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Guidance

Guidance on fracking: developing shale gas in the UK

Updated 12 March 2019

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1. Overview

Hydraulic fracturing, also known as fracking, is a technique which can be used in the extraction of gas from shale rock. It is estimated that more than 2.5 million wells have been hydraulically fractured worldwide.

Shale gas has the potential to provide the UK with greater energy security, economic growth and jobs, and could be an important part of our transition to a low carbon future.

The UK has promising shale reserves: for example the British Geological Survey estimates that the Bowland-Hodder shale in Northern England contains 1300 trillion cubic feet (TTCF) of gas.

However production levels cannot be assumed, so government is encouraging safe and environmentally sound exploration to determine the potential.

Industry will determine what resources are economically viable, and government will ensure the right framework is in place to support industry and local communities as this exploration, and in some cases production, moves forward.

The UK has a strong regulatory regime for exploratory activities, and many decades of experience of regulating the onshore oil and gas industry. We are bringing that experience to bear and measures are in place to ensure on-site safety, prevent environmental contamination, mitigate seismic activity, and to monitor and minimise greenhouse gas emissions.

2. Why do we need gas?

We need gas in every aspect of our lives - for heating and lighting our homes, for transport, and in industry. In 2017 gas met nearly 2 thirds of total domestic energy demand. Over 85% of UK households use gas for heating and around 65% for cooking. In addition to this, around 40% of our electricity generation was sourced from natural gas.

Offshore gas production has been in decline since the year 2000 which has meant that the UK has gone from being a net exporter of gas to importing over half (53%) of gas supplies in 2017 and estimates suggest we could be importing 72% of our gas by 2030.

We believe that it is right to utilise our domestic gas resources to the maximum extent, and to explore further the potential for onshore gas production from shale rock formations in the UK, where it is economically efficient, and where environmental impacts are robustly regulated.

Every scenario proposed by the Committee on Climate Change (CCC) setting out how the UK could meet its legally-binding 2050 emissions reduction target includes demand for natural gas. Shale gas has the potential to be a safe, secure and affordable supply of energy with carbon emissions levels that are consistent with the carbon budgets defined in our Climate Change Act and our international obligations.

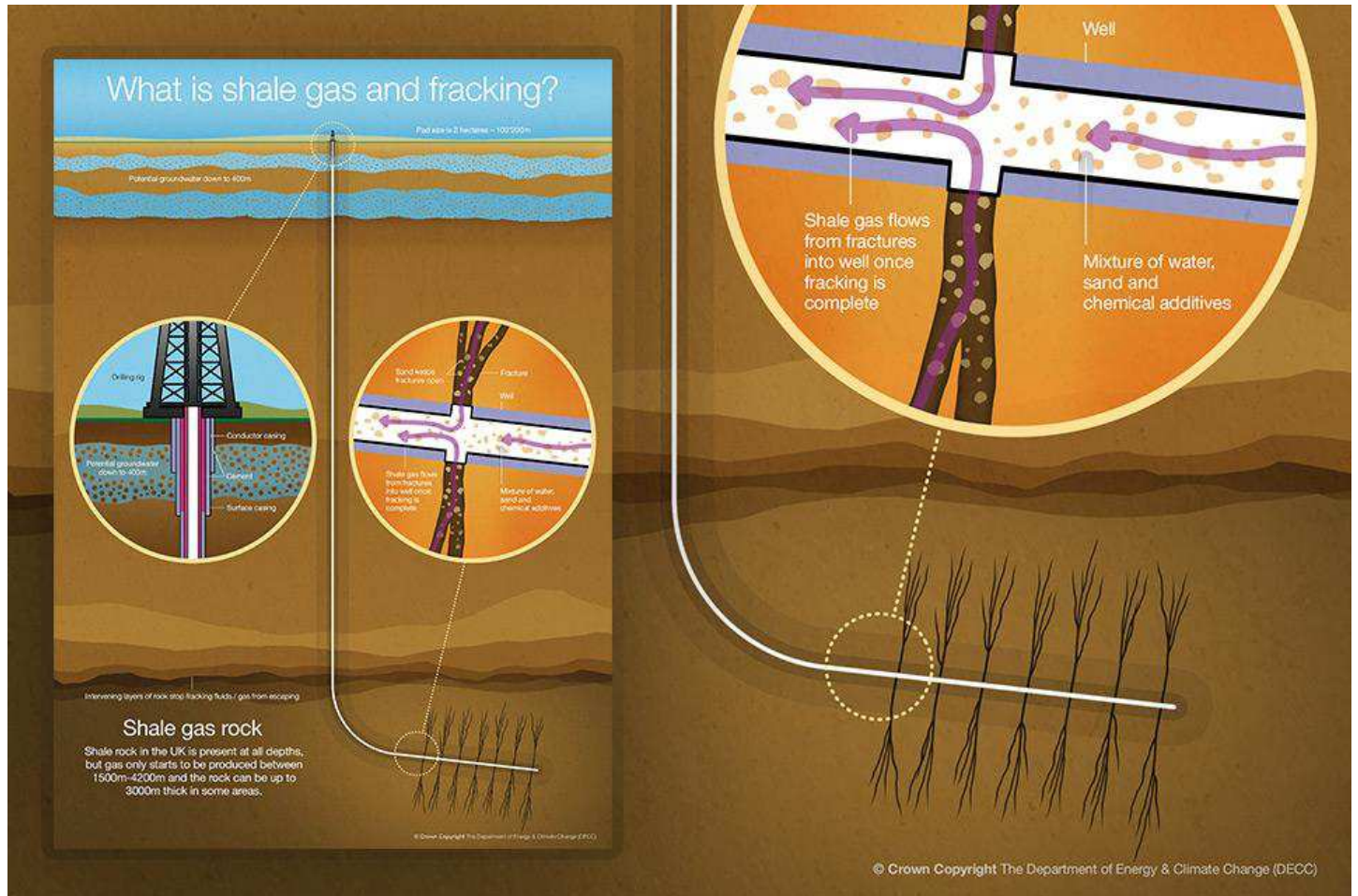
For more information:

