Buckinghamshire County Council

Select Committee

Environment, Transport and Locality Services Select Committee

Title:	**Information Paper on Hydraulic Fracturing (Fracking)**
Committee date:	6th December 2013
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Report signed off by Cabinet Member:	n/a
Electoral divisions affected:	n/a

Introduction

This report builds on the briefing paper which was presented to the Environment, Transport, and Localities Services Select Committee in September 2013. It aims, primarily, to develop an outline of the claimed benefits and risks of fracking in order to raise Member awareness of this issue.

Currently, fracking is not an area of policy over which Buckinghamshire County Council has direct influence or responsibility. Buckinghamshire is unlikely to be a strong candidate for the extraction of Shale Gas.

From media coverage over the summer of 2013 it is evident that fracking is an extremely controversial issue, yet there is a lack of widely understood clarity surrounding the process. Therefore, this report focuses on firstly clarifying the facts which relate to fracking and secondly identifying contentious issues and the positions of key protagonists. In order to do this effectively, this report follows a question and answer format outlining the issues and key positions.

Questions covered in this report;

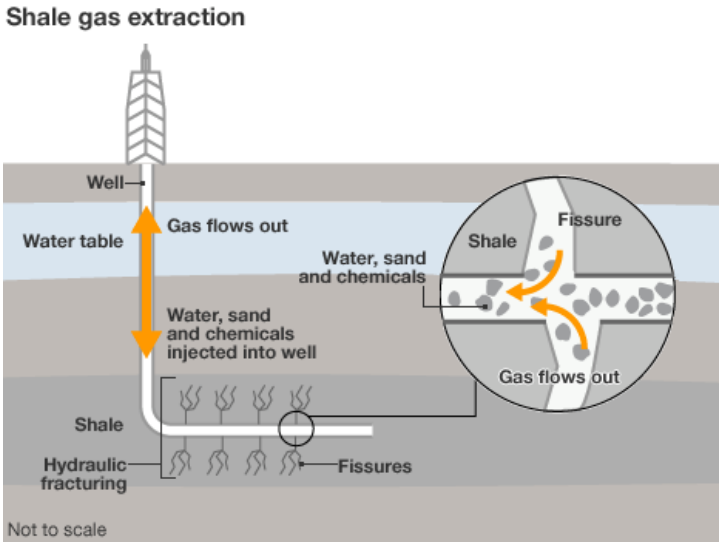
- What is fracking?
- What is the international picture around fracking? US/Australia/China/Europe
- Where has fracking been undertaken in the UK? What are the facts?
- Why was Balcombe a focal point for opponents of fracking?
- Why is fracking supported by the current UK government?
- Who are the protagonists in the fracking debate?

- What are the benefits/risks of fracking in the UK?
    - Health Risks
    - Water contamination
    - Earthquakes
    - Local infrastructure pressure
    - CO2 emissions
    - Energy Security
- What are the specific UK legal aspects (e.g. who owns sub-surface land?)
- How will fracking impact on the local community - local employment/ community benefits/ long-term impact?
- What is the Buckinghamshire position on fracking?
- Is there an overall Local Authority position on fracking?

What is fracking?

1. 'Fracking' (short for hydraulic fracturing) is a process which uses high pressure liquid to release gas trapped in rock below the Earth's surface.

2. Water, sand and small amounts of chemicals (about 0.25% of the liquid used) are injected at high pressure into the Earth to release resources 'locked' in the rock. A well is drilled to a depth of up to 3km and then horizontally through the layer of rock where the gas is trapped. High pressure liquid is pumped down the well to open fractures which are then held open with the 'proppant' (usually sand). This releases the gas which flows back to the surface with the waste water.



Source: Environment Agency

3. Fracking is most frequently used to release shale gas reserves, although it can also be used to extract gas from a coal seam (as in Coal Bed or Coal Mine Methane).

4. Resources extracted using fracking can be referred to as 'unconventional' in reference to the methods of extraction used.

5. The process of fracking requires prospective drilling exploration to identify the potential resource yields which are dependent on the rock types beneath the earth's surface.

What is the international picture around fracking?

