



Department
of Energy &
Climate Change

Fracking UK shale: local air quality

February 2014

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Hydraulic fracturing, known as fracking, is a technique used in the extraction of gas and oil from 'shale' rock formations by injecting water at high pressure to open up fractures in the rock to allow gas to flow out. Some people are concerned shale development may cause air pollution. This guide outlines these concerns, the potential impact and what the government and others are doing to manage risks.

In addition, government is actively considering recommendations study by DECC's Chief Scientist, Professor David MacKay, and Dr Tim Stone on potential greenhouse gas emissions from UK production of shale gas.

There are two potential air pollution risks:

- Emissions from well completion and flowback fluids (see below)
- Emissions from production and associated equipment e.g. compressors or trucks.

Operators' responsibilities

Operators will monitor air quality and provide their results to the relevant environmental regulator (the Environment Agency in England, local planning authority in Scotland or Natural Resources Wales) or, when appropriate, to the Health and Safety Executive (HSE). Operators must be able to show that their activities have not led to air pollution at levels higher than those set out in their environmental permits.

Methane emissions

In the UK, all oil and gas operators must minimise the release of gases as a condition of their licence from the Department of Energy and Climate Change (DECC). Natural gas may only be vented for safety reasons. During exploration an operator may find gas that is not economic to recover, in which case they will flare it. This reduces greenhouse gas emissions by about 80% compared to venting.

Operators must also submit a waste management plan to the relevant environmental regulator. In it operators will state what waste gases they expect and how they will minimise them. The Environment Agency may carry out spot-check monitoring and unannounced inspections, depending on the site's risk to the environment.

Most methane emissions occur during well completion after fracking, when the 'frack fluid', a combination of water, sand, hydrocarbon liquids and natural gas, flows back to the surface. To meet their obligations, operators can control these emissions by using 'green completions', equipment that collects and separates the initial flow of water, sand and gas, and separates them so the gas can be handled.

Green completions and flaring can reduce methane emissions by as much as 95% versus venting straight into the atmosphere. We expect green completion technology to develop and become even more effective as the industry develops.

Moving into production, emissions from processing

If a site is commercially viable and an operator receives the necessary approvals (see our planning guide), they can move to production. After well completion, methane emissions during production and processing can come from compressors, pumps, dehydration equipment, chemical processing and incidental leaks (e.g. from pipe joints). These can be reduced by rigorously maintaining the machinery, and using vapour recovery units to limit venting from storage tanks.

The rules for monitoring and reducing emissions during shale production and operation will likely be similar to those enforced during exploration. The Environment Agency and Scotland's local planning authorities will consider the requirements for mining waste permits during these later stages.

Potential impact of trucks, generators and dust

The largest impacts on local air quality are likely to come from on-site diesel generators, exhaust from vehicles travelling to and from the site (typically for the delivery and removal of water), and the dust created by disturbing the soil.

These emissions can be reduced by using diesel machinery with three-way catalytic converters or, in time, electric instead of diesel drills. Vehicle emissions will depend on the site's location: for example how far it is from materials, the local water supply and a suitable waste-water treatment facility. Reuse of water during production could reduce water demand, and thus the amount of vehicle journeys taken. Operators will choose the most effective methods to meet their obligations.

Operators need to submit a dust management plan to the relevant environmental regulator, before they can start drilling. Environmental impact assessments, where required, will consider these emissions before any operations begin. The local environment, and residential areas, must not be harmed by dust. If it is/they are, drilling will be suspended until dust control measures are improved.

For all of these risks, the local authority has overall responsibility for local air quality and developing a strategy to improve it.

After production

Abandonment of wells is subject to HSE regulation in the same way as their construction. Operators must notify the HSE before abandonment, and demonstrate that they will comply with the standards recommended in Oil and Gas UK guidelines. Restoration of the site is subject to planning controls (see planning brief).

Health impacts

Public Health England assessed the risk to human health of extracting shale gas in an October 2013 report.

They evaluated available evidence on issues including air quality, radon gas, naturally occurring radioactive materials, water contamination and waste water. They concluded that "the risks to public health from exposure to emissions from shale gas extraction are low if operations are properly run and regulated."

Climate change

The government will continue to ensure that use of shale gas and oil in the UK aligns with our legally binding climate change targets. Last September Professor David MacKay (DECC's Chief Scientist) and Dr Timothy Stone wrote a report on potential greenhouse gas emissions from UK produced shale gas. They concluded that the overall effect of UK shale gas production on national emissions is likely, with the right safeguards, to be relatively small.

For more information on how development of shale gas resources can be a part of the UK's transition to a low-carbon economy, please see the Climate Change factsheet (<https://www.gov.uk/government/publications/about-shale-gas-and-hydraulic-fracturing-fracking>)

Green completions have been shown to be very effective at reducing greenhouse gas emissions from shale gas operations in the United States.

More information

A [recent study](#) by DECC's Chief Scientist looked at the potential greenhouse gas emissions from shale gas production and discusses its compatibility with global climate change targets

The University of Texas recently [published research](#) into the extent of methane emissions from shale gas pre-production and production stages.

The Department of Energy and Climate Change, Environment Agency (England), Scottish Environment Protection Agency and Health and Safety Executive have worked with the UK Onshore Operators Group to agree best practices for onshore shale gas wells. The [UK Onshore Operators Group's UK Onshore Shale Gas Well Guidelines](#) provide a description of the Hydraulic Fracturing Programme (HFP).

The [British Geological Survey](#) has information on shale gas and groundwater on its website, including information on the national methane baseline study.

The Environment Agency and Health and Safety Executive have published an agreement that explains their [joint approach to the regulation of unconventional oil and gas developments](#).

The [Scottish Environment Protection Agency](#) has more information on environmental regulation in Scotland.

[Natural Resources Wales](#) has more information on environmental regulation in Wales.

The [Air Quality Standards Regulations 2010](#) provide the legislative basis for air quality in England.

The Environment Agency have released [a review of evidence relating to fugitive emissions](#). Fugitive emissions are gases which are released because they can't be captured as they are extracted.

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Department of Energy & Climate Change
3 Whitehall Place
London SW1A 2AW
www.gov.uk/decc
URN 14D/045