- [CCC report: The compatibility of onshore petroleum with meeting the UK's carbon budgets](https://www.theccc.org.uk/publication/onshore-petroleum-the-compatibility-of-uk-onshore-petroleum-with-meeting-carbon-budgets/)
- [BEIS factsheet 1: Shale gas and energy security](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/747940/Factsheet_1_-_Shale_Gas_and_Energy_Security.pdf)

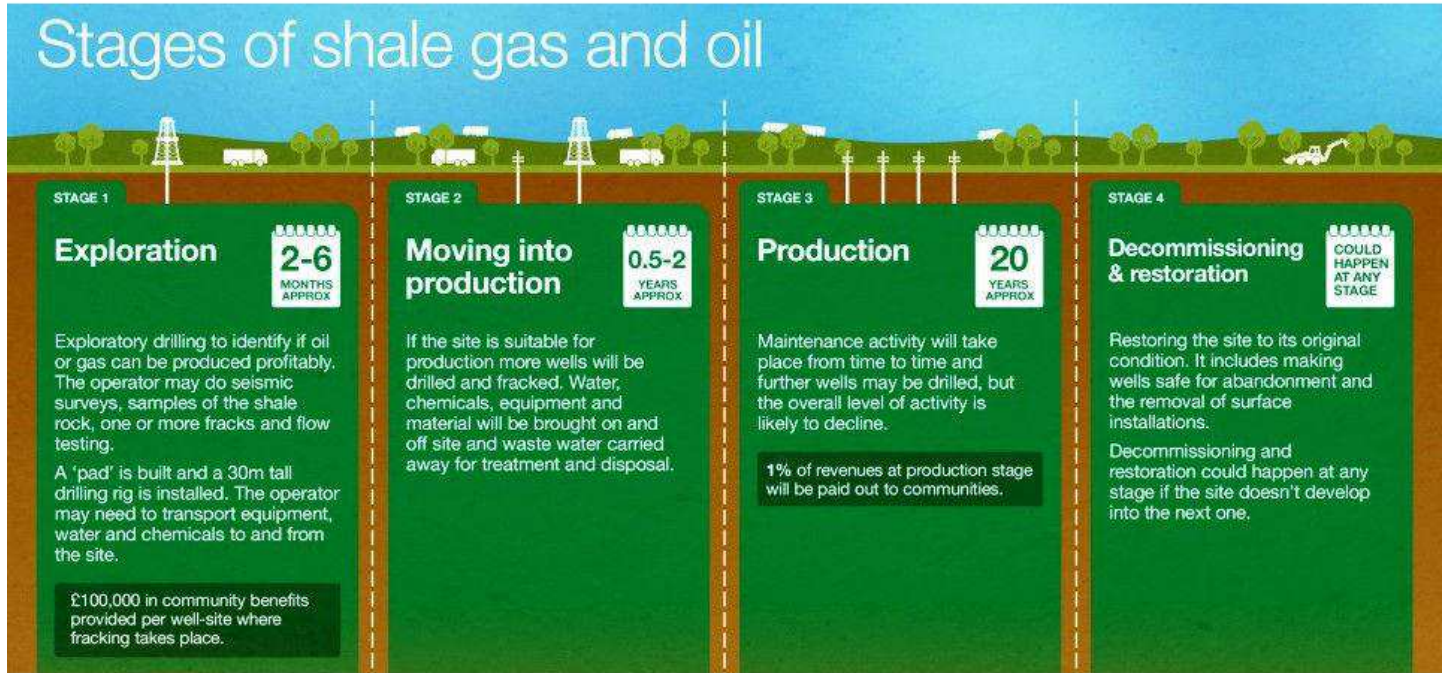
3. What is shale gas and hydraulic fracturing?

