Fracking for Shale Gas: Planning Policy and Practice

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Introduction

Since the turn of the century the rapid exploitation of shale gas by hydraulic fracturing, popularly known as fracking, has transformed the energy landscape within the US. More recently potential large shale gas reserves have been identified within parts of the UK though there has been no commercial development of these reserves to date. The possibility of future development of shale gas by fracking may pose testing challenges for a number of local minerals planning authorities.

Shale Gas and Fracking

Shale gas is natural gas, mainly composed of methane, trapped in organic rich shale beds often located between 1,000 and 4,000 metres below the ground. Traditionally shale has not been seen as a reservoir rock but rather as a source rock in which gas and oil are stored before migrating into sandstone or limestone where they have 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 accessed by fracking. The process involves drilling vertically some 1,500 metres or more below and then drilling a number of horizontal boreholes in several directions. The horizontal drilling means large areas of shale gas can be reached while minimising the number of surface boreholes and it facilitates drilling to less accessible locations. The fracking process involves pumping a mixture of fluids at high pressure into the shale, which creates a path for the gas to flow into the borehole and thence to the surface. Water makes up some 90% of the fluids used in fracking and a large field with 1500 horizontal wells can use up to 20 million gallons of water per day. The water it is mixed with gelling agents, which help to prise open the fractures, sandy materials, which hold open the fractures, chemicals, which reduce surface friction during the fracking process, and biocides, which kill bacteria. The development of shale gas reserves includes three distinct stages namely exploration; production; and decommissioning.

The fracking of shale gas first took place in the US on a demonstration basis in the 1970's but it was the early 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 2013 shale gas was estimated to account for the largest share of total US natural gas production (US Energy Information Administration 2014). Within Western Europe shale gas reserves have been identified in the Netherlands, Ireland, France, Germany, Poland, Romania, Bulgaria, Denmark Sweden and Norway, as well as in the UK.

Shale Gas within the UK

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 exploration for shale gas reserves within the UK is still very much in its infancy and there are no national estimates of how much shale gas which may 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 comprise small fault-bounded sub-basins (Advanced Resources International 2013).

The British Geological Survey (BGS), in association with the UK Government's Department for Energy and Climate Change, has undertaken a number of shale resource estimates for some areas of the UK. In 2013, for example, the BGS published their estimate of shale gas resources in the Bowland Basinunderlying an area stretching from north Wales and Blackpool in the east to Scarborough and Nottingham in the west (British Geological Survey 2015). Given geological uncertainty this estimate ranged from 822 trillion cubic feet (tcf) to 2281 tcf with the central estimate at 1329 tcf. That said the BGS stressed that *'not enough is yet known to estimate a recovery factor'* nor to estimate *'how much gas may be ultimately produced'*

In the past 2-3 years the UK Government, a number of energy companies and some sections of the British business community have been optimistic about the prospects of widespread commercial development of shale gas and of the 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 2014, webpage). Edward Davey, the then Secretary of State for Energy and Climate Change 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.'* The Scottish Government announced a moratorium on all consents for fracking for sale gas in January 2015 and the Welsh Government imposed a similar moratorium the following month and in the light of these developments this article focuses on fracking for shale gas in England.

Planning Framework and Planning Policy Guidance

Shale gas within the UK is owned by the state and under the Petroleum Act of 1988, and a Petroleum and Exploration and Development Licence (PEDL) is required for the development of shale gas reserves. At the time of writing (November 2015) the UK government had issued licences to a range of energy companies for 203 blocks, each about 10 square kilometres, and these licences confer exclusive rights to undertake exploratory drilling and production of shale gas (House of Commons Library/White, Felt, Smith and Keep 2015). Licences in themselves do not give consent for fracking and a number of other permissions are required before a company can begin exploratory or production drilling for shale gas. Companies must gain access rights from the landowners, obtain the appropriate drilling, environmental and health and safety permits from the relevant UK government departments.

While there are a number of elements within the regulatory framework it is the minerals planning authority (namely the county council in two-tier areas of the country and the unitary authority elsewhere) that is responsible for determining if shale gas exploration and production by fracking is acceptable at specific sites. The National Planning Policy Framework (NPPF) for England and Wales published in 2012 did not explicitly mention fracking and thus it offered nothing by way of specific guidance for local planning authorities.That said the NPPF stressed that *'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) and that local authorities should *'give great weight to the benefits of mineral extraction, including to the economy'* (Department for Communities and Local Government 2012, p. 34).