US:

6. Fracking has been credited with dramatically reducing domestic gas prices in the US. For over a decade it has been central to the production of natural gas which provides approximately a quarter of the country's total energy[1]. Although it was seen as an overnight sensation, in reality it took two decades of research and exploratory drilling before shale gas began took on a central role in energy production.

Australia:

7. Coal-seam gas is transforming Australia's energy market but it has also inflamed an environmental protest movement over fracking[2].

China:

8. China may be home to the largest reserves of shale gas in the world. However, so far only a handful of test wells for shale gas have been sunk, and it looks as though the geology may make it harder to access than in America.

Europe:

9. Poland and the UK are currently leading the European move towards fracking. However, the lack of definitive research into the impact and potential significance of fracking has led to widespread controversy throughout Europe.

10. France's Constitutional Court recently confirmed a moratorium on fracking due to environmental concerns – a move which has been welcomed by environmentalist campaigners. French President François Hollande has ruled out exploration for shale gas during his five year presidency.

11. The Netherlands and Luxembourg have also suspended drilling for shale gas and in Austria the cost of complying with environmental regulations makes shale gas uneconomic[3].

[1] US Secretary of Energy Advisory Board (2011), 'Shale Gas Production Subcommittee Ninety-day report'
[2] The Economist (2012) 'Fracking in Australia'

12. The position of the European Union (EU) remains relatively neutral. Member states are responsible for determining their energy mix so the EU stance has not included extensive legislation on fracking. The EU has recognised that Shale Gas can potentially be beneficial in reducing dependency on energy imports. There is, however, a shared commitment across the EU to reduce CO2 emissions. In order to achieve this, a framework to harmonise EU policy has been proposed[4]. The European Commission is to announce proposals for legislation on shale gas in January 2014 as part of its 2030 energy and climate-change strategy.

Where has fracking been undertaken in the UK? What are the facts?

13. So far fracking has only been carried out at two sites in the UK; Preese Hall and Grange Hill (both located in Lancashire). These two sites are run by Cuadrilla Resources (hereafter referred to as Cuadrilla), currently the only oil and gas company which has carried out fracking in the UK. So far, all other areas where drilling has taken place have been exploratory. This means that, although companies have drilled to take core samples which demonstrate the potential for fracking at that site, no gas has yet been extracted.

14. In 2011, a moratorium was placed on fracking following two seismic tremors in the Blackpool area associated with drilling at Preese Hall, Lancashire. However, following further investigation into the causes of these tremors, the government then lifted this moratorium in December 2012 on the understanding that further operations will be subject to significantly closer scrutiny[5].

15. The potential quantities of gas which can be extracted remain uncertain. The reserve figures which have been quoted are based on the amounts of shale rock which it is believed may contain gas which could be fracked. This figure is very high. However, to what extent this gas is recoverable remains very uncertain. The Department for Environment and Climate Change (DECC) have concluded that it is not, at this stage, possible to make meaningful estimates of how much shale gas may be practically and commercially recoverable[6]. This means that an extensive exploration phase is needed before widespread production could begin[7].

[3] The Economist (2013) 'Unconventional Gas in Europe'
[4] Potočnik, J. (2013) 'A European Strategy for Shale'
[5] Department for Environment and Climate Change (2013) 'About shale gas'
[6] Department for Environment and Climate Change (2011) 'Shale gas report'
[7] Parliamentary Office of Science and Technology (2013) 'UK Shale Gas Potential'

Why was Balcombe a focal point for opponents of fracking?

16. Drilling was first proposed in the Balcombe area of West Sussex in 2012. However, it was not until June 2013 – when a licence to drill was granted to Cuadrilla by the Environment Agency – that Balcombe became a pivotal site for opponents to fracking in the UK. The property is privately owned by the Balcombe estate which has granted permission for fracking to be undertaken.

17. Protests escalated throughout August, reaching a climax on August 19th with the arrest of Green Party MP Caroline Lucas. This gained a great deal of media attention. The protest camp was mostly dismantled in October after Cuadrilla temporarily stopped drilling in order to seek further planning permission. It has since been re-established to an extent though outside the West Sussex County Council headquarters.

18. Although the proposal for drilling in Balcombe was the spark for protests, the wider context of the growing controversy surrounding fracking in the US was of at least equal importance in causing the Balcombe protests[8].

