



## BRIEFING PAPER

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# Shale gas and fracking

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## Summary

Hydraulic fracturing (known as fracking) is a technique used to extract gas or oil from subterranean rock. The process involves injecting a mixture of water, sand and chemicals (known as 'fracturing fluid') at high pressure into horizontally drilled boreholes to fracture the rock and release gas or oil. Hydraulic fracturing is not a new technique and has been carried out both offshore and onshore in the UK for many years. However, fracking for shale gas in the UK had only reached the very early stages (exploration).

On 2 November 2019, the UK Government announced that it would take a presumption against issuing any further Hydraulic Fracturing Consents in England. All the main opposition parties (Labour, Scottish National Party, Liberal Democrats, Plaid Cymru and the Green Party) are opposed to fracking and have committed to stop or ban the practice. Similarly, each of the devolved Administrations have planning measures in place which prevent or create a presumption against unconventional oil and gas development (which includes shale gas). The licensing of onshore oil and gas has been devolved to Scotland and Wales. The Scottish Government confirmed its final policy position of no support for unconventional oil and gas in October 2019; the Welsh government confirmed that fracking would not be supported in Wales in December 2018.

Prior to its November 2019 announcement, the [UK Government was encouraging shale gas exploration](#) to determine its potential to provide the UK with greater energy security, growth and jobs. The Government had introduced a number of measures to support such exploration, including:

- Sharing the proceeds of the wealth generated with communities affected;
- Proposing legislation to change planning law and policy;
- Setting up a new Shale Environmental Regulator.

Before commencing drilling operations for onshore oil and gas development (including shale gas) an operator must attain several permissions, including a petroleum exploration and development licence (PEDL), planning permission (unless permitted development rights apply) and environmental permits. For hydraulic fracturing for shale the last of these permissions is a Hydraulic Fracturing Consent issued by the Secretary of State for Business, Energy and Industrial Strategy which is only issued once a list of pre-conditions are satisfied. Prior to the Government's presumption against issuing such consents, only two such consents were issued: both to Cuadrilla Bowland Ltd for two separate wells on its Preston New Road Site in Lancashire. Work at these sites has been paused.

# 1. Onshore hydraulic fracturing (fracking)

## 1.1 What is fracking?

Hydraulic fracturing (known as fracking) is a technique used to extract gas or oil from subterranean rock by injecting a mixture of water, sand and chemicals (known as 'fracturing fluid') at high pressure into horizontally drilled boreholes. The water mixture opens up cracks (or 'fractures') in the rock and the sand lodges into the spaces to keep them open, allowing the released gas/oil to flow out. Fracturing fluid flows back to the surface (known as 'flowback') over the lifetime of the well.

A detailed explanation of shale gas and fracking, including FAQs, is available on the [British Geological Survey webpages on shale gas](#).<sup>1</sup>

Broadly speaking the fracking process for shale gas (see Box 1) can be divided into the following stages:

- 1 **Exploration (approx. 2-6 months):** a pad is built and a drilling rig installed to carry out exploratory drilling to identify if shale gas/oil can be produced profitably. Typically a small number of vertical wells are drilled (perhaps two or three). This stage can involve activities such as seismic surveys, transport of equipment, water and chemicals in and out of the site, and one or more fracks. Fracking for shale gas in the UK is at exploration stage.
- 2 **Moving into production (approx. 6 months-2 years):** if the site is found suitable for production, more wells may be drilled and fracked.
- 3 **Production (approx. 20 years):** this involves the commercial production of shale gas. Horizontal wells are likely to be drilled and fractured. However, overall level of activity likely to decline. Some maintenance activities and possibly some further wells may be drilled.
- 4 **Decommissioning and restoration:** similarly to any other well, once a shale gas well reaches the end of viable production life, the site is abandoned and restored to its original condition. This can involve filling sections of the well with cement to prevent gas flowing up, and covering wells with a cap. This can happen at any stage, depending how the particular site develops.<sup>2</sup>

Detailed information on fracking is available on the [Gov.UK page: Guidance on fracking: developing shale gas in the UK](#).

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<sup>1</sup> British Geological Survey, [Shale Gas](#) [accessed 3 October 2018]

<sup>2</sup> See: Royal Society and Royal Academy of Engineering 2012 [Report on Shale gas extraction in the UK](#); and Gov.uk, [Guidance on fracking: developing shale gas in the UK](#), 13 January 2017 [accessed 20 September 2018]

### Box 1: What is shale gas?

Shale is a common type of sedimentary rock. Shale gas is a natural gas mostly composed of methane, which can be found trapped in shale with very low permeability. It is referred to as an 'unconventional' gas. It does not readily flow into a well without additional intervention (such as fracking).

Conventional gas is found in more permeable 'reservoir' rock formations (such as sandstones and carbonates). If it is trapped in the reservoir rock by overlying impermeable rock (referred to as 'cap' or 'seal' rocks) the gas can be extracted by drilling through the cap rock into the reservoir.

The ReFINE [factsheet on fracking FAQs](#) provides a simple overview of shale and shale gas.<sup>3</sup> [ReFINE](#) is a research consortium on fracking led by Newcastle and Durham Universities.

Hydraulic fracturing is not a new technique, nor is it only used to extract shale gas/oil. In the UK, offshore fracking in the North Sea has been a commonplace activity for many years and onshore fracking has been carried out since the 1970s. The Royal Society and Royal Academy of Engineering 2012 [Report on Shale gas extraction in the UK](#) provides further context:

Over the last 30 years, more than 2,000 wells have been drilled onshore in the UK, approximately 200 (10%) of which have been hydraulically fractured to enhance recovery. The combination of hydraulic fracturing and directional drilling allowed the development of Wytch Farm field in Dorset in 1979. Discovered by British Gas in the 1970s and operated by British Petroleum since 1984, the field is responsible for the majority of UK onshore oil production and is Europe's largest onshore oil field. Over 200 wells have been drilled. Drilling vertically onshore then horizontally out to sea has proved more cost-effective than building offshore platforms, allowing oil to be produced beneath the Sandbanks estate, Bournemouth, from oil reservoirs 10km away. In 1996, British Gas hydraulically fractured a well in the Elswick Gas field in Lancashire (4.5km from Cuadrilla's Preese Hall well). Gas has been produced from it ever since. In the 1990s, several wells were also fractured in the UK to extract coal bed methane.<sup>4</sup>

Further explanation is provided by the Gov.uk guidance [England: Onshore oil and gas exploration in the UK: regulation and best practice](#):

What is the history of hydraulic fracturing and unconventional gas development in the UK?

The UK has experience of hydraulic fracturing and directional drilling for non-shale gas applications. The first UK well to encounter shale gas (accidentally) was drilled in West Sussex in 1875 (Netherfield) and in 1895 the nearby Heathfield well produced enough gas to light the local railway station until well into the 20th century. Advances in directional drilling (involving record-breaking offsets up to 11km) have enabled the development of the Wytch Farm field onshore and offshore Dorset. Discovered by British Gas in the 1970s and now operated by Perenco, the field is responsible for the majority of UK onshore oil production and is a giant oil field, with over 200 wells drilled and reserves of 500 million barrels of oil. Drilling vertically onshore then horizontally out to sea has proved more cost effective and environmentally sensitive than building offshore platforms.

<sup>3</sup> ReFINE, [Frequently Asked Questions about Fracking](#) [accessed 25 September 2018]

<sup>4</sup> The Royal Society and The Royal Academy of Engineering, [Report on Shale gas extraction in the UK](#), 2012 [accessed 10 September 2018]

Horizontal drilling has also allowed the operator to choose drilling locations away from environmentally sensitive areas. The first hydraulic fracturing of onshore conventional UK wells was done in the late 1950s, and it has been a common field operation to increase flow rates since then. Offshore, tight (low permeability) sandstone wells are also now commonly hydraulically fractured. In the 1990s, several wells were also fractured in the UK to improve coal bed methane flow rates, but this is not always necessary for CBM. In the mid-1980s research began into the potential for gas production from UK shales.<sup>5</sup>

This briefing paper focuses on onshore hydraulic fracking for shale gas and recent policy and regulatory developments.

### 1.2 Government position on fracking

On 2 November 2019, the UK Government announced that it would take a presumption against issuing any further Hydraulic Fracturing Consents in England, effectively creating a moratorium.<sup>6</sup> The Government decision was taken on the basis of an interim report by the Oil and Gas Authority which found that it is not currently possible to accurately predict the probability or magnitude of earthquakes linked to fracking operations.<sup>7</sup> The Government press release stated that this also means that existing exploratory work to determine whether shale could be a new energy source has been “paused”. More information on hydraulic fracking consents is set out in section 3 of this paper, and on seismic events is set out in section 4 of this paper.

On 4 November, the UK Government set out the basis for the policy change in a Written Ministerial Statement including the following:

The Oil and Gas Authority summary report contains a number of findings and interim conclusions and highlights that the causes of seismicity are highly dependent on local geology. While we cannot draw definitive direct comparisons between this site-specific evidence and other prospective shale gas sites, the limitations of current scientific evidence mean it is difficult to predict the probability and maximum magnitude of any seismic events, either in the Fylde or in other locations.