However in 2013 the Government published planning practice guidance for onshore oil and gas for England. This guidance provides advice on development management procedures, environmental impact assessment, determining planning applications, decommissioning and land restoration.

Local authorities were advised, for example, that while they should not consider the demand for, or the alternatives, to shale gas but that they should *'give great weight to the benefits of mineral extraction'* (Department for Communities and Local Government 2013, p. 15). This guidance on the need to conduct an environmental impact assessment, suggested that such an assessment would only be required *'if the project is likely to have significant environmental effects'* and *'that it is unlikely that Environmental Impact Assessment will be required for exploratory drilling'* (Department for Communities and Local Government 2013, p.13). Planning authorities were also advised to take account of the possible cumulative effects of one or more applications for shale gas development within an area but that such cumulative effects are unlikely at the exploration phase.

More generally local planning authorities were advised that they must ensure that shale gas development *'does not have an unacceptable adverse impact on the natural or historic environment or human health' (*Department for Communities and Local Government 2013, p.1). The guidance sought to provide greater clarity about the planning process for shale gas exploration and extraction but it was not universally well received. Within the planning profession some critics have argued that this guidance was weighted in favour of granting permission. A principal planner at Savills, the UK's leading estate agency, for example, was reported as arguing *'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).

Environmental Impacts

The 2013 planning policy guidance listed a large number of potential environmental impacts which should be addressed by the minerals planning authorities. However it offered no detailed information on these issues and no explicit recognition that the political momentum behind shale gas development within the UK is fiercely contested and that it has been accompanied by growing and increasingly vocal concerns about the environmental and social risks associated with fracking. Growing numbers of local groups have been mobilizing 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 to blockade sites in an attempt to stop exploratory drilling activity. In July 2013 21 local groups were listed under the national umbrella of the 'Frack Off: Extreme Energy Action Network' (Frack Off: Extreme Energy Action Network 2013, webpage) but by November 2015 the number of local groups had risen to 202 spread across much of the UK. (Frack Off: Extreme Energy Action Network 2015 webpage).

A wide range of potential impacts have been highlighted by those who oppose shale gas development. These include climate change; fugitive carbon dioxide and methane emissions; water use, waste water treatment and water pollution; seismic activity; air pollution; noise; visual intrusion; damage to heritage landscapes; and the fragmentation and loss of habitats, damage to species and reductions in bio-diversity**.** A brief outline of some of these issues illustrates the nature of the potential impacts and public concerns. Shale gas, like other natural gases, is not a low carbon source of fuel and its large scale development would certainly not be consistent with a transition towards a more sustainable energy supply system. Methane can be emitted at a number of stages within the fracking process and such fugitive emissions are a particular concern in that methane has significant global warming potential. Research on potential 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 (2013, webpage) claimed that *'burning shale gas could set the world on course for catastrophic climate change.'*

The initial drilling phase and fracking process require large volumes of water. 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, may generate increasing stress on resources across wide geographical areas. Following the drilling of a well perhaps as much as 80% of the fracturing fluid, which may be saline and contain naturally occurring radioactive materials, returns to the surface and requires treatment before being returned to natural watercourses. That said although the fracking fluid may be pumped into boreholes at discrete locations, once deep underground it is often difficult to predict its migration and concerns may arise about the contamination of drinking water over a wide area.

While earthquakes can be induced by fracking, shale rock is inherently weak and seismic activity is normally too small to be noticed at ground level.

During the initial drilling phase the delivery of equipment, materials and water and the increase in vehicle movements can cause environmental disruption and there is also noise pollution associated with the drilling process. Fracking also has a significant footprint on the landscape. Land clearance is required, with up to two hectares required for each well head plus any land required for improved road access, and this can damage or destroy amenity, landscapes and habitats, reduce biodiversity, and lead to soil erosion.

There are also social concerns about the disruption fracking could bring to small communities, and to their traditional ways of living and working and of the possible impact on property prices and land values. There are concerns, for example, about the capacity of local infrastructure to cope with the attendant increase in traffic, employees and drilling equipment and worries that the chemicals used in the fracking process could pose health risks. In some rural areas there are fears that fracking operations may lead to a reduction in the number of tourists and of the income tourism has traditionally generated. While proposed fracking operations may have an effect on 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 impacts on property prices across a much wider area.