19. Significantly, no fracking has in fact at any time taken place in Balcombe. Rather, it has been a focus for opposition to the process in general and its potential implications in the UK. What the Balcombe protests have highlighted is the extent of the unresolved political issues which surround fracking.

Why is fracking supported by the current UK government?

20. The current UK government has been keen to promote the exploration of potential oil and gas resources through fracking methods. This position has been informed by the fact that since 2004 the UK has been a net importer of gas. Furthermore, production levels of natural gas in the UK were, in 2012, the lowest since 1985[9]. In contrast, the development of shale gas extraction technique in North America has dramatically reduced its reliance on imports.

21. Key government spokespersons in support of fracking are Prime Minister David Cameron and Chancellor George Osborne. Within the coalition government, however, there is a wider spectrum of positions on fracking. Deputy Prime Minister Nick Clegg has given 'cautious support' to fracking, arguing that he recognises the dangers but also the potential benefits which fracking could bring the UK. This is not fully accepted by the Liberal Democrat party though and there is widespread concern over the environmental risks involved. This division of opinions has challenged the coalition government's unity on the issue of fracking.

[8] British Geological Society (2013) 'Meet the Frackers'
[9] House of Commons (2013) 'Shale Gas and Fracking' SN/SC/6073

Who are the protagonists in the fracking debate?

22. Proponents;

- Current UK government – Favours the expansion of fracking techniques (although, as outlined above, this is not supported by all members of the government coalition).
- Department for Environment and Climate Change (DECC) – This is the government department responsible for energy and environmental policy. They have commissioned a number of reports on fracking and how it can be developed further.
- Oil and Gas extraction companies, in particular Cuadrilla Resources.
- Conservative and Liberal Democratic parties – Both are tentatively supportive of fracking although, there is significant division within each on this issue.

23. Neutral;

- British Geological Society – Responsible for a number of studies on fracking, their stance is that there are a number of risks involved in fracking but these can mostly be mitigated through close regulation.
- All Party Parliamentary Group on Unconventional Gas and Oil (APPG UGO) – Stated aim is to consider the costs and benefits of fracking in a rational, fact-based manner which includes all parliamentary parties.
- Some charitable organisations (e.g. World Wildlife Fund, National Trust, Campaign to Protect Rural England) – Although not currently strongly opposed to fracking, they believe that there is a strong requirement for more information prior to widespread commencement of fracking.
- Labour party – Fracking in the UK needs to be much more firmly regulated although they are not absolutely opposed.

24. Key Opponents;

- Frack-off – Responsible for the Balcombe protests and has been extremely vocal in opposing fracking.
- Friends of the Earth – Strongly opposed to fracking based on environmental concerns.
- Greenpeace – Strongly opposed to fracking, they have also started a legal challenge based on land rights (see section on legal issues below).

- Local anti-fracking organisations – Across much of the UK local anti-fracking groups have been established to challenge fracking in their area.
- The Green party - Calling for a ban on all UK fracking operations and for destructive fossil fuel subsidies to be redirected to fund energy efficiency measures, community owned renewable energy sources and the elimination of fuel poverty.

What are the benefits/risks of fracking in the UK?

1. Health Risks;

25. Currently relatively little is known about the potential health risks related to fracking in the UK as it has been so little used.

26. In the US, opponents of fracking have raised a number of concerns surrounding the impact of fracking on public health. For example, the dangers of exposure to large quantities of silica sand have been serious issues. Used as a proppant in the fracking process, silica can cause severe breathing difficulties if workers are over-exposed. Other concerns include the effects of chemicals used in fracking which it is feared can leak into the ground.

27. It is argued that these risks can be controlled if fracking is properly regulated. For example, a report published on October 31st 2013 by Public Health England concludes that the currently available evidence indicates that the potential risks to public health from exposure to emissions associated with the shale gas extraction process are low if operations are properly run and regulated[10].

2. Water contamination;

28. There is a significant concern that fracking may lead to contamination of the local water supply. This could occur in two ways; first, if fracking waste fluids leak out of a well and second, if the gas released by fracking was able to reach the local water supply.

