultimately produced'* (British Geological Survey/Department of Energy and Climate Change 2013, p,3) and suggested that further exploratory drilling and testing was required to identify whether these reserves could be exploited commercially.

Shale gas within the UK is owned by the state and a Petroleum and Exploration and Development Licence (PEDL) under the Petroleum Act of 1988, is required for the exploratory and production stages of shale gas development. Up to the end of 2013 the Government had issued some 176 licenses for onshore oil and gas exploration in the UK (Department for Energy and Climate Change 2013). 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 and meet the appropriate health and safety regulations. A number of small energy companies, including Cuadrilla, Rathlin and Viking have drilled exploratory wells principally in West Lancashire and East Yorkshire. Cuadrilla, for example, began exploratory drilling in 2010 at Preese Hall in Lancashire but following some seismic activity associated with the hydraulic fracturing, the company suspended exploration activity and plugged the well. In response the Government announced a moratorium on fracking in July 2011 but following further investigations and consultations permission was given to resume exploratory drilling in December 2012. More recently Cuadrilla recommenced exploratory drilling, and obtained planning permission for such drilling, elsewhere in Lancashire and Dart Energy, have acquired planning permission for exploratory fracking in Dumfries and Galloway and submitted planning applications for exploration in the Falkirk and Stirling area of central Scotland and some larger companies namely Centrica and Total have bought a financial stake in some of the smaller energy companies.

The Department of Energy and Climate Change are to 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.(In Northern Ireland such licenses are granted through a separate open door system.) Estimates taken from the a study undertaken for the DECC (AMEC 2013) in connection with the forthcoming licensing round, suggest that between 50 and 150 licenses may be awarded for onshore oil and gas

exploration and this could, in turn, suggest that between 30 and 120 well-pads will be constructed, each having between 6 and 24 boreholes and with each well-pad occupying up to 3 hectares of land. Looking to the future there are many difficulties and uncertainties in trying to predict the total well-pads under potential commercial production but trade estimates suggested that the shale gas reserves in part of the Bowland-Hodder basin mentioned earlier could require the construction of up to 33,000 wells and some 5,500 well-pads.

Environmental Risks

The momentum behind shale gas development within the UK has been accompanied by growing and increasingly vocal concerns about the environmental impact of fracking. A wide range of environmental risks have emerged, mirroring those initially identified within the US. The British Geological Survey (2014, webpage), for example, list a number of *'potential environmental considerations associated with shale gas'* namely

- *'carbon dioxide and methane emissions, particularly the potential for increased fugitive methane emissions during drilling compared with drilling for conventional gas*
- *The volumes of water and chemicals used in fracking and their subsequent disposal*
- *The possible risk of contaminating groundwater*
- *Competing land use requirements in densely populated areas*
- *The physical effects of fracking in the form of increased seismic activity.'*

Other potential environmental risks include noise; visual intrusion; high volumes of heavy commercial traffic; damage to valued and heritage landscapes; the fragmentation and loss of habitats and damage to species; reductions in bio-diversity; subsidence; and climate change. All these environmental risks are manifest at often different, though partially interlinked, scales. Thus concerns about carbon emissions and climate change might be seen to be global though they have implications for the UK Government's committed targets on reductions in greenhouse gas emissions. There are also wider environmental concerns about disruption to communities and to their traditional ways of living and working and to impacts on property prices and land values.