This video is available in Welsh:

Hydraulic fracturing, also known as fracking, is a technique used in the extraction of gas from rock formations by injecting fluid at high pressure. Gas from hydraulic fracturing is the same natural gas that is obtained from conventional gas fields, such as the North Sea.

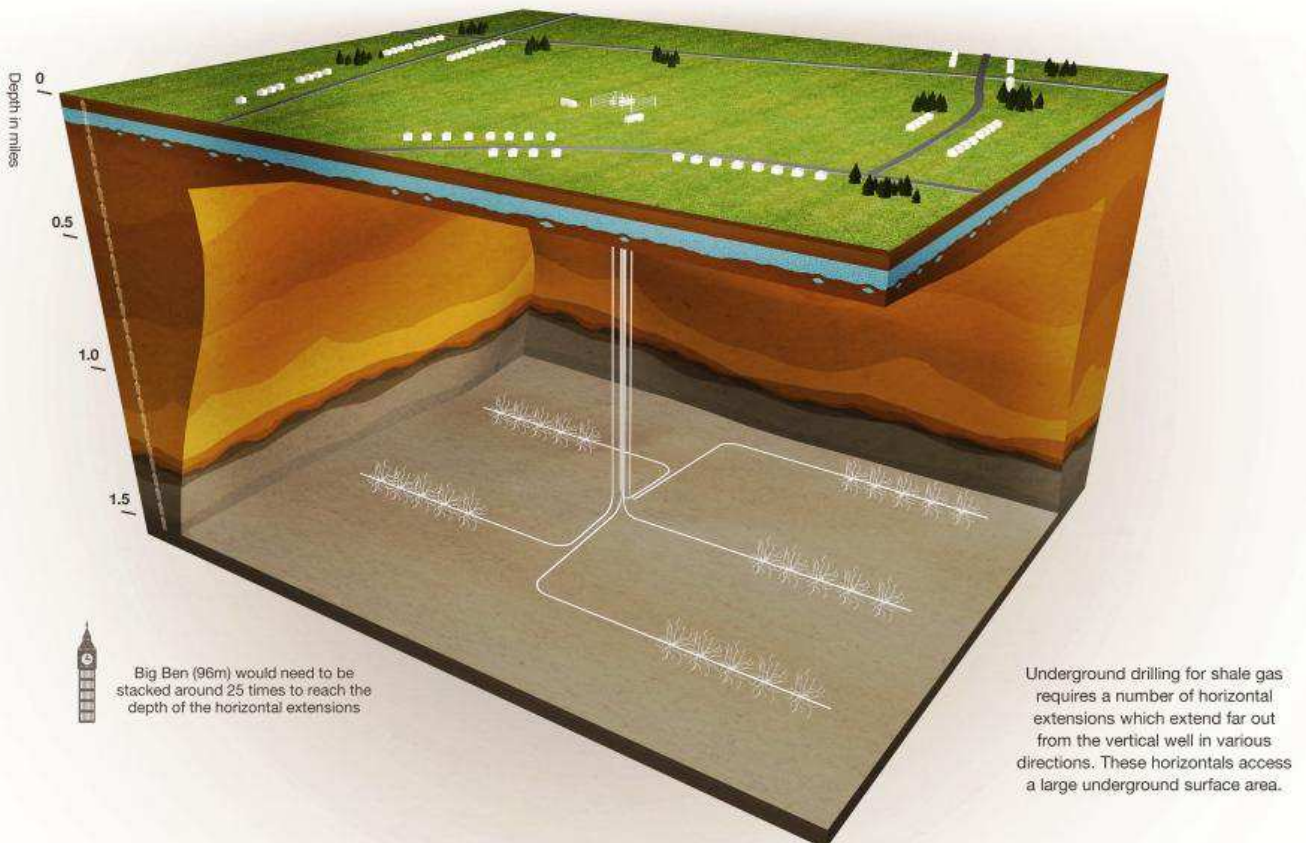


Infographic: What is shale gas and fracking?



Infographic: The stages of shale gas and oil

What might underground drilling for shale gas look like?



Infographic: What underground drilling looks like (3D model)

4. The potential of shale gas and oil

Scientists from the British Geological Survey ([BGS](http://www.bgs.ac.uk/research/energy/shalegas/home.html)) (<http://www.bgs.ac.uk/research/energy/shalegas/home.html>) have estimated that the total volume of gas in the Bowland-Hodder shale in northern England is some 1300 trillion cubic feet (central estimate).

It is the government's view that we must take an evidence-based approach to developing shale gas in the UK, and to do that we need to test how much of the considerable potential in the UK's shale resources can be technically and economically recovered.