29. This has been a focal point for much of the opposition to fracking in the UK[11]. The belief that gas from fracking can pollute local water was graphically portrayed in the film 'GasLand' which showed footage of water which ignites when exposed to

[10] Public Health England (2013) 'Shale gas extraction emissions are a 'low' risk to public health'

[11] Good summary of these concerns available at BBC Horizon (2013) 'Fracking: The New Energy Rush'

a flame. This phenomenon has been widely emphasised by opponents of fracking as a serious danger to human health.

30. The UK government response – supported by a report from the British Geological Society – is that there is no clear evidence to suggest that fracking waste fluid has been able to enter the water supply[12]. Rather, it is concluded that the problems have occurred where there have been failures in building or maintaining a well. This has led the DECC to argue that this issue can be prevented through rigorous regulation[13].

31. In the US fears have been exacerbated by the fact that there has been no disclosure of the composition of fracking fluids. In contrast, UK regulation requires this information to be public. Cuadrilla has been keen to provide this in the hope that it might reduce public concerns[14].

3. Earthquakes;

32. Exploratory drilling in Lancashire was suspended in 2011 following two relatively small earthquakes: a magnitude-2.3 earthquake occurred on 1 April, followed by a magnitude-1.5 quake on 27 May. Both of these occurred close to the Preese Hall drilling site, where Cuadrilla Resources was using fracking to extract gas from a shale bed. A British Geological Society investigation concluded that these earthquakes were related to the use of fracking techniques. This has not been a recorded issue in the US but has become a significant factor in UK debates about the risks of fracking.

33. Opponents of fracking fear that earthquakes may pose a risk to the integrity of the well-casings and this could cause significant pollution. They argue that although a clear causal link between fracking and earth tremors has not been demonstrated in all cases, a close correlation can be seen[15].

34. In response to the earthquakes in 2011 the government carried out significant research from which it concluded that with greater seismic regulation in place fracking should be allowed to continue. There are no documented cases of shale gas operations, whether exploration or production, causing subsidence or earthquakes large enough to cause damage at the surface[16]. The Cuadrilla report on the subject states that the earthquakes occurred because of a rare

[12] British Geological Society (2013) 'Meet the Frackers'
[13] Department for Environment and Climate Change (2011) 'Shale gas report'
[14] Parliamentary Office of Science and Technology (2011) 'Unconventional Gas'
[15] Friends of the Earth (2013) 'Shale Gas: Unconventional, unnecessary and Unwanted'
[16] Department for Environment and Climate Change (2013) 'About Shale Gas and Hydraulic Fracturing'

combination of circumstances: the fault was already under stress, was brittle enough to fracture and had space for large amounts of water that could lubricate it[17].

35. It is also worth noting that natural or mining-induced earthquakes in the UK are not uncommon with around 150 earthquakes recorded on average each year[18]. Furthermore, the probability of larger earthquakes is low as "weak rocks like shale break easily so they do not allow enough tension to build to generate big tremors" (Brian Baptie, British Geological Society)[19].

4. Local infrastructure pressure;

36. In order to extract shale gas, large amounts of water and sand are required. This means that the infrastructure of the local area faces greater demands.

37. Opponents to fracking argue that it will require the building of new roads and will put pressure on local water supplies. They believe that the need for a large number of lorries to provide materials and remove gas will cause significant damage to local communities. This is an issue of particular relevance where fracking takes place in rural areas[20].

38. Cuadrilla argues that this issue is mitigated to an extent by the community benefits which result from fracking. Companies which are involved in drilling have pledged to provide community benefits in areas where shale is commercially extracted. These will include £100,000 for communities situated near each exploratory (hydraulically fracked) well, and 1% of revenues from every production site[21].

39. Also, it has been suggested that shale gas extraction if fact uses less water than other industries, and indeed than other sources of energy[22].

(For more information on the local impacts of fracking see later section)

5. CO2 emissions;

[17] Cuadrilla (2012) 'Seismiscity, prevention and safety'
[18] House of Commons (2013) 'Shale Gas and Fracking' SN/SC/6073
[19] The Sunday Times (12th February 2012) 'Hydraulic Fracturing and Seismicity'
[20] Lech Kowalski (2013) Film: 'Drill baby drill'
[21] Department for Environment and Climate Change (2013) 'About Shale Gas and Hydraulic Fracturing'
[22] Massachusetts Institute of Technology (2011) 'Gas report'

40. The UK is bound by the 2008 Climate Change Act to reduce its carbon footprint. Clear targets are also laid out in both the Copenhagen Accord and the Low Carbon Transition Plan. Government support for fracking therefore raises a number of questions around this requirement to reduce CO2 emissions.