The potential environmental risks are manifest at a variety of, often partly interlinked, spatial and temporal scales. Concerns about carbon emissions and climate change might, for example, be seen to be global though they have implications for the UK Government's national targets on the reduction of greenhouse gas emissions. Although fugitive methane is relatively short lived in that it decays more rapidly in the atmosphere than carbon dioxide it has a greater warming impact over its lifetime. Fracking of shale gas requires up to 30,000 cubic metres of water per well and meeting these demands in areas where other users are already finding it difficult to meet their water needs and that are vulnerable to water shortages, fracking may generate increasing stress on resources across wide geographical areas. While these large volumes of water, mixed with a smaller volume of chemicals, are pumped into boreholes at discrete locations, once deep underground it is

often difficult to predict their migration and concerns may arise about the contamination of drinking water over a wide area. Groundwater can be contaminated by fugitive methane and by the chemicals used in the fracking process. While proposed fracking operations may affect house prices, on potential purchaser's perceptions, on the availability of mortgages and on property insurance in the immediate vicinity of such operations, the employment of horizontal drilling could also have adverse property impacts across a much wider area.

There are also concerns about the cumulative impact of a number of the environmental risks outlined above, in areas such as South West Lancashire where much of the initial fracking activity in the UK has been concentrated. In a wide ranging report on the potential environmental risks arising from fracking operations in Europe for the European Commission, AEA, for example, suggested that the development of shale gas reserves may span a wide geographical area and argued that *'cumulative risks need to be taken into account in risk assessment'* (AEA 2012, p. 24). The AEA report classed the cumulative impacts associated with water resources; ground and surface water contamination; gas emissions; land take; risks to biodiversity; noise impacts; and traffic as all being *'high'* (AEA 2012, P. vi). More specifically research on the large Marcellus shale gas reserves in the US (Evans and Kiesecker 2014) concluded *'our analysis reveals it will be the cumulative impacts that pose the greatest challenge for landscape level conservation.'*

At the same time it is important to recognise that many of the claims about the environmental risks associated with the fracking of shale gas are contested. On the one hand, for example, a study of the potential greenhouse gas emissions from the production of sale gas in the UK, for example, commissioned in 2012 by the Department of Energy and Climate Change (Mackay 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.'* More positively a review by AMEC (2013, p.122) of the potential environmental effects of the forthcoming shale gas exploration licensing round concluded that looking to the future *'domestic shale gas production and consumption could help reduce net greenhouse gas emissions associated with reduced impacts 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 2013, 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. On the other hand research on the environmental and climate change impacts of shale gas (Tyndall Centre for Climate Change Research 2011, p.110) concluded that *'without a meaningful cap on global carbon emissions, any emissions associated with shale gas are likely to be additional, exacerbating the problem of climate change.'* Arguably more polemically Friends of the Earth (2013a, webpage) claimed that *'burning shale gas could set the world on course for catastrophic climate change' and 'have a major impact on investment in renewable energy needed to decarbonise the energy sector.'*

Reputation: Making the Case

Public concerns about many of the potential environmental risks associated with the fracking of shale gas reserves is generally seen to pose a threat to the successful commercial development of these reserves. In taking *'a global perspective'* on the *'risks that could dim the future of shale gas',* KPMG (2011, p.18), for example, suggested that *'the*

industry needs to control reputation risk and turn public opinion round' and that *'negative public opinion about environmental safety of the hydraulic fracturing process could undermine the development of this industry, particularly where the process is used in –or directly under- populated areas'* (KPMG 2011, p.19). More specifically within the UK in identifying *'reputation'* as one of the main barriers to enabling commercial production to go ahead the Institute of Directors (2013,p.6) recommended that *'the industry itself needs to develop a social licence to operate'* and that *'more needs to be done to gain the confidence of local communities.'* In a similar vein KPMG (2013, p.25) argued that *'If the UK is to meet the government's goals and extract shale gas on a commercially viable basis, the sector needs to overcome regulatory and market barriers and manage negative public views on exploration'* (KPMG 2013). A battle has certainly been underway within the UK to win the public's hearts, minds and confidence particularly, though certainly not entirely, within local communities where exploration fracking for shale is underway or planned. While it would be an oversimplification to suggest that either those who wish to pursue, encourage and support the commercial development of shale gas and those who oppose its development sing from the same, if very contrasting, hymn sheets two simple illustrative examples provide some basic insights into the communication and public opinion forming process.