5. Evidence on safety and the environment

This video is available in Welsh:

The government takes the safety of the public and protection of the environment very seriously. The government believes that current regulation and planning policy is robust for oil and gas development. However we continue to monitor the effectiveness of our regulations.

The Royal Academy of Engineering and Royal Society have reviewed the scientific and engineering evidence on shale gas.

The review concluded that “the health, safety and environmental risks associated with hydraulic fracturing (often termed ‘fracking’) as a means to extract shale gas can be managed effectively in the UK as long as operational best practices are implemented and enforced through regulation.” The Royal Society has announced that this review will be updated towards the end of 2018.

- The Royal Society review of hydraulic fracturing (<https://royalsociety.org/policy/projects/shale-gas-extraction/report/>)

Public Health England has assessed the risk to human health of extracting shale gas. 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.”

- Public Health England report (<https://www.gov.uk/government/publications/shale-gas-extraction-review-of-the-potential-public-health-impacts-of-exposures-to-chemical-and-radioactive-pollutants-draft-for-comment>)

In September 2013 Professor David MacKay (the then Department of Energy and Climate Change'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. Indeed emissions from the production and transport of UK shale gas would be comparable to imported Liquefied Natural Gas ([LNG](#)), and much lower than coal, when both are used to generate electricity.

- Report on potential greenhouse gas emissions from UK produced shale gas (<https://www.gov.uk/government/publications/potential-greenhouse-gas-emissions-associated-with-shale-gas-production-and-use>)
- [BEIS factsheet 2: Shale gas and climate change](#) (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/750895/Factsheet_2_-_Shale_Gas_and_Climate_Change.pdf)

[BEIS](#) currently grant-funds a research consortium led by the British Geological Survey to deliver a baseline environmental monitoring programme in and around sites in the Fylde (Lancashire) and Kirby Misperton (North Yorkshire), where 2 exploration shale sites are based. The researchers are gathering data on features

including water and air quality, seismicity and ground motion. Data gathering began in the Fylde in January 2015 and in Kirby Misperton in August 2015.

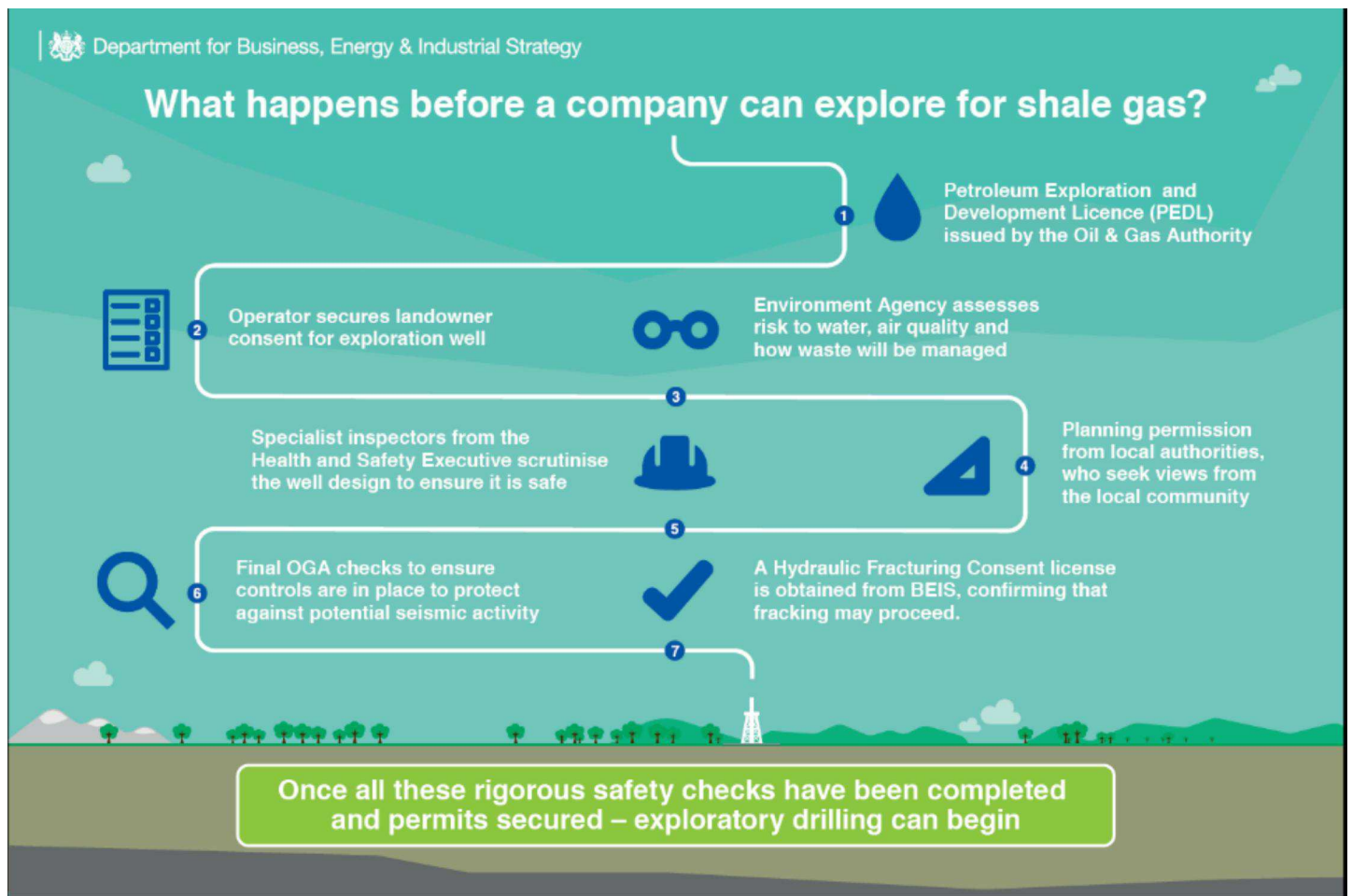
This monitoring will gather data for the environmental baseline in the areas prior to any hydraulic fracturing processes. Future shale gas projects' data can be checked against these baseline data. This allows any significant changes to be flagged for further scrutiny. The investigations are independent of any monitoring carried out by the industry or the regulators, and information collected is freely available to the public.

