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Fracking: Why the risks of earthquakes or drinking water contamination are minimal

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Energy and Climate Change Secretary, Ed Davey, **reignited the row over fracking this week (http://www.theguardian.com/environment/2013/sep/09/fracking-shale-gas-ed-davey-climate-change)** , when he insisted this method of extracting shale gas was no 'great evil' and could act as a bridge to a 'green future' in the UK so long as it was properly regulated.

The UK is thought to have significant reserves of shale gas and the government is encouraging the industry to exploit these resources as our North Sea gas reserves are depleting.

Hydraulic fracturing, or 'fracking', is not new. It has been used to improve the permeability of rock around a well for many years in gas reservoirs where rocks are relatively impermeable. Fracking for shale gas differs only in scale. For the shale gas formations, it is not just the permeability of the rock near the well that must be enhanced – the fractures made by fracking are the only pathways for gas to move through the formation to the well and so the fracking must be much more extensive. This is done by injecting sand-filled water under pressure to create fractures in the shale from long horizontal wells. Both horizontal drilling and reservoir development using fracking are well established techniques but they are used more extensively when exploiting shale gas reserves.

What are the risks? Public concern has been raised by the two earthquakes in Blackpool and by health scare stories from the USA where there has been evidence of water supply contamination and burning tapwater.

Fracking by its nature breaks the rock, and this creates micro-seismic events. However, extensive monitoring and experience from the USA in particular, has shown that the fracking is unlikely to lead to harmful seismicity. The Royal Society and Royal Academy of Engineering **investigated these risks (http://royalsociety.org/uploadedFiles/Royal_Society_Content/policy/projects/shale-gas/2012-06-28-Shale-gas.pdf)** and concluded that there was no risk from seismicity associated with fracking from suitably located wells in the UK. The Blackpool earthquakes were at the upper end of the range of expected seismicity, caused no harm, and were associated with fracking wells close to an existing fault.

The second issue that causes alarm is the risk of pollution. The additives used to help the injection of the sand laden fracking fluids include hazardous substances. When the fracking is completed these fluids flow back under pressure to the surface via the well along with methane from the formation. Pollution has occurred when these fluids and methane have found their way into the drinking water aquifer (the layer of water-bearing permeable rock). The regulatory system in the USA does not require details of the commercial fracking fluid to be disclosed and the control of well completion is less rigorous than EU and UK requirements, and this has made it difficult to identify and control the pollution risks. The primary route for the fluid to directly pollute the aquifer is by failed well casings allowing seepage into the aquifer. However, the construction of these wells is tightly regulated in the UK and risks associated with this issue can therefore be managed and controlled.

Recent EU reports on the risks of exploiting shale gas across Europe identify the environmental risks, but they concluded that these would be better managed by the existing EU regulation than has been the case in the USA. Guidelines in the Royal Society report identify a number of measures to ensure that the wells are suitably sited and propose requirements for monitoring that will identify any issues early and prevent pollution of the water supply.

Is it worth it? In the USA, shale gas has replaced oil and coal with significant reductions in greenhouse gas emissions and has significantly reduced gas prices. In the UK, we are replacing depleted supplies of North Sea gas. There is no direct benefit in terms of green house gas emissions and it remains to be seen what the economic costs are, but if we do not take advantage of this energy resource, we face an even more uncertain energy supply over the coming years.

There are of course reasons why one might not like a gas production platform in your backyard, but the risks of it leading to methane in your tap water or to earthquakes are minimal.

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