A growing number of local opposition groups are also mobilising against shale gas exploration and production. These groups are generally well organized at the grassroots level, their case draws on a wide range of research evidence and they also tap into powerful community emotions. They have been harnessing information and communication technologies and social media to good effect and some have taken direct action in an attempt to stop exploratory drilling activity. At the local level a large number of opposition groups have emerged and are linked under the umbrella of 'Frack Off: Extreme Energy Action Network.' In July 2013 21 local groups were listed on the pressure group's website (Frack Off: Extreme Energy Action Network 2013, webpage) but by late March 2014 the number of local groups had risen to 108 spread throughout much of the UK. (Frack Off: Extreme Energy Action Network 2014a, webpage). Nationally the pressure group's outlined *'The Fracking Threat to the UK'* in graphic terms namely 'Fracking *is a nightmare! Toxic and radioactive water contamination. Severe air pollution. Tens of thousands of wells, pipelines and compressor stations devastating our countryside and blighting communities. All while accelerating climate change. And to produce expensive gas that will soon run out'* (Frack Off: Extreme Energy Action Network 2014b, webpage). More positively Frack Off suggests that *'while all this may seem very bleak, there are rays of hope within this dark cloud'* in that shale gas reserves are *'much more dispersed than conventional ones, meaning that in order to get them many more communities are affected but must at least passively consent to their extraction. If these communities get organised to resist this invasion then it can be stopped'* (Frack Off: Extreme Energy Action Network 2014b, webpage).

Local group Gas Field Free Mendip, for example, *'campaigns to raise awareness and prevent unconventional gas development on the Mendips in Somerset'* and claims to represent *'local people talking to local people about an issue which could have a profound and direct impact on their lives and the environment in which they live and work'* (Gas Field Free Mendip 2014, webpage). More specifically the pressure group argues that a large number of toxic chemicals will be used in the gas exploration process, that the complicated and fragile geology of the Mendips creates greater risk of leakage and pollution into

watercourses through caves and smaller aquifers and that between 20% and 40% of the contaminants, hazardous and potentially radioactive water used in the extraction process flows back to the surface and requires treatment before disposal. Frack Free Fylde (2014, webpage) describes itself as *'a group of concerned local residents who have joined together in a collective effort to put a stop to hydraulic fracturing on the Wyre & Fylde coast',* argues that the fracking industry *'has left a toxic legacy in many of the communities that it has touched worldwide' It has also caused widespread environmental degradation. Residents on the Fylde have already suffered property damage due to seismic activity in the exploration phase'* and emphasises that *'our aim, with the help of our local community, is to stop this before any more damage is done'* (Frack Free Fylde 2014, webpage).

The UK Government has looked to provide strong support for the fracking of shale gas reserves. The Government has sought, for example, to assuage many of the environmental concerns outlined above and has stressed that shale gas development *'must be done in partnership with local people'* and that it wants *'to encourage a shale industry that is safe and doesn't damage the environment,'* (GOV. UK 2013a, webpage) and in March 2013 the Government announced the creation of the new Office of Unconventional Gas and Oil within the Department of Energy and Climate Change. This Office plans, inter alia, to '*bring forward proposals to ensure people benefit from shale gas production if there are future developments in their area'* (Gov. UK 2013c, webpage). In January 2014, for example, The Prime Minster, David Cameron, was reported as saying *'I want us to get on board this change that is doing so much good and bringing so much benefit to North America. I want us to benefit from it here as well'* and he stressed that UK had the '*strongest environmental controls'* and pledged that *'nothing would go ahead if there were environmental dangers*' (BBC 2014, webpage*).* 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 retain 100%, as opposed to the existing 50/%, of business rates from shale gas developments (Gov. UK 2014b, webpage).