See the [BGS Environmental Monitoring website](http://www.bgs.ac.uk/research/groundwater/shalegas/monitoring/home.html)

(<http://www.bgs.ac.uk/research/groundwater/shalegas/monitoring/home.html>).

6. Regulation

Before any shale operation can begin in the UK, operators must pass rigorous health and safety, environmental and planning permission processes.



What happens before a company can explore for shale gas?

[BEIS's Regulatory Roadmap](#) provides detailed information on the process operators must follow when seeking to drill for any form of onshore oil and gas in the UK:

- Regulatory Roadmap (<https://www.gov.uk/government/publications/regulatory-roadmap-onshore-oil-and-gas-exploration-in-the-uk-regulation-and-best-practice>)

The Infrastructure Act 2015 (<http://www.legislation.gov.uk/ukpga/2015/7/contents/enacted>) simplifies the procedure for obtaining the right to use underground land 300 metres and below for the purpose of exploiting oil and gas (petroleum) and deep geothermal energy, whilst ensuring that communities benefit and that the UK has a

robust regulatory regime. More information is available in the press statement (<https://www.gov.uk/government/news/infrastructure-act-will-get-britain-building>) and the Infrastructure Act 2015, Sections 43 to 48.

In addition, Section 49 of the Act requires the Secretary of State for Business, Energy and Industrial Strategy to regularly seek, and publish, advice from the Committee on Climate Change on the impact of emissions from the onshore oil and gas sector on the ability of the UK to meet the carbon limits set by the Climate Change Act. It also introduces a range of safeguards (Section 50), such as requiring independent well inspections, monitoring of groundwater, restoration conditions, and banning hydraulic fracturing, also known as fracking, within protected areas.

The regulations (<http://www.legislation.gov.uk/uksi/2016/384/note/made>) that define the protected areas in which hydraulic fracturing is prohibited ensure that the process of hydraulic fracturing can only take place below 1200 metres in specified groundwater areas (source protection zones 1), National Parks, Areas of Outstanding Natural Beauty and World Heritage Sites.

6.1 Oil and Gas Authority (OGA)

The OGA regulates the licensing of exploration and development of England's onshore oil and gas resources. The OGA issues well consents, development programme approvals, completion of work programme approvals and production consents.

Before a company can carry out onshore exploration for oil and gas, a company needs to apply to the OGA for a Petroleum Exploration & Development License (PEDL). PEDLs do not give permission for operations; rather, they grant exclusivity to licensees, in relation to hydrocarbon exploration and extraction (including for shale gas but also for other forms), within a defined area.

As part of the OGA's regulation of onshore hydraulic fracturing operations, it has stringent controls in place to ensure that operators manage the risk of induced seismicity from such operations. If hydraulic fracturing is proposed, operators are required to undertake detailed geological studies and submit a Hydraulic Fracture Plan (HFP) setting out how they will control and monitor the fracturing process and assess the risk of induced seismic events.

