

# Does fracking have a future in the UK?



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Fracking, short for 'hydraulic fracturing', is the process of extracting oil and natural gas from shale rock underground. It is controversial because the process can cause water pollution, while continued extraction and burning of fossil fuels contribute towards climate change.

A fracking boom has seen US oil production surge to a 50-year high, extracting more barrels than Saudi Arabia in 2015. Extensive shale gas production in the US has rebalanced global markets, reduced energy prices and had geopolitical consequences. Carbon emissions have fallen – especially in the US – as cheap natural gas replaces more polluting coal in power generation. But prospects in Europe, including the UK, and in China are not as promising.

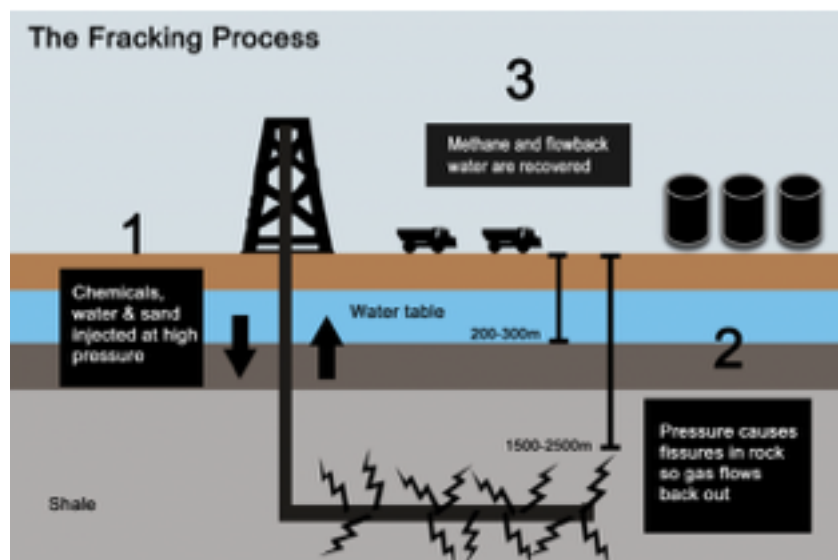


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## What is hydraulic fracturing?

Fracking began in the late 1940s in the US. Beginning in the 1970s, a series of technical developments made it increasingly suitable for use in formations of shale rock that contain oil or gas.

Operators usually drill a vertical well into the shale layer. Then the drill is used horizontally to penetrate sideways. A mixture of water, chemicals and sand is pumped in under high pressure, creating fractures in the shale. Tiny particles of sand prop open the fractures, allowing oil and gas to escape, eventually to the surface.

Chemically, the gas produced from fracked shale wells is identical to that from orthodox wells – methane (CH<sub>4</sub>), also known as natural gas.

Following the boom in US shale oil, the number of natural gas wells almost doubled from 2000-10, allowing 89% of gas consumption to be produced domestically. The recent drop in oil and gas prices has slowed investment and extraction in the US.

The US has largely replaced Saudi Arabia as the swing producer of crude oil, as American rig operations respond to fluctuations in the oil price while Saudi extraction remains constant.

China has found replicating the US experience harder than expected, despite having the largest recoverable shale deposits in the world. China's latest five-year plan outlines aims to produce 15% of its natural gas consumption from shale gas by 2020, outlining it as a policy priority. Within Europe, governments in Bulgaria, France and Germany have banned fracking, while a temporary moratorium has been in place in the Netherlands since 2013.

## Fracking in the UK

The UK contains shale formations bearing oil in the south and gas in the north. The Bowland Shale in the north of England is thought to contain about 1,300 trillion

cubic feet (Tcf) of gas. By comparison, the UK consumes about 3 Tcf per year.

However, only a small proportion of gas in the Bowland can be extracted – perhaps only about 4%. Compared with North America, the shale geology of the UK is considerably more complex, faults are numerous, and drilling costs are substantially higher [pdf link].

Despite this, proponents of UK fracking say that it could duplicate the US experience and lead to a cheap energy boom. Conservative Party ministers have been particularly enthusiastic, with David Cameron saying the government is 'going all out' for shale and Chancellor George Osborne making it a 'personal priority'.

The Conservative government stressed that local councils would decide whether exploration and/or extraction would go ahead, although in August 2015 it was announced that the government would in fact have the final say.

The Institute of Directors calculates that the UK shale industry could support 74,000 jobs, but this is not independently corroborated.

Exploratory drilling in Lancashire, by Cuadrilla, was halted in 2011 after fracking caused earth tremors. Surveys in Balcombe, Sussex were also carried out by Cuadrilla, opposed by local and environmental protesters, although plans to frack were dropped.