The Government has always been clear that we will take a precautionary approach and only support shale gas exploration if it can be done in a safe and sustainable way, and that we will be led by the science on whether this is indeed possible. It remains our policy to minimise disturbance to those living and working nearby, and to prevent the risk of any damage.

[...]

On the basis of the current scientific evidence, Government is confirming today that it will take a presumption against issuing any further Hydraulic Fracturing Consents. This position, an effective moratorium, will be maintained until compelling new

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<sup>5</sup> Gov.uk guidance [England: Onshore oil and gas exploration in the UK: regulation and best practice](#), p.8 [accessed 5 October 2018]

<sup>6</sup> Gov.uk press release, [Government ends support for fracking](#), 2 November 2019 [accessed 7 November 2019]

<sup>7</sup> OGA, [Preston New Road – PNR 1Z – Hydraulic Fracturing Operations Data](#) [accessed 7 November 2019]



evidence is provided which addresses the concerns around the prediction and management of induced seismicity. While future applications for Hydraulic Fracturing Consent will be considered on their own merits by the Secretary of State, in accordance with the law, the shale gas industry should take the Government's position into account when considering new developments.<sup>8</sup>

The Government also confirmed that the proposals to change the planning process for fracking sites will no longer be taken forward (see background in section 3.3 below). The Government press release confirmed that this position would be maintained unless compelling new evidence is provided. Other sources of natural gas will continue to contribute to the UK's energy mix. The Government has since confirmed that it has no plans to turn the moratorium into a ban.<sup>9</sup>

### Government approach prior to November 2019

Prior to the announcement in November 2019, the UK Government was encouraging shale gas exploration to determine its potential to provide the UK with greater energy security (see Box 2), growth and jobs.<sup>10</sup> Building on its [2017 Conservative party manifesto](#) the Government had introduced, or planned to introduce, a number of measures to support fracking, including:

- Sharing the proceeds of the wealth generated with communities affected (see section 3.8 of this paper)
- Legislating to change planning law and policy (see section 3.3 of this paper)
- Setting up a new Shale Environmental Regulator (see section 3.6 of this paper).<sup>11</sup>

In a written ministerial statement on 25 January 2018 ([HCWS428](#)) the then Secretary of State for Business, Energy and Industrial Strategy (Greg Clark) provided the following summary of the Government's then position:

Exploring and developing the UK's shale gas resources could bring substantial benefits and the government's view is that there is a national need to develop these resources in a safe, sustainable and timely way. As set out in the Clean Growth Strategy, the government is fully committed to the development and deployment of low carbon technologies for heat and electricity generation. As we move towards this low carbon economy, natural gas will continue to play an important role in our energy system. The government is confident that the right protections are in place to explore shale safely and has always been clear that shale development must be safe and environmentally sound.<sup>12</sup>

In a further written ministerial statement on 17 May 2018 the then Secretary of State provided the following summary of the Government's

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<sup>8</sup> [HCWS68](#), 4 November 2019

<sup>9</sup> HL Deb, 9 January 2020, [Col 301-302](#)

<sup>10</sup> Gov.uk, [Guidance on fracking: developing shale gas in the UK](#), 13 January 2017 [accessed 20 September 2018]

<sup>11</sup> The Conservative and Unionist Party Manifesto 2017, [Forward, together](#), 2017

<sup>12</sup> [HCWS428](#) [on energy policy] 25 January 2018

view of the role shale gas has to play in the UK's energy mix and as a new economic driver:

[...] Our current import mix, via pipelines from Norway and Continental Europe and LNG terminals that can source gas from around the world, provides us with stable and secure supplies. However, we believe that it is right to utilise our domestic gas resources to the maximum extent and exploring further the potential for onshore gas production from shale rock formations in the UK, where it is economically efficient, and where environment impacts are robustly regulated.

We also believe that further development of onshore gas resources has the potential to deliver substantial economic benefits to the UK economy and for local communities where supplies are located by creating thousands of new jobs directly in extraction, local support services, and the rest of the supply chain. A potential new shale gas exploration and production sector in the shale basins of England could provide a new economic driver. We also see an opportunity to work with industry on innovation to create a "UK Model" - the world's most environmentally robust onshore shale gas sector - and to explore export opportunities from this model, a core theme of our modern industrial strategy.

But to achieve these benefits, we need to work with responsible companies prepared to invest in this industry as they proceed with the exploration process, to test the size and value of the potential reserves and to ensure that our planning and regulatory systems work appropriately whilst assisting local councils in making informed and appropriate planning decisions.<sup>13</sup>

### Box 2: Shale gas and UK energy security

One of the arguments the UK Government used in support of fracking is that it would increase the UK's energy security by securing domestic supplies of fuel. The UK has been a net importer of both oil and gas since the early 2000s, and import dependency has increased despite reduced demand, due to falling domestic production such as in the North Sea. The large majority of UK gas imports come via pipeline from Norway. Other important sources are Liquefied Natural Gas (LNG) from Qatar and pipelines with Belgium and the Netherlands.<sup>14</sup>

Increasing domestic production would reduce the need for imports. Aside from fracking, successive Governments have also introduced reforms aimed at helping North Sea production. At present, the Government's annual Statutory Security of Supply report to Parliament suggests that gas supplies are secure. On gas the 2019 report states:

GB's gas system has delivered securely to date and is expected to continue to function well, with a diverse range of supply sources and sufficient delivery capacity to more than meet demand. The UK Continental Shelf (UKCS) remains a major source of gas in the GB market, with the remainder imported from a variety of sources, including pipelines from Norway, interconnection with the Continent through the IUK and BBL pipelines and some of the largest liquefied natural gas (LNG) import infrastructure in Europe. There are a range of future supply outlooks, but all show sufficient gas available from the combination of domestic, regional and global markets.<sup>15</sup>

National Grid, who operate GB's electricity and gas networks, produce an annual report on [Future Energy Scenarios](#), which suggests four possible scenarios of GB's future energy needs. On gas the 2019 scenarios state:

<sup>13</sup> [HCWS690](#) [on energy policy] 17 May 2018

<sup>14</sup> Department for Business, Energy and Industrial Strategy, [Digest of UK Energy Statistics 2018](#) Table G.5

<sup>15</sup> Department for Business, Energy and Industrial Strategy and Ofgem, [Statutory security of supply report 2019](#), 2019



UK Continental Shelf (UKCS) production declines in all scenarios, but with more support for extended use in the centralised scenarios;

- Gas demand in one scenario is similar to current levels in 2050 but over 73 per cent is transformed into electricity or hydrogen, via processes decarbonised by Carbon Capture Usage and Storage;
- Green gas makes up 46% of the total gas supply by 2050 in another scenario;
- Shale gas replaces UKCS as the primary source of gas in another scenario;
- Imported gas makes up between 49 per cent and 87 per cent of total gas supply by 2050.<sup>16</sup>

## 1.3 Proposals to ban fracking

**The Labour Party**, as part of its energy commitments in its manifesto for the 2019 General Election, undertook to:

...immediately and permanently ban fracking<sup>17</sup>

The Labour Party also proposed a new clause for the *Environment Bill 2019-20* which would have the effect of banning fracking in England. The Member's explanatory statement explained that the new clause would:

[...] prevent the Oil and Gas Authority from being able to provide licences for hydraulic fracturing, exploration or acidification, and would revoke current licences after a brief period to wind down activity.<sup>18</sup>

Due to the Coronavirus pandemic, the Public Bill Committee proceedings for the *Environment Bill* were adjourned on 19 March 2020 to a time and date to be fixed by the Chair. The proposed new clause on fracking was not debated in the Committee proceedings held between 10-19 March.<sup>19</sup> Further information on the Bill is available in the [Commons Library analysis of the Environment Bill 2019-20](#).

**The Scottish National Party**, in their manifesto for the 2019 General Election, in the section on Climate Change as one of their commitments on the energy mix, said:

### **Opposing Fracking**

Following a comprehensive period of evidence gathering and consultation, the SNP Scottish Government has set out a finalised policy of no support for unconventional oil and gas – such as 'fracking' - in Scotland.