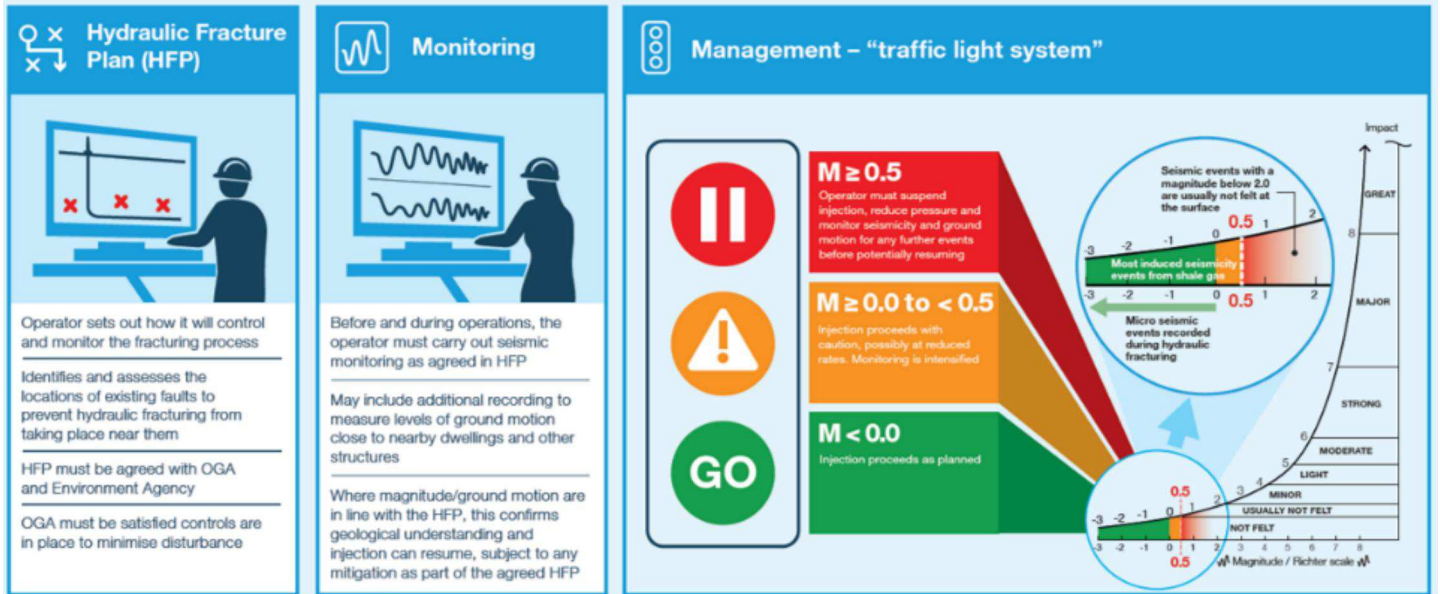
The HFP sets out the steps that the operator has taken to minimise seismic risks and the ways in which the operator will monitor and control the hydraulic fracturing process. This includes detailed geological studies to be undertaken by an operator to assess the risk of seismic activity, and to prevent any hydraulic fracturing operations taking place near geological faults. It must be approved independently both by the OGA and by the Environment Agency (EA), with the Health and Safety Executive (HSE) having had the opportunity to comment.

The OGA requires operators to adhere to certain controls before, during and after hydraulic fracturing operations. The details of these controls are set out in the operator's HFP and will be based on a real-time "traffic light system", describing in detail the operator's monitoring and operational precautions in response to seismic events.

If a seismic event of or above magnitude 0.5ML on the Richter scale is detected, the operator will pause injection operations and reduce well pressure, monitor seismicity and ground motion to determine the cause of the event and whether it is in line with the HFP.

If the event is not in line with what is anticipated in the HFP, the OGA will require further analysis of the cause of the seismic activity before considering whether injection operations can resume. Otherwise operations will resume once it is determined safe to do so.

Managing onshore induced seismicity



Infographic: Seismic activity traffic light monitoring system

Infographic: Seismic activity traffic light monitoring system

(https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/750891/Managing_Seismicity_Infographic_Final.pdf) - PDF version for full screen viewing

6.2 Environmental regulators

The operator needs the landowner's permission and planning permission, which may require an environmental impact assessment. They also need environmental permits from the relevant environment regulator in England, Wales, Scotland, and Northern Ireland respectively:

- the Environment Agency
- Natural Resources Wales
- the Scottish Environment Protection Agency
- Northern Ireland Environment Agency

Currently, however, all planned shale gas developments are located in England. Therefore, the processes described below relate primarily to developments in England. The Environment Agency (EA) ensures that any shale gas operations are conducted in a way that protects people and the environment. The Environment Agency's environmental permitting regulations cover:

- protecting water resources, including groundwater (aquifers) as well as assessing and approving the use of chemicals which form part of the hydraulic fracturing fluid
- appropriate treatment and disposal of mining waste produced during the borehole drilling and hydraulic fracturing process
- suitable treatment and management of any naturally occurring radioactive materials (NORM)
- disposal of waste gases through flaring

The Environment Agency is also a statutory consultee in the planning process and provides local mineral planning authorities (normally the county or unitary local authority) with advice on the potential risks to the environment from individual gas exploration and extraction sites.