More specifically Cuadrilla, for example, has worked with the public affairs company Bell Pottinger and the public relations consultancy PPS. Cuadrilla's website, managed by PPS, claims*' that there is a strong argument that supports the exploration and commercial extraction of natural gas in the UK'* and provides that information on *'the benefits'* that will be generated by the *'exploration and commercial extraction of natural gas'* (Cuadrilla 2014a, webpage). These benefits are described as *'jobs and investment', 'energy security', 'tax revenue' and community benefits'* (Cuadrilla 2014a, webpage). Cuadrilla (2014b, webpage) claims to be *'part of the community'*, *'to be committed to building strong relationships and being a good neighbour'* and the company *'sees itself as being part of the communities it operates within, and as part of this is keen to make a contribution to community life.'* Cuadrilla's website provides a 'snapshot' of its engagement activities. These include local residents and community representatives being welcomed on site visits; the sending of correspondence to thousands of local residents; holding several public information days; the establishment of a free phone information line for local residents' enquiries; holding meetings with local and regional businesses and local community groups; and organising site visits and briefing sessions for local farmers and growers. The company also reports to be *'protecting our environment'* (Cuadrilla 2014c, webpage) and claims that *'throughout*

Cuadrilla's operations robust safety measures are in place to protect the environment' (Cuadrilla 2014c, webpage).

Regulation: Planning Framework

While a number of UK Government departments and bodies, including the Department for Energy and Climate Change, the Environmental Agency and the Health and Safety Executive, have regulatory environmental responsibilities for shale gas development it is the planning system that controls the development and use of land in the wider public interest that is charged with deciding if shale gas exploration and production by fracking is acceptable at specific sites. Given the scale of recent estimates of shale gas reserves local planning authorities in many parts of the UK seem likely to face a growing number of applications for shale gas exploration and production.

The National Planning Policy Framework (NPPF) for England and Wales published in 2012, for example does not explicitly mention fracking and thus it offered nothing by way of specific guidance for local planning authorities. That said the NPPF stressed the need *'to help increase the use and supply of renewable and low carbon energy, local authorities should recognise the responsibility on all communities to contribute to energy generation from renewable and low carbon sources'* (Department for Communities and Local Government 2012, p. 22). More generally the NPPF also emphasised that planning decisions concerning large-scale infrastructure projects can be removed from local authority jurisdiction and considered as part of a new Nationally Significant Infrastructure Projects (NSIP) regime first introduced in 2010. Such projects are reviewed by the Planning Inspectorate at the national level with a recommendation then being made to the Secretary of State who will ultimately be responsible for determining whether to grant or refuse planning permission.

However in July 2012 the UK Government announced that that the NSIP regime would not be extended to embrace onshore gas developments and the following month the Government published planning practice guidance for onshore oil and gas. This guidance provides advice on the planning issues associated with the different stages of shale gas development, lists some 16 environmental issues which should be addressed by planning authorities, and stresses that planning authorities must ensure that shale gas development is appropriate to its location and that it does not have an unacceptable adverse impact on the natural or historic environment or human health (Department for Communities and Local Government 2013).

While the guidance sought to provide greater clarity about the planning process for shale gas exploration and extraction it was not universally well received. Pinsent Masons (2013, p.2), a UK based law firm with specific expertise in energy and natural resources and real estate, for example, in arguing that the guidance is not comprehensive, suggested that *'there are areas where some in the industry may find that guidance is lacking: for example, in its failure to tackle key questions such as how planning boundaries should be drawn for directional and horizontal drilling once the appropriate rock formation is reached, how to deal with issues where the surface and subsurface are in different ownership and the way in which the guidance deals with the consideration of alternatives in the context of need and demand.'* More generally Pinsent and Mason (2013, p.7) argue that the Government's

decision not to treat applications for shale gas developments as NSIP's could be seen *'as a lost opportunity'* which would have allowed such applications to enjoy *'the benefits of the streamlined examination procedure and the possibility of wrapping up other consents.'* In a similar vein Sector (2013, webpage) a Legal Director at Addleshaw Goddard, where real estate is a core area of business, has argued that the Government's decision to determine planning applications for shale gas at the local level *'may prove wide of the mark if the ongoing publicity war about shale gas in the UK favours local action groups.'* That said Pinsent and Mason (2013, p.7) note that the Government intend to keep this situation under review and they suggest that *'it may be possible for a developer to argue that their particular project should have NSIP status.'*