This means the Scottish Government will not issue licences for new unconventional oil and gas development, and that Scotland's planning framework will not support development using unconventional oil and gas extraction techniques, including coal bed methane and hydraulic fracturing, commonly known as 'fracking'.<sup>20</sup>

<sup>16</sup> National Grid, [Future Energy Scenarios](#), July 2019

<sup>17</sup> [It's time for real change: The Labour Party Manifesto 2019](#), p15

<sup>18</sup> House of Commons [Notices of Amendments given up to and including 20 March 2020](#), Public Bill Committee, Environment Bill, NC3

<sup>19</sup> [Environment Bill 2019-20](#), Committee debate: compilation of sittings so far, 19 March 2020

<sup>20</sup> [Stronger for Scotland, the Scottish National Party Manifesto 2019](#), p32

**The Liberal Democrats**, in their manifesto for the 2019 General Election, listed as one of their first priorities for the next Parliament under their Plan for a Green Society and a Green Economy:

...banning fracking for good<sup>21</sup>

Included in their policies on renewable energy was to:

Ban fracking because of its negative impacts on climate change, the energy mix and the local environment.<sup>22</sup>

A Private Members Bill which would prohibit licensing for onshore hydraulic fracturing activities and to search and bore for petroleum was introduced in the Lords on 15 January 2020 by Liberal Democrat Baroness Sheehan. The [Petroleum \(Amendment\) Bill \[HL\] 2019-21](#) would also amend the principal objective for the Oil and Gas Authority to meeting the carbon reduction target for 2050 under the *Climate Change Act 2008*. The Bill is awaiting a date for second reading.<sup>23</sup>

**Plaid Cymru**, in its manifesto for the 2019 General Election, among its environment and climate change commitments, undertook to:

Seek a complete ban on fracking and new open-cast coal mines.<sup>24</sup>

**The Green Party**, in its manifesto for the 2019 General Election, under its proposals for a Green New Deal for energy, undertook to:

Ban fracking, and other unconventional forms of fossil fuel extraction, now and forever.<sup>25</sup>

## 1.4 Approach in the devolved Administrations

### Scotland

Licensing of onshore oil and gas extraction was devolved to Scotland by the *Scotland Act 2016*.<sup>26</sup>

The Scottish Government does not support the development of unconventional oil and gas in Scotland. On 28 January 2015, the Scottish Government put in place a planning moratorium on unconventional oil and gas development in Scotland, which temporarily prevents hydraulic fracturing and coalbed methane extraction taking place.<sup>27</sup> A Strategic Environmental Assessment and Business Regulatory Impact Assessment was carried out and considered by the Government prior to the preferred policy position being finalised.<sup>28</sup> A [consultation](#) on these documents was launched on 23 October 2018, and ran for eight weeks.<sup>29</sup> On 3 October 2019, the Scottish Government confirmed its final policy position of no support for unconventional oil and gas:

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<sup>21</sup> [Stop Brexit and Build a Brighter Future: the Liberal Democrat Manifesto 2019](#), p40

<sup>22</sup> *ibid*, p42

<sup>23</sup> See [Petroleum \(Amendment\) Bill \[HL\] 2019-21 Bill pages](#) for latest information

<sup>24</sup> [Wales, It's Us – Plaid Cymru General Election Manifesto 2019](#), p65

<sup>25</sup> [If Not Now, When? The Green Party Manifesto 2019](#), p11

<sup>26</sup> Responsibility for the onshore oil and gas licensing regime in Scotland transferred to Scottish Ministers on 9 February 2018.

<sup>27</sup> Scottish Government, [Onshore oil and gas webpage](#) [accessed 10 September 2018]

<sup>28</sup> Scottish Government, [Onshore oil and gas webpage](#) [accessed 10 September 2018]

<sup>29</sup> Scottish Government, [Onshore oil and gas webpage \[accessed 1 November 2018\]](#)

Following careful consideration of the statutory and other assessments and related consultation responses, and all the previous evidence we have assembled, Ministers have concluded that an unconventional oil and gas industry would not be of sufficient positive benefit to Scotland to outweigh its negative impacts.

Therefore, based on the evidence on impacts and the clear lack of social acceptability, I can confirm today the Scottish Government final policy position is that we do not support the development of unconventional oil and gas – often known as fracking - in Scotland.<sup>30</sup>

In September 2018, the petrochemical company INEOS lost a legal challenge against the Scottish Government's position on fracking, arguing that the Government was exceeding their powers and lacked the legal competence to impose an effective ban.<sup>31</sup>

## Wales

Licensing of onshore oil and gas extraction was devolved to Wales by the *Wales Act 2017*.<sup>32</sup> The Welsh Government does not support fracking.

From 16 February 2015, the Welsh Government took a precautionary approach by requiring that a minerals planning authority that is minded to approve a minerals application for "unconventional oil and gas development" first refer the planning application to Welsh Ministers to determine whether the application should be called in for their determination.

Following devolution, the Welsh Government launched a [consultation on Petroleum extraction policy in Wales](#) (2 July 2018) seeking views of its proposed policy on petroleum extraction, including fracking.<sup>33</sup> The consultation proposed not undertaking any new petroleum licensing in Wales or supporting applications for hydraulic fracturing petroleum licence consents. The consultation closed on 25 September 2018.

A [consultation on the Draft Planning Policy Wales](#) was published in February 2018 and proposed placing the extraction of onshore oil and gas at the bottom of the planning energy hierarchy to reflect their position as the least preferred source of fuel for power generation.<sup>34</sup> The [Planning Policy Wales](#) was revised to reflect this approach in December 2018.

On 10 December 2018, a [written statement on Petroleum extraction policy statement](#) from the Welsh Government responded to the consultations and confirmed that fracking would not be supported in Wales. Furthermore, the Statement confirmed that the Welsh

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<sup>30</sup> Gov.scot, [Ministerial Statement: unconventional oil and gas](#), 3 October 2019

<sup>31</sup> See: the Scotsman, [Ineos loses its legal challenge to Scottish Government fracking "ban"](#), Diane King, 19 June 2018 [accessed 12 September 2018]

<sup>32</sup> Responsibility transferred to Welsh Ministers on 1 October 2018.

<sup>33</sup> Welsh Government consultation, [Petroleum extraction policy in Wales](#), 3 July 2018 [accessed 1 October 2018]; Welsh Government, [News: Welsh Government consults on new powers for petroleum extraction](#), 2 July 2018 [accessed 10 September 2018]

<sup>34</sup> Welsh Government consultation, [Planning Policy Wales: Edition 10](#), 12 February 2018 [accessed 1 October 2018]

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Government would not undertake any new petroleum licensing in Wales:

Having considered the evidence, the risks, and the responses we have received to the consultation, I confirm today hydraulic fracturing "fracking" of petroleum **will not** be supported in Wales.

To help deliver on my commitment in 2016 to reduce the use of fossil fuels I also confirm we **will not** undertake any new petroleum licensing in Wales. Individual licences will only be considered to ensure the safe management of abandoned mines or to support scientific research.

Following the transfer of powers, there are 13 existing licences in Wales which are still live. The recently revised 'Planning Policy Wales' has placed fossil fuels as the least favoured fuel in the energy hierarchy. PPW sets the policy framework against which all planning applications will be determined, including for existing licences. The recent Notification Direction also means Local Planning Authorities must also notify the Welsh Government if they intend to approve applications for any petroleum extraction development.<sup>35</sup>

### Northern Ireland

The Department for Economy (previously the Department of Enterprise, Trade and Investment) grants petroleum licences in Northern Ireland under powers granted by the *Petroleum (Production) Act (Northern Ireland) 1964*.<sup>36</sup>

The Strategic Planning Policy Statement for Northern Ireland creates a "presumption against" the extraction of unconventional hydrocarbons "until there is sufficient and robust evidence on all environmental impacts".<sup>37</sup>

In November 2019, a spokesperson for the Department for Economy in Northern Ireland was reported to say that the future of fracking in Northern Ireland was for a future minister to decide as exploration for onshore oil and gas is a devolved issue. The report also highlighted a consultation on an application for a licence to test a large area in the south west of Co Fermanagh for natural gas, with more than 3000 responses being analysed by the Department.<sup>38</sup>

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<sup>35</sup> Gov.wales, Cabinet statement, [Written Statement: Petroleum Extraction Policy statement](#), 10 December 2018

<sup>36</sup> Gov.uk, [Northern Ireland: Onshore oil and gas exploration in the UK: regulation and best practice](#), last updated 1 October 2018 [accessed 3 October 2018]

<sup>37</sup> Northern Ireland [Strategic Planning Policy Statement](#) (SPPS) para 6.157; see more in Business Green, [Northern Ireland adopts no fracking policy](#), Jocelyn Timperley, 29 September 2015 [accessed 1 October 2018]

<sup>38</sup> Belfast Telegraph, [Fracking for Stormont minister to decide, say officials after England halts controversial practice](#), 4 November 2019 [accessed 30 March 2020]; see also: DfE [consultation on Petroleum Licence Application PLA2/16](#), 7 May-31 July 2019

## 2. Shale gas in the UK

### 2.1 Shale gas areas in the UK

The British Geological Survey (in association with the Oil and Gas Authority) completed shale gas resource estimates for the following areas in the UK: Jurassic shale in the Wessex area; Midland valley of Scotland; Jurassic shale of the Weald Basin; Bowland Shale in central Britain; and Wales.<sup>39</sup>

#### Location of shale gas wells in the UK

The Oil and Gas Authority's [interactive map](#), which can be searched by place name or postcode, shows the location of all onshore wells including shale gas wells in the UK. Each well location also lists the relevant operator of that well. Further information on petroleum exploration development licences (PEDLs) held is available in section 3.1 of this paper.