The Environment Agency has published a number of factsheets (<https://consult.environment-agency.gov.uk/onshore-oil-and-gas/onshore-oil-and-gas-regulation-information-page/>) relating to shale gas and the work it does to regulate the industry.

6.3 The Health and Safety Regulator

The operator must notify the Health and Safety Executive (HSE) of the well design and operational plans at least 21 days before drilling is due to start. The HSE then inspects the plan for the well design, its construction and maintenance to ensure that the operator has put measures in place to ensure that health and safety risks are effectively managed throughout the life cycle of the well.

Further notifications are required from the operator under the following circumstances:

- material changes to the design and construction of the well
- if the well is re-drilled or side tracked
- any other operation that could result in a loss of well integrity
- during work to abandon the well

The operator must also provide a weekly report gives details of all work that has taken place since the previous report including:

- operations on the well including the results of integrity tests
- the depth and diameter of the borehole
- the depth and diameter of the well casing
- details of the drill fluid density which allows the inspector to gauge the pressure in the well and identify any stability issues

This provides HSE with assurance that the operator is constructing and operating the well as described in the notification. If they are not, HSE will take appropriate regulatory action.

More information about HSE's role can be found at their website (<http://www.hse.gov.uk/shale-gas/about.htm>).

6.4 Joint inspection by EA and HSE

The EA and HSE work closely together to share relevant site information and to ensure that there are no material gaps between safety and environmental protection, and that all material concerns are addressed. Working together, the EA and HSE will meet all new or first-time shale gas operators and advise them of their legal duties under the relevant legislation and conduct a joint inspection of the key operations at the site.

Further details of the EA's and HSE's working together arrangements (<http://www.hse.gov.uk/aboutus/howwework/framework/aa/hse-ea-oil-gas-nov12.pdf>)

6.5 Hydraulic fracturing consent

Section 50 of the Infrastructure Act 2015 inserted section 4A into the Petroleum Act 1998. Under this legislation, hydraulic fracturing can only take place with the consent of BEIS. Hydraulic fracturing consent (HFC) will not be issued unless 13 conditions are met and BEIS is otherwise satisfied that it is appropriate. The conditions relate to a variety of environmental and social factors including emissions and community benefits. The operator must also demonstrate its financial resilience prior to HFC being granted. The operator then seeks final well consent from the OGA.

6.6 Shale Environmental Regulator Group

The Shale Environmental Regulator Group (SERG) was announced on 5 October 2018. This virtual group will act as a single-entry point for information related to the environmental regulation of the shale gas industry and bring regulators together to act as one coherent single face for operators, the mineral planning authorities and the public.

The Shale Environmental Regulator Group (<https://www.gov.uk/government/groups/shale-environmental-regulator-group>)

The SERG will ensure a smooth interface between the Environment Agency (EA), the Health and Safety Executive (HSE) and the Oil and Gas Authority (OGA) so the environmental aspects of shale regulation work effectively. Each regulator will continue to retain its own independent regulatory functions, duties and enforcement powers as set out in law.

The SERG consists of 2 workstreams:

1. A Planning Authority Liaison will share knowledge and information with mineral planning authorities, who are considering shale gas applications, on environmental regulation processes. Each mineral planning authority has been given the name of a key contact from each of the three regulators to engage directly.
2. Coordinators who work across EA, HSE and the OGA and act as a single point of contact for operators. They will co-ordinate regulation of shale gas sites, liaise with the operator to help them understand and plan for the regulatory process and facilitate progress and resolution of issues. The coordinator role will be staffed by EA staff.

For more information on the virtual Shale Environmental Regulator Group please visit the regulatory body sites:

- The Environment Agency: Onshore oil and gas regulation - information page (<https://consult.environment-agency.gov.uk/onshore-oil-and-gas/onshore-oil-and-gas-regulation-information-page/>)
- The Health and Safety Executive (<http://www.hse.gov.uk/offshore/unconventional-gas.htm>)
- The Oil and Gas Authority (OGA) (<https://www.ogauthority.co.uk/onshore/the-shale-environmental-regulator-group-serg/>)

7. Community and public engagement

The shale gas industry has set its commitment to community engagement in its Charter. This Charter sets out what communities can expect from companies developing shale in their areas. Operators will engage communities in advance of any application for planning permission and then again at each stage of development.

The industry has committed to a package for communities that host shale development. This includes:

- at exploration stage, £100,000 in community benefits per well-site when hydraulic fracturing takes place
- 1% of revenues at production stage will be paid out to communities
- operators will publish evidence each year of how they have met these commitments

Some operators have decided to go further than this, for example by providing community benefits. This Charter and offer to communities will be regularly reviewed as the industry develops and operators consult with communities.