41. The current government position is that the UK needs a diverse energy mix including both renewables and gas. It believes that gas generation will continue to play a major role in our electricity mix over the coming decades alongside a greater focus on renewables. As such it can be used as a transition fuel to support the move towards renewable energy. In comparison to coal, electricity generated from natural gas is relatively clean. It is therefore possible that more gas could help bridge the gap to cleaner renewables or more nuclear generation[23]. It can also be used to fuel vehicles and so could help to replace dependence on petrol and diesel[24].

42. In contrast it has been argued that increased fracking would decrease incentives for reducing reliance on fossil fuels challenge the government position. There have been a number of reports questioning the extent to which Shale gas is a clean fossil fuel due to the damaging impact of methane on the atmosphere (e.g. Tyndall; Howarth et al; Mckay and Stone). These reports support the argument that although Shale gas is cleaner than coal, it is a carbon heavy source of energy and so the government focus should be instead on improving renewables[25].

43. Energy and Climate Change Secretary Edward Davey has acknowledged these concerns and announced a study into the possible impacts of shale gas extraction on greenhouse gas emissions.

6. Energy Security;

44. Currently the UK is heavily reliant on gas as a source of energy. The government's fiscal measures in the 2013 Budget, alongside new planning guidance, indicate a continuing role for gas in the energy mix and support for shale gas exploration.

45. The need to import gas has made the UK energy consumer more vulnerable to disruptions in supply, especially from Qatar, a politically unstable region which

[23] House of Commons (2013) 'Shale Gas and Fracking' SN/SC/6073
[24] Institute of Directors (2013) 'Getting Shale Gas Working'
[25] Friends of the Earth (2013) 'Shale Gas: Unconventional, Unnecessary and Unwanted'

has been the source of most of our natural gas since 2009[26]. Supporters of the fracking industry argue that it can significantly increase UK energy security[27].

46. UK offshore production is continuing to decline year on year, and over the last ten years it has decreased by around 9 per cent on average per annum. Although there has been a slight dip in imports since the peak in 2011, they have started to rise again and in quarter 2 of 2013 they increased by 8.7 per cent compared to the same quarter a year ago. In the same period the UK imported 17.8 per cent more gas via pipelines from Norway and the Netherlands[28].

47. The extent of this potentially increased energy security is uncertain, however. Although shale gas could to some degree increase self-reliance, it is not likely to be a game changer as it has been in the US. Current figures suggest that it could produce 10% of gas that is currently consumed annually. Furthermore, issues such as depletion rates remain extremely uncertain[29].

What are the specific UK legal aspects (e.g. who owns sub-surface land?)

48. The legal issues which surround fracking in the UK are notably different from those in the US. In the UK all mineral rights are the property of the Crown. This means that private landowners in the UK stand to gain relatively little profit from leasing surface and subsurface access to shale gas. This was laid out in the 1998 Petroleum Act[30].

49. There are a number of legal challenges to Crown ownership of fracking profits. Manorial rights, for example, provide one means by which landowners could profit from fracking on their land. The government required all land owners with manorial rights to register their interest before October 2013 to maintain these rights. The Church of England has acted upon this recommendation and has gained some media attention surrounding the possibility that it might benefit from fracking. A second legal challenge was raised in early October 2013 by environmental group Greenpeace who called on landowners to invoke trespass laws against 'underhouse fracking' – denying companies the right to drill under the landowner's property.

How will fracking impact on the local community - local employment/ community benefits/ long-term impact?

50. Fracking requires highly skilled employees. The majority of jobs created are within professional and skilled trade occupations. In relation to its fracking

[26] Financial Times (2012) 'UK warned over dependence on Qatar gas'
[27] UK Onshore Operations Group (2013) 'Community engagement charter'
[28] Department for Energy and Climate Change (2013) 'Energy trends section 4: Gas'
[29] Department for Environment and Climate Change (2011) 'Shale gas report'
[30] House of Commons (2013) 'Shale Gas and Fracking' SN/SC/6073

activities in Lancashire, Cuadrilla estimated that the test well activity would support some 250 full-time equivalent jobs across the UK over a 12 month period. Approximately 15% of these jobs are estimated to be taken by local residents[31]. These issues suggest that, at least in the short-term, fracking is unlikely to provide significant local employment.