Detailed local reports of sites are often available on the [Drill or Drop website](#) (an independent journalism website on fracking and reactions to it).

### 2.2 How much shale gas is there in the UK?

It is not possible to definitively say how much shale gas there is in the UK as shale gas exploration was in the very early stages in the UK. In this context, some estimations / predictions are included below.

The Government provided the following information on its [Guidance page on developing shale gas in the UK](#):

Scientists from the British Geological Survey (BGS) have estimated that the total volume of gas in the Bowland-Hodder shale in northern England is some 1300 trillion cubic feet (central estimate).

But it is not possible to estimate how much shale gas and oil the UK can produce until there has been some exploration and testing.<sup>40</sup>

The British Geological Survey (in association with the Oil and Gas Authority) completed shale gas resource estimates for several areas in the UK. Its full reports are available on the [BGS webpages on shale gas](#).

The [Grantham Research Institute on Climate Change](#) provides a short overview of potential reserves of shale gas in the UK, stating that:

Estimates suggest that the amount of shale gas (regardless of the feasibility of extraction) lies between 2.8 and 39.9 trillion cubic metres (tcm). The lower figure is based on analogies drawn with similar formations in the United States, and envisages 2.7 tcm in the Bowland shale (the largest resource) and less than 1 tcm in the Weald basin. The higher figure is based on 3D geological modelling by the British Geological Survey (BGS), which estimates

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<sup>39</sup> British Geological Survey, [Shale gas](#) [accessed 3 October 2018]

<sup>40</sup> Gov.uk, [Guidance on fracking: developing shale gas in the UK](#), 13 January 2017 [accessed 1 October 2018]

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around 37.6 tcm in the Bowland Shale, 2.3 tcm in the Midland Valley, and no shale gas in the Weald Basin.

Some background information on estimation methodologies is available in a 2013 [POSTbox on UK Shale Gas Potential](#).



### 3. Regulation of fracking in the UK

Prior to the Government's announcement in November 2019 to end support for fracking,<sup>41</sup> the Department for Business, Energy and Industrial Strategy (BEIS) published [regulatory roadmaps for onshore oil and gas exploration in England and Northern Ireland](#), which set out the process to be followed within each legislative and regulatory framework. Similar roadmaps for Wales and Scotland were removed from Gov.uk due to powers being devolved.<sup>42</sup> UK Onshore Oil and Gas (UKOOG) represent the onshore oil and gas industry and provide further resources including on [regulation on its website](#).<sup>43</sup>

Before carrying out commencing drilling operations for onshore oil and gas development (including shale gas) an operator had to attain a number of permissions and approvals as set out in Box 3. Further information on each of these regimes is set out below.

#### Box 3: Pre-drilling approvals

##### **Before commencing drilling operations for onshore oil and gas development the operator must have**

- Obtained a petroleum exploration and development licence (PEDL) from the OGA
- Secured a lease / access rights from the landowner
- Submitted relevant petroleum operations notifications
- Satisfied BEIS that effective operational and environmental management systems are in place
- Secured planning permission from the local minerals planning authority (permitted development rights may cover some of the works)
- Discharged any relevant conditions placed on the planning permission
- Obtained a permit from the Coal Authority if the well will encroach on coal seams (excluding NI)
- Informed the British Geological Survey of the intention to drill
- Completed the necessary consultation processes with all the statutory/relevant consultees
- Obtained all the necessary environment permits from the relevant environmental agency
- Notified the Health and Safety Executive (HSE/HSENI) of the intention to drill (minimum 21 days' notice)
- Provided HSE/HSENI with details of the proposed well design that have been examined by an independent and competent well examiner (minimum 21 days' notice)
- Agreed data-reporting methods with BEIS
- Agreed a method for monitoring induced seismicity and fracture growth height with BEIS, where hydraulic fracturing is planned
- Received consent from the BEIS to drill and frack (referred to as a "Hydraulic Fracturing Consent").<sup>44</sup>

<sup>41</sup> Gov.uk press release, [Government ends support for fracking](#), 2 November 2019 [accessed 7 November 2019]

<sup>42</sup> [Gov.uk site updates](#) state: Removal of document relating to Scottish onshore oil and gas exploration regulation - due to powers being devolved to Scottish government.

<sup>43</sup> See: UKOOG website: <http://www.ukoog.org.uk/regulation>

<sup>44</sup> Gov.uk, [Onshore oil and gas exploration in the UK: regulation and best practice, England](#), December 2015, p10 [accessed 3 October 2018]

This paper focuses on the consents needed in England for exploration stages, as onshore shale gas development was still in these early stages.

### 3.1 Petroleum exploration and development licences (PEDLs)

The *Petroleum Act 1998* (as amended) vests all rights to the nation's petroleum resources in the Crown, allowing the Secretary of State to grant Petroleum exploration and development licences (PEDLs) that confer exclusive rights to “search and bore for and get” petroleum.<sup>45</sup> Each PEDL confers such rights over a limited area and for a limited period.

In England, the [Oil and Gas Authority](#) (OGA) is responsible for awarding licences, and assesses operator competency, safety management systems, well examination schemes and financial capability as part of the process.<sup>46</sup> The OGA is an executive agency of BEIS, formally established under powers in the *Energy Act 2016*. Licensing of onshore oil and gas extraction is devolved to Scotland and Wales.<sup>47</sup>

PEDLs are granted through licensing rounds, of which there have now been fourteen. The [results of the latest fourteenth round were announced in 2015](#) and included 93 new licences covering 159 ordnance survey blocks. The previous 13 licensing rounds resulted in 137 licences covering 360 blocks. These licences are not just for shale gas, as they cover all onshore exploration including conventional oil and gas and coalbed methane. The OGA has grouped the 159 blocks into a total of 93 licence areas. Of these, 63 are for shale exploration. Another 19 are for conventional oil or gas, 6 for abandoned mine methane vents and 5 for coal bed methane.

All of the blocks can be seen on the [OGA's interactive map](#), which can be searched by place name or postcode. OGA also published data on the fourteenth licensing round on the [operator's proposed work programmes](#).<sup>48</sup>

### 3.2 Land access rights

The operator would need the landowner's permission to access the relevant land. This could also involve gaining consent to access any neighbouring land for access routes. This would be negotiated on a case by case basis between the landowner and operator.

Pursuant to the [Infrastructure Act 2015](#), consent is not required from owners of surrounding properties under which any horizontal drilling will take place at depths of 300 metres or more.<sup>49</sup>

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<sup>45</sup> Section 3 of the *Petroleum Act 1998* (as amended)

<sup>46</sup> Gov.uk, [Onshore oil and gas exploration in the UK: regulation and best practice. England](#), December 2015, p14 [accessed 3 October 2018]

<sup>47</sup> Scotland Act 2016 and Wales Act 2017

<sup>48</sup> OGA, [14<sup>th</sup> round offers by operator](#), 2015. 'S' in the type column refers to shale.

<sup>49</sup> Section 43

### 3.3 Planning permission

In England and Wales, proposals for shale gas exploration or extraction would be subject to the requirements of the *Town and Country Planning Act 1990* (as amended) administered by the Minerals Planning Authority (MPA) for the area in which the proposed development is located.<sup>50</sup>

The operator would need to secure planning permission (also known as a minerals permission), although permitted development rights may cover some of the works (see below). The planning authority could also decide that an environmental impact assessment (EIA) is needed. A PQ response from June 2018 stated that, “since 2012, 10 planning applications for individual shale exploration proposals have been submitted. 5 of these applications have been granted planning permission.”<sup>51</sup>

In England, the MPA would take the decision in accordance with the policies set out in the [National Planning Policy Framework](#) (NPPF) (updated July 2018) and the [“minerals” section of the online Planning Practice Guidance \(PPG\)](#). The PPG is expected to be updated to reflect the updated NPPF, but at the date of this paper has not yet been published. More information on the updated NPPF is available in the Library Briefing Paper [What next for planning in England? The National Planning Policy Framework](#) (CBP 08260).

Planning authorities should also have a section on mineral extraction in their Local Plan which would have gone through (or will go through if not yet in place) a period of public consultation.

When a decision is made on a planning application, only planning matters called “material considerations” can be taken into account. There is no exhaustive list of what constitutes a material planning consideration, although the [Planning Practice Guidance on minerals](#) lists some “principal issues” for consideration (see Box 4).<sup>52</sup>

#### **Box 4: National Planning Policy Guidance “principal issues” for consideration**

The principal issues that mineral planning authorities should address, bearing in mind that not all issues will be relevant at every site to the same degree, include:

- noise associated with the operation;
- dust;
- air quality;
- lighting;
- visual impact on the local and wider landscape;
- landscape character;
- archaeological and heritage features (further guidance can be found under the Minerals and Historic Environment Forum’s Practice Guide on mineral extraction and archaeology;
- traffic;
- risk of contamination to land;

<sup>50</sup> Planning permission in Scotland is subject to the *Town and Country Planning (Scotland) Act 1997* (as amended).