More general concerns have been expressed about the cumulative impact of a number of the environmental (and social) risks outlined above. 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). 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.'*

The energy companies and the UK Government have sought to counter many of these environmental and social concerns. Here again some illustrative examples provide the flavour of the counter arguments. A study of the potential greenhouse gas emissions from the production of shale gas in the UK, for example, commissioned in 2012 by the UK Government's 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.' The Government has also 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. Cuadrilla claims that throughout its operations *'robust safety measures are in place to protect the environment'* (Cuadrilla 2015a, webpage). More specifically Cuadrilla argues that the *'prevention of water contamination'* is central to the company's environmental protection measures but that *'in the industry such incidents have been extremely rare'* (Cuadrilla 2015b, webpage). Cuadrilla also claims *'it is keen to make a contribution to community life'* and to be prepared to provide funding for *'projects which matter most to the community'* (Cuadrilla 2015c, webpage).

Determining Planning Applications

In June 2015 the first, and currently the only, planning applications to produce shale gas by fracking in the UK, on two sites, at Roseacre Wood and Preston New Road, Little Plumpton, between Blackpool and Preston in Fylde, West Lancashire, submitted by the energy company Cuadrilla, were rejected by Lancashire County Council. The rejection of these two applications was against the advice of the planning officers and followed detailed and wide ranging representations and legal advice. The application at the Plumpton site, for example, was rejected for two reasons. Firstly *'The development would cause an unacceptable adverse impact on the landscape, arising from the drilling equipment, noise mitigation equipment, storage plant, flare stacks and other associated development. The combined effect would result in an adverse urbanising effect on the open and rural character of the landscape and visual amenity of the residents contrary to policy DM2 Lancashire Minerals and Waste local Plan and Policy EP11 of the Fylde Local Plan.'* Secondly *'The development would cause unacceptable noise impact resulting in a detrimental impact on the amenity of local residents which could not be adequately controlled by condition contrary to Policy DM2 of the Lancashire Minerals and Waste Local Plan and Policy EP27 of the Fylde Local Plan'* (Lancashire County Council 2015). In July 2015 Cuadrilla announced their intention to formally appeal against Lancashire County Council's refusal of planning permission for fracking on the two sites and the appeals were subsequently submitted in September 2015.

Seemingly, though not explicitly, in response to Lancashire County Council's rejection of these two applications and perhaps because of the signal it might be seen to send to other local planning authorities, in August 2015, the UK Government announced that '*shale gas planning applications will be fast tracked through a new dedicated planning process'* (Gov.UK 2015). The objective was *'to ensure shale applications can't be frustrated by slow and confused decision making amongst councils* (local planning authorities)*, which benefits no one'* and a number of specific measures were included in the announcement. The Secretary of State at the Department for Communities and Local Government can call in shale gas planning applications on a case by case basis, thus removing the decision making process from the local minerals planning authority. The Secretary of State can also call in shale gas applications that have not been determined by local planning authorities within the 16 week statutory timeframe. More pointedly where local authorities repeatedly fail to determine shale gas applications within the statutory time frame they could lose their right to determine any such future applications. At the same time the emphasis will be on ensuring that any applications called in and all appeals are prioritised by the Government's Planning Inspectorate.

While it remains to be seen how these new measures will play out in reality they attracted considerable criticism when they were announced. Local authority politicians in Lancashire, for example, expressed concerns about proposals which may effectively take decisions about the fracking of shale gas away from locally elected representatives. At the same time there are also concerns that in submitting planning application for fracking shale energy companies may include large amounts of detailed technical data and documentation to support their application. Consequently the local minerals planning authority may find it very difficult to assimilate and evaluate within the statutory 16 week time frame. Where local community groups and environmental organisations also look to make detailed and wide ranging representations to the local authority this may further exacerbate delays and effectively play into the hands of the applicants. Friends of the Earth (2015) argued *'bulldozing fracking applications through the planning system, against the wishes of local people and councils, will simply fan the flames of mistrust and opposition. Local authorities have been following the rules. These changes are being made because the Government doesn't agree with the democratic decisions councils have been making.'*

Conclusion

The development of shale gas reserves is still at the exploratory stage in the UK. While the UK Government has stressed 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 any such development. Local minerals planning authorities in many parts of the UK may begin 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 minerals planning authorities may have to weigh the potential inward investment and job creation benefits claimed and strong UK government support for shale gas development against their commitments to sustainability and to the transition to a low carbon future and to 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 minerals 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 associated with fracking for shale gas can be seen in terms of competing local and national frameworks. Thus while major national economic and energy benefits are claimed for the development of shale gas the environmental and social impacts are primarily concentrated at the local level.

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