51. Cuadrilla has argued that local communities will gain significantly from both the community engagement programme and through corporation tax. It has estimated that between £5 billion to £6 billion will be payable in corporation tax over a 30 year lifespan for this project[32]. However, it remains unclear the extent to which local residents will consider this to be sufficient reason to support fracking.

52. Unlike in the US, there are fewer direct benefits to local residents. This is an issue which remains to be fully addressed. It has been suggested that Local Authorities should receive a share of the gains from shale gas development in their area, for example, allowing them to keep 100% of the business rates for shale gas pads[33].

53. Once fracking has been completed there are a number of longer-term impacts which should be considered. These include issues such as the policy regarding wells which are no longer viable and how it can be ensured that these are not a risk to the environment. There is concern among opponents to fracking in the US that it leaves a large and comparatively invasive footprint on the landscape because of the large number of wells needed[34]. There is a need therefore for the government to identify a clear strategy to minimise the long-term impact of fracking.

Is there an overall Local Authority position on fracking?

54. Currently there is no clear unified local government position on fracking. On 23rd July 2013 the Department for Communities and Local Government (DCLG) published guidelines which outline the responsibilities of the council for planning regarding fracking (see further reading).

55. The Local Government Information Unit (LGiU) has encouraged councils to review the significance of fracking in their area and how best to address the issues arising from this controversial method of energy extraction.

56. Some councils (for example, Brighton and Hove City Council, London Borough of Brent) have stated clear opposition to fracking. However, the majority have

[31] Cuadrilla (2011) 'Economic Impact of Shale Gas Exploration & Production in Lancashire and the UK'
[32] Ibid
[33] Institute of Directors (2013) 'Getting Shale Gas Working'
[34] House of Commons (2013) 'Shale Gas and Fracking' SN/SC/6073

focused on gaining further understanding of the issues prior to stating a clear the Council position.

What is the Buckinghamshire position on fracking?

57. There has been relatively little drilling for hydrocarbons in Buckinghamshire. In 1911 a well was drilled in Calvert. This was deepened and a second well drilled but there was no further evidence of gas. Later, in the 1960s, BP drilled a series of exploratory wells at Twyford. In total, four wells were drilled but the gas produced was limited and not economically viable.

58. These previous gas shows at Calvert and Twyford may indicate the presence of conventional gas within Buckinghamshire. However, a report commissioned by the BGS in 2003 concluded that "the county appears to have limited oil and gas prospectivity, although the possibility for the discovery of (small) gas accumulations may still exist". Furthermore, potential sites in Buckinghamshire have been labelled 'higher risk' targets – areas where the quantity of gas produced is lower than the cost of extraction. This means that if drilling was to occur in Buckinghamshire it would probably not be until after low risk fields have been exhausted[35].

59. There is currently one existing PEDL (Petroleum Exploration and Development Licence) which falls partially within Buckinghamshire (PEDL236). This relates to an existing licence for oil exploration beneath Windsor Castle which will expire in June 2014 if a well is not drilled prior to this date. A PEDL grants exclusive rights to explore, drill and produce within a small, specified area. However, it does not remove the need to comply with planning, health and safety or environmental regulation. The Council would therefore receive full information on and have a key input into any planned drilling in relation to this licence.

60. Buckinghamshire County Council is currently developing its Minerals Local Plan as a successor to the existing Buckinghamshire Minerals and Waste Local Plan 2004-2016 which covers in detail the Council's policy on hydrocarbon developments.

    For a detailed report on fracking potential in Buckinghamshire and the licensing and planning processes for Shale Gas development see the Select Committee Briefing Note on Fracking and Shale Gas (September 2013).

<u>Further reading</u>

- DCLG planning practice guidance (2013)
- Department for Environment and Climate Change (2013) 'About Shale Gas and Hydraulic Fracturing'

[35] Department for Environment and Climate Change (2011) 'Shale gas report'

- Select Committee (Sept 2013) Briefing paper on shale gas