<sup>51</sup> [PQ 149061](#) [on fracking: planning permission] 11 June 2018

<sup>52</sup> Gov.uk, [Planning Practice Guidance on Minerals](#), 17 October 2014

- soil resources;
- geological structure;
- impact on best and most versatile agricultural land;
- blast vibration;
- flood risk;
- land stability/subsidence;
- internationally, nationally or locally designated wildlife sites, protected habitats and species, and ecological networks;
- impacts on nationally protected landscapes (National Parks, the Broads and Areas of Outstanding Natural Beauty);
- nationally protected geological and geo-morphological sites and features;
- site restoration and aftercare;
- surface and, in some cases, ground water issues;
- water abstraction.

On the appeals process and calling in of shale gas planning applications, the Government made a number of commitments in relation to the planning process which were summarised by the then Secretary of State for Business, Energy and Industrial Strategy (Greg Clark) in a [Written Ministerial Statement on 17 May 2018](#) as follows:

- we will continue to treat appeals against any refusal of planning permission for exploring and developing shale gas, or against any non-determination as a priority for urgent determination by the Planning Inspectorate, making additional resources available where necessary.
- under the Written Ministerial Statement in 2015 the criteria for recovering planning appeals were amended to include proposals for exploring and developing shale gas. This was applied for a two-year period subject to further review. The Secretary of State for Housing, Communities and Local Government has conducted a review and remains committed to scrutinising appeals for these proposals. We are therefore announcing that the criteria for considering the recovery of planning appeals are continued for a further two years. The new criterion is added to the recovery policy of 30 June 2008, Official Report, column 43WS.
- the Secretary of State for Housing, Communities and Local Government will actively consider calling in shale applications particularly where statutory deadlines have been exceeded. Each case will be considered on its facts in line with his policy. Priority timeframes for urgent determination will be given to any called-in applications.
- the Government continues to commit to identifying underperforming local planning authorities that repeatedly fail to determine oil and gas applications within statutory timeframes. When any future applications are made to underperforming authorities, the Secretary of State will consider whether he should determine the application instead.<sup>53</sup>

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<sup>53</sup> [HCWS690](#) [on energy policy] 17 May 2018

More general information and background on these powers is available in the [Library Briefing on Planning Appeals](#) (19 August 2015) and [Calling In a Planning Application](#) (17 July 2017).

### Permitted development for preparatory work

Permitted development rights derive from a general planning permission granted by Parliament – principally through the [Town and Country Planning \(General Permitted Development\) \(England\) Order 2015](#).<sup>54</sup> As such, development done under permitted development rights does not need planning permission.

From 6 April 2016 (and following a [March 2015 consultation](#)), the [Town and Country Planning \(General Permitted Development\) \(England\) \(Amendment\) Order 2016](#) allowed during a period not exceeding 28 consecutive days the drilling of boreholes for the purposes of (a) carrying out groundwater monitoring; (b) seismic monitoring or (c) locating and appraising the condition of mines, in each case which is preparatory to potential petroleum exploration.<sup>55</sup> This right was subject to a number of exceptions (for example where drilling would be carried out within a National Park or protected groundwater source area) and a number of conditions (including no operations between 6pm-7am, and notification to the Environment Agency).

This work could be carried out to establish baseline information on the groundwater environment without the need for planning permission, although other regulatory consents, such as a PEDL, would still be required.

The Commons Library briefing [Permitted development rights](#) offers more general information.<sup>56</sup>

### Consultations and Government proposals for change are paused

The Government's announcement on 2 November 2019 stated that proposals to change the planning process for fracking sites will no longer be taken forward at this time.<sup>57</sup> Responses to the relevant consultations have been published.

The information below is therefore provided for background information and understanding only.

In the [Written Ministerial Statement on 17 May 2018, the](#) then Secretary of State said that the Government would:

- set up a Shale Environmental Regulator and new Planning Brokerage Service;

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<sup>54</sup> SI 2015/596

<sup>55</sup> MHCLG, [Amendment to permitted development rights for drilling boreholes for groundwater monitoring for petroleum exploration: technical consultation](#), March 2015

<sup>56</sup> SN 00485, 14 June 2017

<sup>57</sup> Gov.uk press release, [Government ends support for fracking](#), 2 November 2019 [accessed 7 November 2019]

- launch a new £1.6 million shale support fund over the next 2 years to build capacity and capability in local authorities dealing with shale applications;
- consult “in the summer” on:
  - the principle of whether the early stages of shale exploration should be treated as permitted development: and
  - the criteria required to trigger the inclusion of shale production projects into the Nationally Significant Infrastructure Projects regime.
- strengthen community engagement by consulting in due course on the potential to make pre-application consultation a statutory requirement.

### **Permitted development for non-hydraulic shale gas exploration**

The [consultation on permitted development for shale gas exploration](#) ran from 19 July 2018 to 25 October 2018. The consultation document invited views on creating a permitted development right for non-hydraulic shale gas exploration development in England:

6. The purpose of this consultation is to seek views on the principle of whether non-hydraulic fracturing shale gas exploration development should be granted planning permission through a permitted development right, and in particular the circumstances in which it would be appropriate. Any permitted development right would not apply to the appraisal and production operations of shale gas extraction.<sup>58</sup>

The consultation document stated it would only apply to non-hydraulic fracturing operations to take core samples for testing purposes. It would not allow injection of any fluids for the purposes of hydraulic fracturing. The consultation proposed the following definition for non-hydraulic fracturing shale gas exploration:

Boring for natural gas in shale or other strata encased in shale for the purposes of searching for natural gas and associated liquids, with a testing period not exceeding 96 hours per section test.<sup>59</sup>

The consultation document also set out the proposed limitations and exclusions from permitted development on environmental and other grounds:

23. The Government remains committed to ensuring that the strongest environmental safeguards are in place. The formulation of any permitted development right will have regard to environmental and site protection laws such as those for Areas of Outstanding Natural Beauty, Scheduled Monuments, conservation areas<sup>4</sup>, Sites of Special Scientific Interest and World Heritage Sites, National Parks or Broads<sup>5</sup>.

24. By law, development which is likely to have significant effects on the environment requiring an Environmental Impact Assessment would not be permitted development. If the

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<sup>58</sup> MHCLG, [Permitted development for shale gas exploration: Consultation](#), July 2018: page 7

<sup>59</sup> MHCLG, [Permitted development for shale gas exploration: Consultation](#), July 2018: page 10



proposed development would fall into Schedule 2 of the Environmental Impact Assessment Regulations, it would only be permitted where a local planning authority has issued a screening opinion determining that the development is not Environmental Impact Assessment development, or where the Secretary of State has directed that it is not Environmental Impact Assessment development, or that the development is exempt from the Environmental Impact Assessment Regulations.

25. Some existing permitted development rights also exclude various other types of land. For example there are restrictions on agricultural change of use on sites designated as a scheduled monument, safety hazard areas, and military explosive areas. Others do not permit development on land safeguarded for aviation or defence purposes.<sup>60</sup>

The [Government Response to this consultation](#) was published on 1 November 2019.<sup>61</sup>

### **Nationally Significant Infrastructure Projects**

The May 2018 Written Ministerial Statement also committed to consulting, in summer 2018, on the criteria required to trigger the inclusion of shale production projects into the Nationally Significant Infrastructure Projects regime (see Box 5).<sup>62</sup>

#### **Box 5: NSIPs**

Nationally Significant Infrastructure Projects (NSIPs) are large scale developments (relating to energy, transport, water, or waste) which require a type of consent known as “development consent”. The [Planning Act 2008](#) introduced a new development consent process for NSIPs which was subsequently amended by the [Localism Act 2011](#).

A Development Consent Order (DCO) automatically removes the need to obtain several separate consents, including planning permission and is designed to be a much quicker process than applying for these separately.

The DCO process starts when an application is formally accepted by the National Infrastructure Planning Unit and lasts approximately 12-15 months. The process however, is front-loaded with a number of pre-application consultation requirements, which, depending on the complexity of the project, can take a number of years to carry out.

The final decision on granting a DCO rests with the Secretary of State for that field. The [National Infrastructure Planning website](#) provides guidance on the processes.