A turning point came in April 2016 when North Yorkshire council approved Third Energy's proposal to frack an existing well in Kirby Misperton, despite objections from the majority of the local population. Environmental campaigners fear that this may set the precedent for many more wells to be drilled across the UK.

In October 2016, Communities Secretary Sajid Javid gave the green light to Cuadrilla's proposal to frack at their Preston New Road site. After a two-year

delay due to traffic and noise concerns, permission was granted to frack at four wells.

The [UK Energy Research Centre \(UKERC\)](#) concludes that shale gas will not reduce energy prices or reduce the UK's reliance on gas imports. Gas prices will remain relatively unaffected because the UK is part of a highly [interconnected gas network](#).

'Any talk of shale gas making the UK self-sufficient again, let alone allowing significant exports, is far fetched,' UKERC concludes.

In February 2015, [BP said](#) it did not expect a significant shale gas industry in Europe for the next 20 years.

Public opinion in the UK is divided. Half of the population neither support nor oppose fracking. Of those with a view, [31% are against](#) the process while 21% are in favour, with opposition growing in more recent surveys. This can be compared to renewable energy, which has the support of over 80% of UK adults.

According to government plans, communities where wells are drilled will receive £100,000 plus [1% of future revenues](#). Mr Osborne said tax receipts would be put into a sovereign wealth fund.

The forthcoming Infrastructure Bill will [make it easier](#) for companies to drill for shale gas. The bill includes a provision to allow companies to put '[any substance](#)' under people's homes. Changes were also put forward to [prohibit fracking in areas where drinking water is collected](#) and to prohibit drilling rigs in National Parks (although horizontal drilling can take place underneath).

### **Is fracking an environmental threat?**

Fracking has been linked to a number of issues including groundwater contamination, air pollution, surface water pollution and health problems.

Research supports some of these claims. For example, researchers found evidence

of dissolved methane in [drinking water](#) wells in New York and Pennsylvania associated with shale-gas extraction. Methane is flammable, so can cause [explosions](#). There have been reports of methane bubbling out of [kitchen taps](#). An earthquake of 3.0 magnitude occurred in March 2014 in Ohio within [1km](#) of active fracking operations. But most tremors associated with fracking operations have been smaller, including the [1.5 and 2.2 magnitude](#) events caused by Cuadrilla's operations near Blackpool in 2011.

Surface spills and improper disposal are highly feasible in some areas, especially given the [vast amount of waste fluid](#) to be disposed of. Health impacts can also affect [animals and pets](#). Hazardous air pollution resulting from [volatile compounds](#) is another concern.

There is the potential for [drinking water to be contaminated with toxic chemicals](#). [Hundreds of chemicals](#) are involved in fracking and some can cause [cancer](#), with [pregnant women and children](#) particularly sensitive to health risks. Groundwater near [drilling regions in Colorado](#) had an increased concentration of hormone-disrupting chemicals, while [higher levels of birth defects](#) have been observed near drilling areas.

However, in the U.S, a comprehensive study by the Environmental Protection Agency found that while there were [isolated cases](#) of contamination, fracking for shale oil and gas has not led to widespread pollution of drinking water.

### **Is shale gas good or bad for the climate?**

Shale gas can affect climate change in two ways. Firstly, methane can leak from wells and pipes into the air, where it acts as a greenhouse gas; secondly, shale gas burning can displace either lower-carbon technologies such as renewables, or higher-carbon activities such as coal burning, so increasing or decreasing carbon dioxide emissions.

[Methane release](#) occurs if pipes leak or if wells are not properly sealed with concrete. By weight, methane is 25 times more potent than carbon dioxide as a greenhouse gas.

On the positive side, burning [natural gas](#) releases about half as much carbon dioxide as coal. As long as leakages are well-regulated, UK shale gas could have lower emissions than [importing liquefied natural gas \(LNG\)](#) from Qatar, because less energy is used in processing and transport. In the US, switching to gas for electricity contributed to domestic emission reductions, but globally, it is estimated more than half these reductions were cancelled out by increased coal exports and [coal-burning abroad](#).

In some economies, gas can replace coal as a 'bridge' to a low-carbon

electricity system. However, in the UK this is unlikely.

The Committee on Climate Change calculates that the most economic route to achieving the legally binding target of cutting emissions by 80% from 1990 levels by 2050 includes '[virtually decarbonising](#)' electricity generation by 2030. This timescale led the Environmental Audit Committee to [conclude](#) in January 2015: 'extensive production of unconventional gas through fracking is inconsistent with the UK's obligations under the Climate Change Act'.

The biggest overt commitment to shale gas in the UK is the 2014 announcement from chemicals giant [Ineos](#) of a \$1bn (£665 million) exploration plan. The gas would be used as feedstock for chemicals at the company's Grangemouth plant, rather than as fuel.