Within the planning profession some critics have argued that the new planning policy guidance is weighted in favour of granting permission and a principal planner at Savills, the UK's leading estate agency, has been reported as arguing that the guidance was akin to a presumption in favour of the development of shale gas resources and more specifically that *'rather than just introducing controls over how decisions would be made, the guidance implies that government wants to see them go through'* (Planning Resource 2013, webpage). More critically Friends of the Earth (2013b, webpage) has criticized this guidance, arguing that *it 'will ride roughshod over local concerns about shale gas exploration and development with little regard for the impact on the wellbeing of local people or the environment'* and that it is *'little more than a carte blanche to dispatch dirty energy companies into the British countryside to start sinking thousands of new fracking wells.'* More specifically Friends of the Earth (2013b, webpage) argued that the planning guidance for local authorities on fracking is *'not fit for purpose'* because *'it undermines UK commitments to help secure radical reductions in greenhouse gas emissions', 'it fails to ensure groundwater pollution is prevented'* and *'it doesn't specify that comprehensive Environmental Impact Assessments are conducted for all applications.'* More generally a report on the potential environmental impacts of fracking for shale gas undertaken for a range of UK nature conservation organisations concluded *'the current regulatory regime is not fit for purpose and therefore unable to adequately manage serious environmental risks that may arise from individual projects and cumulative development'* (Moore et.al. 2014, p. 26).

Conclusion

The development of shale gas reserves is very much at the exploratory stage in the UK but the development pressures for the commercial development of these reserves by fracking are rapidly gaining momentum in a number of areas. Opinion is sharply divided about the potential economic benefits and environmental risks of such development. While the UK Government and the business community have generally been keen to stress the economic benefits the development of shale gas could bring nationally and locally, a range of environmental pressure groups are energetically and vociferously opposed to such development. Within the shale gas industry there certainly is a general consensus that promoting positive messages about shale gas development and managing and countering many of the negative public views about such developments are essential if shale gas resources are to be successfully exploited commercially. To this end a number of the energy companies have engaged public relations companies to develop comprehensive, coherent

and co-ordinated media relations campaigns in an attempt to win hearts and minds at both the local and national levels. However the scale of the challenges should not be underestimated. The independent global risks consultancy, Control Risks (2013, p1), for example has argued that *'the oil and gas industry has largely failed to appreciate social and political risks and has repeatedly been caught off guard by the sophistication, speed and influence of anti-fracking activists.'*

authorities in many parts of the UK seem likely to receive a growing number of planning applications for shale gas exploration and development and they seem likely to have the primary regulatory responsibility for determining whether initial exploration for, and subsequent production of, shale gas reserves goes ahead. As such in looking to reconcile competing interests at the local level planning authorities may have to balance the potential inward investment and job creation benefits claimed for such exploration and development and their commitments to sustainability and to the transition to a low carbon future and deeply held local environmental and community concerns. That notwithstanding there is a body of opinion that suggests that the current planning policy guidance issued to local planning authorities by the UK Government is, at best, flawed and at worst, weighted in favour of the development of shale gas reserves. More generally the potential economic benefits and environmental risks with fracking for shale gas can be seen in terms of a local and national framework. Thus while major national economic and energy benefits are claimed for the development of shale gas the environmental risks are concentrated at the local level. If local campaigns against the fracking of shale gas continue to gather momentum then the UK government may revisit its decision not to treat planning applications for shale gas exploration and development as NSIP's.

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