The Commons Library briefing on [planning for nationally significant infrastructure projects](#) offers more information.<sup>63</sup>

The consultation on the [Inclusion of shale gas production projects in the NSIP regime](#) ran from 19 July 2018 to 25 October 2018.<sup>64</sup> The consultation applied to England only and considered the question of moving production phase shale gas projects into the Nationally Significant Infrastructure Project regime (not the exploration or appraisal

<sup>60</sup> MHCLG, [Permitted development for shale gas exploration: Consultation](#), July 2018, p11

<sup>61</sup> MHCLG, [Government response to the permitted development for shale gas exploration consultation](#), 1 November 2019

<sup>62</sup> [HCWS690](#) [on energy policy] 17 May 2018

<sup>63</sup> SN 06881, 17 July 2017

<sup>64</sup> DBEIS, [Inclusion of shale gas production projects in the NSIP regime: consultation](#), July 2018

stages). The [Government response to this consultation](#) was published on 4 November 2019.<sup>65</sup>

### **Compulsory community pre-application consultation**

The Ministry of Housing, Communities and Local Government (MHCLG) published a consultation on 31 October 2018 seeking views on whether applicants should be required to conduct pre-application consultation with the local community prior to submitting a planning application for shale gas development.<sup>66</sup> The consultation applied to England only and will run until 7 January 2019. The [Government response to this consultation](#) was published on 4 November 2019.<sup>67</sup>

### **Shale support fund for local authorities**

The May 2018 Written Ministerial Statement committed to provide a new £1.6 million shale support fund “over the next 2 years” to build capacity and capability in local authorities dealing with shale applications.<sup>68</sup> The Fund is now closed. A PQ response provided the following information on funding:

Between March 2015 and February 2020, the Government’s Shale Support Fund, for the purpose of building capacity and capability in mineral planning authorities to deal with shale gas applications, made the following payments to mineral planning authorities: £46,173 (2015); £365,000 (2016); £123,947.42 (2017); £252,858 (2018) and £193,000 (2019). The final year of the Fund closed in February 2020.<sup>69</sup>

### **Planning brokerage service**

The May 2018 Written Ministerial Statement<sup>70</sup> also committed to “the creation of a new planning brokerage service for shale applications to provide guidance to developers and local authorities on the planning process to help facilitate timely decision making. The service would focus exclusively on the planning process and would have no role in the consideration or determination of planning applications. The service would not comment on the merits of a case and would also have no role in the appeals process.” No further information was available at the time this paper was published.

### **Parliamentary scrutiny on planning for fracking (2018)**

The Housing, Communities and Local Government Select Committee published a [report on Planning guidance on fracking](#) on 5 July 2018. This made a number of recommendations on the Government’s planning proposals, including that fracking planning applications should not be brought under the NSIP regime nor acquire permitted

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<sup>65</sup> DBEIS, [Government response to inclusion of shale gas production in the NSIP regime](#), 4 November 2019

<sup>66</sup> MHCLG, [Compulsory community pre-application consultation for shale gas development](#), 31 October 2018

<sup>67</sup> MHCLG, [Government response to compulsory community pre-application consultation for shale gas development](#), 4 November 2019

<sup>68</sup> [HCWS690](#) [on energy policy] 17 May 2018

<sup>69</sup> [PO 26152](#) [on fracking and wind power: finance] 11 March 2020

<sup>70</sup> [HCWS690](#) [on energy policy] 17 May 2018

development rights. The Committee also concluded that it would be “inappropriate” for fracking to be regulated by one single body and proposed the Government’s Shale Environmental Regulator (see section 3.5 below) should be renamed and repurposed as the Shale Information and Coordination Service.<sup>71</sup>

On 12 September 2018, a [Westminster Hall debate](#) led by Conservative MP Lee Rowley, considered planning permission for shale gas exploration. Concerns were raised in relation to the Government’s proposals for permitted development and extending the NSIP regime. The then Minister for Energy and Clean Growth (Claire Perry) responded to a number of the concerns:

As set out in our manifesto, we intend to consult on what can be done to the planning process. As well as looking at moving production rights into a national regime, as we have done for other complicated energy sources, we have considerably increased the level of support for local authorities and local decision makers. We have set up training; we have provided funding. I will shortly appoint a shale gas commissioner, who will have deep and extensive constituency knowledge of the issue and will be out there, helping local residents to understand some of the challenges that exist. To put the myth-buster in place again, we are not overriding local decision making; there are plenty of opportunities for decision makers to express their views in the pre-consultation stage, as is done for other complicated and difficult energy policies.<sup>72</sup>

On 31 October 2018, a further Westminster Hall debate on Shale Gas Development was led by Conservative MP Mark Menzies. It focused on local involvement in shale gas development and the Government proposals on planning changes. Mr Menzies called for greater local involvement in “major decisions such as the approval of shale gas sites”.<sup>73</sup> The then Minister for Housing (Kit Malthouse) replied, emphasising that the Government had not yet made a decision as a result of the planning consultations, and acknowledging the importance of community engagement:

My hon. Friend the Member for Fylde highlighted the importance of community engagement in the planning process. I reassure him that we remain fully committed to ensuring that local communities are fully involved in planning decisions that affect them, and to making planning decisions faster and fairer. Those are long-standing principles and I am adamant that we should stick to them. However, we understand that communities feel that they are often not consulted closely enough before planning applications are submitted to the local planning authority by developers. As my hon. Friend highlighted, that can lead to opposition to developments and a longer application process.<sup>74</sup>

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<sup>71</sup> Housing, Communities and Local Government Select Committee, Planning guidance on fracking, Eight Report of Session 2017-19, [HC 767](#), 5 July 2018

<sup>72</sup> HC Deb 12 September 2018 [Col 328WH](#)

<sup>73</sup> HC Deb 31 October 2018 [Col 397WH](#)

<sup>74</sup> HC Deb 31 October 2018 [Col 409WH](#)

### 3.4 Environmental permits and consents

An operator would also need to obtain various environmental permits and consents from the relevant environment regulator (the Environment Agency, Natural Resources Wales, or the Scottish Environment Protection Agency).

In England, the Environment Agency's role is to ensure that any shale gas operations are conducted in a way that protects people and the environment. The Environment Agency published [guidance on the environmental permits and permissions an operator needs for onshore oil and gas operations](#)<sup>75</sup> which sets out detailed information and explanation of this regime.

Broadly speaking, 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); and
- disposal of waste gases through flaring and disposal of waste water (known as flowback fluid).

An operator may also need a water abstraction licence which would be issued by the relevant environmental regulator.

Under the environmental permitting regulations, the Environment Agency (EA) can issue standard and bespoke permits. The EA confirmed that "all applications for high volume hydraulic fracturing or any other well stimulation involving the use of proppants" will require full bespoke permits with site specific risk assessment, public consultation and conditions which the operator will be required to comply with.<sup>76</sup> Information about how the Environment Agency inspects, monitors and enforces environmental permits is available on [Gov.uk guidance: How you'll be regulated: environmental permits](#).

The EA 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.<sup>77</sup>

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<sup>75</sup> Gov.uk guidance: [onshore oil and gas operations: environmental permits](#), 14 November 2016 [accessed 5 October 2018]

<sup>76</sup> Gov.uk Guidance, [standard rules for the environmental permitting regulations consultation: no.11](#), 24 February 2016

<sup>77</sup> Gov.uk, [Guidance on fracking: developing shale gas in the UK](#), 13 January 2017 [accessed 20 September 2018]

### 3.5 Health and safety

The operator would also be required to notify the Health and Safety Executive (HSE) of the well design and operation plans at least 21 days before drilling is due to start. The HSE is responsible for health and safety regulation in England, in particular inspecting the well design, its construction and upkeep to ensure that measures are in place to manage risks effectively throughout its life cycle.<sup>78</sup>

The HSE has a [webpage on the HSE's role in regulating onshore shale gas and hydraulic fracturing](#) which sets out key information on the health and safety regime, including:

For shale gas operations, HSE focuses on ensuring wells are designed, constructed, operated, maintained, and ultimately abandoned to ensure that the flow of fluids in the well, whether fracking fluids or produced gas or water is controlled and stays within the well. This is called 'well integrity' and is equally important for safety and environmental protection.<sup>79</sup>

The HSE and the Environment Agency published a [joint working strategy](#) (2012)<sup>80</sup> which sets out how they will work together to regular environmental and health and safety, for instance by conducting joint inspections and sharing information.

### 3.6 Shale environmental regulator group

The Conservative Party 2017 manifesto pledged to set up a new shale environmental regulator which would take on the functions of BEIS, the environment agency and the HSE in order to streamline the regulatory process. This was confirmed in a Written Ministerial Statement in May 2018, in which the Government committed to set up the regulator for England from "summer 2018".<sup>81</sup>

On 5 October 2018, BEIS announced the set up of a Shale Environmental Regulator Group, which would bring the regulators (Oil and Gas Authority, Health and Safety Executive and Environment Agency) together as a virtual body. The Shale Environmental Regulator Group was expected to act as one, coherent, single face for local authorities and industry, helping to resolve regulatory issues on sites and sharing best practice with local authorities considering shale gas applications.<sup>82</sup>

### 3.7 Hydraulic fracturing consent

The *Infrastructure Act 2015* (amending the *Petroleum Act 1998*) introduced the concept of a hydraulic fracturing consent, as a safeguard for onshore fracking. Prior to the Government's November 2019

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<sup>78</sup> Gov.uk, [Guidance on fracking: developing shale gas in the UK](#), 13 January 2017 [accessed 20 September 2018]

<sup>79</sup> HSE [Shale gas](#) [accessed 5 October 2018]

<sup>80</sup> Environment Agency and HSE, [Working together to regulate unconventional oil and gas developments](#), November 2012

<sup>81</sup> [HCWS690](#) [on energy policy] 17 May 2018

<sup>82</sup> OGA Announcement, [Shale Environmental Regulator Group launched today](#), 5 October 2018

announcement, two hydraulic fracturing consents had been issued to Cuadrilla Bowland Ltd (see Box 6). From 2 November 2019, the UK Government has taken a presumption against issuing any further hydraulic fracturing consents. Work at the existing sites has also been “paused”.<sup>83</sup> The information below is provided for further understanding only.

