

Fracking Explained

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Fracking is increasingly in the news. It refers to the method used to extract gas from shale rock. It's not a new idea even in Britain (some conventional wells have been fracked for years) but now the UK Government is backing a big push to extract gas out of the shale rock that exists under Britain to replace dwindling domestic gas supplies from the North Sea. The recent British Geological Survey estimates that there may be 1,329 trillion cubic feet of shale gas, which (even if only 10% recoverable) would supply 10% of Britain's gas needs for over 30 years. Government calculations suggest that this could require maybe 2,500 - 3,000 wells in 250 to 300 sites each slightly bigger than a football pitch. Some think the figure could be much higher. For comparison, the USA, which has been developing shale gas rapidly over the past 10 years, has over 500,000 shale gas wells. Experience from the USA shows fracking has to be seen as a substantial environmental hazard.

Shale gas exploration

In December 2012, the Government gave the go-ahead for a drilling company, Cuadrilla, to resume exploration in Lancashire, after an 18 month delay to investigate earth tremors. The very controversial drilling at Balcombe in East Sussex is actually a conventional oil/gas exploration - though the original planning permission allowed "stimulation" if found necessary. Much will depend on exploratory work, and the outcome is not at all certain. In Poland, for example, early excitement about shale gas has subsided because of poor exploration results.

Shale gas extraction

Shale gas is natural gas trapped in impermeable shale rock, as opposed to conventional natural gas deposits, which are trapped below a layer of impermeable rock. Therefore simply drilling down to it is not enough. The rock has to be cracked open at high pressure or 'fractured' to get the gas out. Fracking involves drilling up to around 2,500 metres vertically, then laterally out for 1,000 -3,000 metres.

The gap between the borehole liner and the surrounding rock is then sealed up with concrete. The well casing is perforated to allow fracking fluid to get into the rock, and gas to get out. Then, on a typical well, up to 10 million litres of water containing lubricating fluids and other additives, and sand, are pumped into the borehole under extremely high pressures. This opens up cracks in the shale for up to 50 metres. The cracks are kept open by the sand particles when the pressure is released, so the shale gas can escape. A well head is then installed to capture the released gas. The drilling and fracking equipment is then taken away.

Regulatory regime

Each well drilling site currently requires planning permission from the Minerals Planning Authority (MPA) who will require an Environmental Impact Assessment for all proposals for fracking. Drilling itself requires consent from the Department for Energy and Climate Change the Environment Agency and the Health and Safety Executive, as does fracking. The Government is committed to enhancing these procedures so that licensees will be required to carry out a comprehensive high-level assessment of environmental risks, including risks to human health, and

covering the full cycle of the proposed operations, including well abandonment; and to consult with stakeholders, including local communities, as early as practicable in the development of their proposals.

Each shale gas well site requires up to five permits in addition to planning permission: Mining Waste; Radioactive Substances (radon); ground water protection; Industrial Emissions (methane & flaring); on site water treatment and possible discharge. For more on the regulatory regime see *Guidance Note: Regulation of exploratory shale gas operations* (Environment Agency, 2012).

Environmental concerns

The fracking process can cause earth tremors, although their extent and severity are usually quite small. A related concern is whether fracking will open pathways extending away from the well site. Apart from the risks of groundwater pollution, there is also a fear that the shale gas could find its way into people's homes. Escapes into the atmosphere are also an issue. Shale gas is mostly methane, a greenhouse gas 20 times more powerful than carbon dioxide. It has been pointed out that if just 2-4% of shale gas were to escape we'd be better off just burning coal. Industry experts tell us that these possible problems can be avoided by good drilling practice and leak detection. Regulations are being drawn up to ensure this.

Also, while emissions from burning shale gas are much lower than for coal, it's still not all that green. We are told (in the Tyndall Report) that if just 20% of the reserves identified under Lancashire were to be extracted and burnt, this would result in emissions of over 2,000 million tonnes of carbon dioxide, representing around 15% of the Government's greenhouse gas emissions budget through to 2050.

Only a small percentage of the large amount of water used for fracking can be recycled - best practice in Pennsylvania achieves up to 14%, say state authorities. The remainder, containing a range of substances, some of which may be hazardous, stays in the ground.

Countryside concerns

Fracking will entail some degree of unsightly well-pad development in the countryside including boring ten or so wells per pad, equipment storage, vehicle turning space and the creation of onsite water storage. There's drilling of exploratory and production wells, heavy lorries moving equipment, and water to be brought in - up to 300 - 400 tanker loads to initially frack each well and to re-frack as necessary. (Operators Halliburton say that most wells require re-fracking within 3-5 years, and often more than once). Noise pollution is a concern as is light pollution as gas production requires the flaring of gas. On the other hand, gas-bearing shale is widely distributed in the UK, so we should be able to make sure the most sensitive landscapes are avoided.

Energy Security

The UK needs to identify sufficient resources to power future domestic and commercial energy requirements. Currently there is a mixed domestic and import supply and our reliance on imports is set to increase if a replacement source of gas for dwindling North Sea gas supplies is not identified. Shale gas is unlikely to bring down energy prices much in Britain. This is because Europe has a gas grid that allows gas to be traded to the highest bidder. So the UK is unlikely to benefit from substantially lower prices unless other European countries decide to back shale gas too. However, shale gas could yield important revenues to the Exchequer, and create jobs - up to 74,000 according to an estimate by the Institute of Directors.