

Reading Text 1

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What is shale gas, how is it extracted through fracking and what are fracking's impacts?

What is shale gas and how much is there globally?

Shale gas is a form of natural gas (mostly methane), found underground in shale rock. It is classified as 'unconventional' because it is **found in shale**, a less permeable rock formation than sandstone, siltstone or limestone in which 'conventional' gas is found, and **it is generally distributed over a much larger area**. Shale is a fine-grained sedimentary rock, with smaller spaces or pores containing gas, and these spaces are relatively unconnected to each other. Therefore natural gas does not flow easily through shale.

Estimates of the volume of shale gas can be **expressed in different ways**. 'Resource estimates' refer to the amount of natural gas that is believed to exist in a particular location. In some cases, technically recoverable resources can be estimated. 'Reserve estimates' refer to the amount of gas that is both technically and economically viable to extract. Reserves typically represent a small percentage of resources and can only be reliably estimated when based on detailed exploration and evaluation, including drilling. **Recovery rates for shale gas are much lower than for conventional gas.**

In 2015, the total amount of 'unproved technically recoverable resources' of shale gas was estimated at **214.6 trillion cubic metres (tcm), across 46 countries**.

The largest estimated resources are in China (31.6 tcm), followed by Argentina (22.7 tcm), Algeria (20 tcm), the United States (17.6 tcm) and Canada (16.2 tcm). In Europe the largest estimated resources lie in Poland (4.1 tcm) and France (3.9 tcm), with 0.7 tcm for the United Kingdom. (All figures from the US **Energy Information Administration**.)

Projections by the **US Energy Information Administration in 2016 estimated** that shale gas would account for 30 per cent of world natural gas production by 2040.

How is shale gas extracted through hydraulic fracturing ('fracking')?

Hydraulic fracturing – commonly known as fracking – is **the process** used to extract shale gas. **Deep holes are drilled** down into the shale rock, **followed by horizontal drilling** to access more of the gas, as shale reserves are typically distributed horizontally rather than vertically. **Fracking fluids containing sand, water and chemicals are then pumped at high pressure into the drilled**

holes to open up fractures in the rock, enabling the trapped gas to flow into collection wells. From there it is piped away for commercial use.

What are the main environmental impacts of fracking?

Fracking can create a variety of **local environmental impacts**. **A study published in 2016** by US Environmental Protection Agency in 2016 found that **fracking can potentially lead to the contamination of drinking water**. **A report published in 2012** by the Royal Society and Royal Academy of Engineering concluded that there was a very low risk of fracking contaminating drinking water in the UK, given the distance between aquifers and the depth at which fracking occurs. These studies indicate that **water contamination can also occur from spillages on the ground, or cracks in wells allowing leakage** – risks faced from all oil and gas extraction – and preventative actions can be taken. **Fracking requires relatively large quantities of water and therefore water extraction could have an impact on supplies at a local level.**

While **natural gas emits significantly lower amounts of carbon dioxide** than coal when consumed to generate electricity, there are concerns that **shale gas extraction could undermine goals for cutting emissions** if it replaces the use of renewables. **Furthermore, some leakage of methane, a powerful greenhouse gas, is possible** during shale gas extraction, and so careful monitoring and checks are required.

Other concerns include local community impacts through potential noise pollution, increased road traffic (due to lorry movement), damage to the natural environment and space required for drilling sites.

Can fracking cause earthquakes?

A report published in 2012 by the Royal Society and the Royal Academy of Engineering in the UK in 2011 concluded **that shale gas extraction** where large quantities of water are pumped under the surface **could in principle cause small earth tremors locally under certain conditions, but that these were unlikely to lead to damage**. It pointed out that any **tremors would be due to injected fluids activating pre-existing faults in the rock, rather than the shattering of the rocks during fracking itself**. The report noted that the risk of seismic activity was greater where pre-stressed faults existed – **identified as having occurred in 2011** at the Preese Hall site in Lancashire, UK – and so **recommended ongoing mapping of faults to identify potentially high-risk sites to avoid.**

The US Geological Survey noted that there has been an increase in seismicity around shale gas operations since 2009 in the state of Oklahoma, but that most of this was due to the disposal of wastewater rather than fracking.

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