#### Box 6: Preston New Road Site, Lancashire

Cuadrilla Bowland Ltd’s Preston New Road site in Lancashire was awarded a hydraulic fracturing consent for one of its wells (horizontal well, number ‘PNR-1z’) by the Government on 24 July 2018, subject to certain conditions. The conditions were: that no associated hydraulic fracturing may commence until Cuadrilla had submitted audited accounts of Spirit Energy Ltd (who are joint and several licensees of the the relevant PEDL) or had deposited £557,000 into an escrow account, and the Secretary of State had confirmed the arrangements as satisfactory. A further condition was that existing arrangements for publication of the results of the monitoring required by section 4A(6)(a) of the *Petroleum Act 1998* must remain in place for the period for the Hydraulic Fracturing Consent remains in force.

The [Government decision notice](#) and the [accompanying press notice](#) set out more detailed information.<sup>84</sup>

Cuadrilla was awarded a second hydraulic fracturing consent for a second well (horizontal well, number ‘PNR-2’) at the same site on 19 September 2018. The [Government decision notice](#) sets out more detailed information.

Cuadrilla commenced fracking at this site on 15 October 2018 and shale gas flowed to the surface for the first time on 2 November.<sup>85</sup> Pro-fracking group, Lancashire for Shale, responded stating that it proved “that it is possible to safely recover gas from the rich shale deposits beneath our feet” whereas anti-fracking group Frack Free Lancashire referenced the recent seismic events (see section 4.3 below) stating “it sounds as though they [Cuadrilla] are now claiming that a small quantity of gas that returned when they had to depressure the well (after triggering both amber and red events) is somehow exciting news”.<sup>86</sup>

Detailed information on this site is available on the Cuadrilla [Preston New Road webpages](#).

The law sets out that hydraulic fracturing cannot take place at a depth of less than 1000 metres, and the Secretary of State must issue a hydraulic fracturing consent for any “associated hydraulic fracturing” which will take place at a depth of 1000 metres or more. This is defined in the Act by reference to purpose of the fracking of shale and volume of water used as follows:

“Associated hydraulic fracturing” means hydraulic fracturing of shale or strata encased in shale which— (a) is carried out in connection with the use of the relevant well to search or bore for or get petroleum, and (b) involves, or is expected to involve, the injection of— (i) more than 1,000 cubic metres of fluid at each stage, or expected stage, of the hydraulic fracturing, or (ii) more than 10,000 cubic metres of fluid in total.<sup>87</sup>

<sup>83</sup> Gov.uk press release, [Government ends support for fracking](#), 2 November 2019 [accessed 7 November 2019]

<sup>84</sup> This BBC News article provides further coverage of reactions to this decision: <https://www.bbc.co.uk/news/uk-england-lancashire-44941862>

<sup>85</sup> Drill or drop, [Cuadrilla produces first shale gas from fracking site – despite “strict” earthquake rules](#), 2 November 2018

<sup>86</sup> Drill or drop, [Cuadrilla produces first shale gas from fracking site – despite “strict” earthquake rules](#), 2 November 2018

<sup>87</sup> Section 50 *Infrastructure Act 2015*, inserting section 4B into *Petroleum Act 1998*.



Before issuing a hydraulic fracturing consent, the Secretary of State must be satisfied that a list of specific conditions are met (see Box 7). The Secretary of State must also be satisfied that it is appropriate to issue the consent and may apply any other conditions they consider appropriate. The then Secretary of State (Greg Clark) made a written statement on 25 January 2018 confirming the Government considered the financial resilience of all companies wishing to carry out fracking as a relevant consideration.<sup>88</sup>

#### Box 7: Pre-conditions for the issue of an onshore hydraulic fracturing consent

- The environmental impact of the development which includes the relevant well has been taken into account by the local planning authority
- Appropriate arrangements have been made for the independent inspection of the integrity of the relevant well
- The level of methane in groundwater has, or will have, been monitored in the period of 12 months before the associated hydraulic fracturing begins
- Appropriate arrangements have been made for the monitoring of emissions of methane into the air appropriate arrangements have been made for the publication of the results of the monitoring
- The associated hydraulic fracturing will not take place within protected groundwater source areas (see below).
- The associated hydraulic fracturing will not take place within other protected areas (see below). In considering an application for the relevant planning permission, the local planning authority has (where material) taken into account the cumulative effects of—
  - (a) that application, and
  - (b) other applications relating to exploitation of onshore petroleum obtainable by hydraulic fracturing
- The substances used, or expected to be used, in associated hydraulic fracturing—
  - (a) are approved, or
  - (b) are subject to approval,by the relevant environmental regulator
- In considering an application for the relevant planning permission, the local planning authority has considered whether to impose a restoration condition in relation to that development
- The relevant undertaker has been consulted before grant of the relevant planning permission
- The public was given notice of the application for the relevant planning permission
- A scheme is in place to provide financial or other benefit for the local area

### Protected groundwater source areas and other protected areas

The [Onshore hydraulic fracturing \(protected areas\) Regulations 2016](#) define the terms “protected groundwater source areas” and “other protected areas” for the purposes the conditions set out by the *Infrastructure Act 2015* (inserting section 4A of the *Petroleum Act 1998*).

A “**protected groundwater source area**” is defined as any land at a depth of less than 1,200 metres beneath a relevant surface area. A “relevant surface area” means any land at the surface that is—

<sup>88</sup> [HCWS428 \[on Energy Policy\]](#) 25 January 2018

- a. within 50 metres of a point at the surface at which water is abstracted from underground strata and is used to supply water for domestic or food production purposes, or
- b. within or above a zone defined by a 50-day travel time for groundwater to reach a groundwater abstraction point that is used to supply water for domestic or food production purposes.

“**Other protected areas**” is defined as areas of land at a depth of less than 1,200 metres beneath—

- a. a National Park;
- b. the Broads;
- c. an area of outstanding natural beauty; or
- d. a World Heritage site.

## 3.8 Community engagement and support

### Community Engagement Charter

In 2013, the trade body UKOOG launched a Shale Community Engagement Charter to outline the steps the industry had committed to in order to address concerns about safety, noise, dust and other environmental issues. The [Community Engagement Charter](#)<sup>89</sup> includes:

- At exploration stage, £100,000 in community benefits per well-[Enviro Bill 2020](#) site where fracking takes place;
- 1% of revenues at production will be paid out to communities;
- Operators will publish evidence each year of how they have met these commitments.<sup>90</sup>

The industry charter and offer to communities was to be regularly reviewed as the industry develops and operators consult with communities.

### Shale Wealth Fund

The Government committed to creating a Shale Wealth Fund to ensure that communities which host shale sites can share the benefits of shale development. The fund was intended to initially consist of up to 10% of tax revenues arising from shale gas production and could provide up to £1 billion of funding in total, a proportion of which could be paid out to each community over 25 years. The government consulted on the priorities and delivery models for the Shale Wealth Fund and HM Treasury published its response in November 2017.<sup>91</sup> The Government Response set out a number of principles which would guide the detailed design of the fund, but also highlights that more evidence is required on a number of areas (see para 3.17 of the Response). Regarding next steps, the Government stated:

The deployment of the Shale Wealth Fund depends both on production and the profitability of the industry, which will

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<sup>89</sup> UKOOG, [Community Engagement Charter](#) [accessed 5 October 2018]

<sup>90</sup> See UKOOG [Annual Report 2017](#)

<sup>91</sup> HM Treasury, [Shale Wealth Fund: response to consultation](#), November 2017

determine the level of tax that can be attributed to shale production and, therefore the Shale Wealth Fund. In the meantime, we will work with the industry to learn from its exploration stage community benefits schemes and continue to consult openly with communities, local areas and industry on how best to design a Shale Wealth Fund that puts local people at its heart.<sup>92</sup>

## Commissioner for Shale Gas

On 5 October 2018, former MP Natascha Engel was appointed as an independent Commissioner for Shale Gas to be a direct communication link between local communities, the shale gas industry and the industry regulators. Some 6 months later Ms Engel resigned from the post, and was reported to have said:

a perfectly viable industry is being wasted because of a Government policy driven by environmental lobbying rather than science, evidence and a desire to see UK industry flourish.<sup>93</sup>

The commissioner was a contact point for residents, to listen to their concerns, refer them to relevant and factual research and help improve communication with regulators and industry.<sup>94</sup>

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<sup>92</sup> HM Treasury, [Shale Wealth Fund: response to consultation](#), November 2017

<sup>93</sup> Drill or Drop, [Shale gas commissioner resigns](#), 28 April 2019 [accessed 16 December 2019]

<sup>94</sup> Gov.uk, [Commissioner for shale gas](#) [accessed 16 December 2019]  
Gov.uk press release, [Natascha Engel appointed as Commissioner for shale gas](#), 5 October 2018

## 4. Tremors associated with fracking

Shale gas extraction and fracking received significant Parliamentary and media interest. Like most industrial processes, there are identifiable risks, including geological risks like potential induced seismicity and environmental risks like water contamination. A complex and detailed regulatory framework was put in place to reduce the risks to a level deemed acceptable by the regulators (as explained in section 3 above).