- The Community Charter, UK Onshore Oil and Gas (the trade body for companies developing shale gas and oil) (<http://www.ukoog.org.uk/community/charter>)

In addition to this, the government has announced that it will create a Shale Wealth Fund to ensure that communities which host shale sites can share the benefits of shale development. The fund will initially consist of up to 10% of tax revenues arising from shale gas production, a proportion of which could be paid out to each community over 25 years. The government has consulted (<https://www.gov.uk/government/consultations/shale-wealth-fund>) on the priorities and delivery models for the Shale Wealth Fund.

7.1 The Commissioner for Shale Gas

The department announced a new role for a Commissioner for Shale Gas on 5 October 2018. The primary focus of the role is to act as a point of contact for members of the public, pointing them directly to clear, factual guidance on shale gas regulation and developments. They will also feedback comments to industry and regulators on their engagement with the public.

The Commissioner for Shale Gas is an independent role who will:

1. Listen to the concerns of local residents in areas with planning applications for shale gas (and exploratory drilling).
2. Work with local residents, local elected representatives and MPs to ensure that legitimate concerns are addressed by the industry, regulators and government.
3. Help to improve understanding of shale gas with impartial and fact-based information.
4. Report back to government on what changes could be made to address the concerns of local residents.
5. Work closely with the Shale Environmental Regulator Group as well as the new Planning Brokerage Service to ensure accurate and timely information is available to residents.

For more information please visit the Commissioner for Shale Gas webpage (<https://www.gov.uk/government/organisations/shale-commissioner>).

8. Exploration in your area

Oil and gas sites have long been part of the landscape in many parts of Great Britain, with around 2,100 onshore wells drilled.

The 14th Onshore Oil and Gas Licensing Round (<https://www.ogauthority.co.uk/licensing-consents/licensing-rounds/onshore-licensing-rounds/#tabs>) was launched on 28 July 2014 and closed on 28 October 2014. The OGA offered licences for a total of 159 blocks.

Licences themselves do not give consent for drilling or any other operations (see effective regulation above). Questions about future activity should be addressed to the operator. The industry has committed to early engagement with local communities to identify and address local issues and concerns proactively among other things.

All onshore licences in the UK (<http://www.ogauthority.co.uk/onshoremap>)

9. Government development of shale gas industry

The government established the Office of Unconventional Gas and Oil (OUGO) (<https://www.gov.uk/government/groups/office-of-unconventional-gas-and-oil-ougo>) in December 2012 to develop the shale gas industry in the UK. Now known as the Oil and Gas Exploration and Production team as part of the

Department for Business, Energy and Industrial Strategy ([BEIS](#)), the office works closely with regulators and the industry to ensure that the regulatory regime is as clear and simple as possible while protecting the environment and ensuring public safety.

We are taking steps to encourage the safe and environmentally sound development of shale gas, for example:

- Hydraulic Fracturing Consent ([HFC](#)) was introduced by Section 50 of the Infrastructure Act 2015 (inserted as Section 4A of the Petroleum Act 1998), as an additional step to the existing regulatory and permitting regime, to be determined by [BEIS](#)
- in 2016 the government introduced The Onshore Hydraulic Fracturing (Protected Areas) Regulations 2016. These regulations ensure that the process of hydraulic fracturing cannot take place within 1,200 metres beneath the surface of protected areas and areas that are most vulnerable to groundwater pollution
- separately in 2016 the government amended The Petroleum Licensing (Exploration and Production) (Landward Areas) Regulations 2014 to specify in licence conditions that hydraulic fracturing will not be permitted in wells drilled from protected areas
- in February 2017 the government published guidance for Licensees in Great Britain for submitting an application for [HFC](#)
- in January 2018 the government announced that, as a matter of policy, alongside any applications for Hydraulic Fracturing Consent an assessment should be undertaken of the financial resilience of companies proposing to carry out hydraulic fracturing operations
- in the Written Ministerial Statement of May 2018 the government announced a £1.6 million shale support fund and the creation of a new shale planning brokerage service through [MHCLG](#)
- in Summer 2018 an initial consultation on the inclusion of shale gas production in the Nationally Significant Infrastructure Projects regime was opened by [BEIS](#)
- additionally in Summer 2018, an early-stage consultation on the principle of granting planning permission for non-hydraulic fracturing shale gas exploration development through a permitted development right was opened by [MHCLG](#)
- in October 2018 the government announced the appointment of an independent Commissioner for Shale Gas
- in October 2018 the government announced the formation of the virtual Shale Environmental Regulatory Group ([SERG](#))

10. Related documents

Shale gas related documents can be found on the 'Development of onshore oil and gas industry in the UK' document collection page (<https://www.gov.uk/government/collections/shale-oil-gas-and-fracking>)