However, an OGA report published in November 2019 concluded that it was not possible with current technology to accurately predict the probability or magnitude of tremors associated with fracking.<sup>95</sup> Based on this report, the Government decided to place a moratorium on fracking “until compelling new evidence is provided”.

A [Written Ministerial Statement on 4 November 2019](#) provided further context regarding the various events and regulatory responses that led up to the Government’s decision:

Following seismic events in 2011 that were connected to shale gas exploration, the Government introduced regulations to mitigate these risks. A ‘Traffic Light System’ was introduced to monitor real-time seismic activity during operations, with a clear framework for stopping operations in the event of specified levels of seismic activity.

The Government also introduced tighter controls over the shale gas industry through the Infrastructure Act 2015. This included the requirement for operators to obtain Hydraulic Fracturing Consent from the Secretary of State which requires careful consideration and detailed scrutiny of the necessary technical and legislative requirements. This Consent ensures that all the necessary environmental and health and safety permits have been obtained before activities can commence.

While the regulatory and legal framework for shale gas activities has operated effectively to date, it is right that Government and regulators regularly review whether it remains fit for purpose in light of further evidence from shale gas operations.

Cuadrilla, a private company exploring for onshore oil and gas, obtained Hydraulic Fracturing Consent in 2018 to undertake shale gas exploration activity at their site at Preston New Road, Lancashire. Hydraulic fracturing operations took place in 2018 and 2019. Their operations were tightly controlled by the relevant independent regulators, including the Oil and Gas Authority, who are responsible for regulating the licensing of exploration and development of England’s onshore oil and gas reserves, including shale gas.

Following a seismic event of magnitude 2.9 on 26th August 2019, hydraulic fracturing at Preston New Road was suspended by the Oil and Gas Authority, in accordance with its strict regulatory controls. While seismicity was at a level below that at which we would expect significant damage, seismic activity at this level does impact local communities and was clearly unacceptable. An event

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<sup>95</sup> OGA, [Onshore update](#), 2 November 2019 [accessed 30 March 2020]

of this significance was considered highly unlikely in the detailed plan that Cuadrilla provided to the regulator before their activities began.

In parallel to their action following the 26th August 2019 event, the Oil and Gas Authority have been analysing in detail data drawn from Cuadrilla's earlier operations that took place at Preston New Road last year. This included commissioning a series of expert reports to better understand and learn from the induced seismicity observed in 2018. The Government has recently received these reports and they are being published alongside a summary of their findings by the Oil and Gas Authority today. The Oil and Gas Authority summary report contains a number of findings and interim conclusions and highlights that the causes of seismicity are highly dependent on local geology. While we cannot draw definitive direct comparisons between this site-specific evidence and other prospective shale gas sites, the limitations of current scientific evidence mean it is difficult to predict the probability and maximum magnitude of any seismic events, either in the Fylde or in other locations.

The Government has always been clear that we will take a precautionary approach and only support shale gas exploration if it can be done in a safe and sustainable way, and that we will be led by the science on whether this is indeed possible. It remains our policy to minimise disturbance to those living and working nearby, and to prevent the risk of any damage.<sup>96</sup>

Some further background and commentary on seismic events in England which led up to the Government's decision is included below. While the moratorium is in place, this paper does not include the debate on the other pros and cons of fracking.

## 4.1 Seismic events: commentary and key events

Following seismic activity that was felt in Blackpool in Spring 2011, concerns were raised regarding the potential for fracking activities to induce earthquakes. 'Seismicity' or 'seismic events' refer to sudden phenomena that release energy in the form of vibrations that travel through the Earth as sound (seismic) waves.

On 1 April 2011, the Blackpool area in north England experienced seismicity of magnitude 2.3 ML (local magnitude) shortly after Cuadrilla Resources hydraulically fractured a well at its Preese Hall site. Seismicity of magnitude 1.5 ML occurred on 27 May 2011 following renewed fracturing of the same well.<sup>97</sup> Hydraulic fracturing was suspended by Cuadrilla. Cuadrilla commissioned a set of reports to investigate the cause of seismicity<sup>98</sup> which concluded that the earthquake activity was caused by fluid injection directly into a nearby fault zone, which reduced the effective normal stress on the fault and caused it to fail repeatedly in a series of small earthquakes. The then Department of Energy and

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<sup>96</sup> [HCWS68](#), 4 November 2019

<sup>97</sup> See, for example, Scottish Government, [Understanding and Monitoring Induced Seismic Activity](#), para 3.4 [accessed 2 October 2018]

<sup>98</sup> Geomechanical Study of Bowland Shale Seismicity, [Synthesis Report](#), de Pater and Baisch 2 November 2011

Climate Change also commissioned an [independent report](#) that was published for public comment.<sup>99</sup> This Report agreed that the observed seismicity was induced by the hydraulic fracture treatments at Preese Hall and set out several recommendations for the mitigation of seismic risk in future hydraulic fracture operations for shale gas. Some of these recommendations were adopted as part of the regulatory framework for future operations. Controls were put in place so that operators would have to assess the location of faults before fracking, monitor seismic activity in real time and stop if a magnitude greater than M0.5 (on the Richter scale) is detected. More information is available on the [BGS pages on hydraulic fracturing and induced seismicity](#) and the [Gov.uk infographic on its Traffic light monitoring system](#).<sup>100</sup>

In 2012, the Royal Society and the Royal Academy of Engineering Report summarised its views relating to seismicity as follows:

Concerns have also been raised about seismicity induced by hydraulic fracturing. Natural seismicity in the UK is low by world standards. On average, the UK experiences seismicity of magnitude 5 ML (felt by everyone nearby) every twenty years, and of magnitude 4 ML (felt by many people) every three to four years. The UK has lived with seismicity induced by coal mining activities or the settlement of abandoned mines for a long time. British Geological Survey records indicate that coal mining-related seismicity is generally of smaller magnitude than natural seismicity and no larger than 4 ML. Seismicity induced by hydraulic fracturing is likely to be of even smaller magnitude. There is an emerging consensus that the magnitude of seismicity induced by hydraulic fracturing would be no greater than 3 ML (felt by few people and resulting in negligible, if any, surface impacts). Recent seismicity induced by hydraulic fracturing in the UK was of magnitude 2.3 ML and 1.5 ML (unlikely to be felt by anyone). The risk of seismicity induced by hydraulic fracturing can be reduced by traffic light monitoring systems that use real-time seismic monitoring so that operators can respond promptly.<sup>101</sup>

Cuadrilla recommenced fracking activities at its Preston New Road site on 15 October 2018. A number of seismic activities were recorded by the British Geological Survey (BGS) in the first weeks of activity which led to three temporary suspensions of fracking activities in accordance with the Government's traffic light system.<sup>102</sup> The largest magnitude of tremor was measured as 1.1ML on 29 October, about which a Cuadrilla spokesman was reported to state:

As we have said many times this level is way below anything that can be felt at surface and a very long way from anything that would cause damage or harm.

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<sup>99</sup> Green et al., [Preese Hall shale gas fracturing Review and recommendations for induced seismic mitigation](#), 2012

<sup>100</sup> Gov.uk guidance, [Traffic light monitoring system](#), 9 September 2013 [accessed 5 October 2018]

<sup>101</sup> Royal Society and the Royal Academy of Engineering, [Shale gas extraction in the UK: a review of hydraulic fracturing](#), June 2012

<sup>102</sup> See: Drill or Drop, [Largest tremor so far stops Cuadrilla's fracking again](#), 29 October 2018 [accessed 2 November 2018]



In line with regulations, hydraulic fracturing has paused for 18 hours now, during which seismicity will continue to be closely monitored by ourselves and the relevant regulators.

Well integrity has been checked and verified.<sup>103</sup>

BGS has an [FAQ site on seismic activity at Preston New Road](#) which provides more detail on the seismic activity at this site.

There were some press reports that the Government was planning to lower seismic activity thresholds in October 2018,<sup>104</sup> and that the CEO of Cuadrilla had called for the threshold to be reconsidered.<sup>105</sup> Local MP Mark Menzies dismissed those calls stating that the “ship had sailed”.<sup>106</sup> The Government subsequently confirmed that there are no plans to change the traffic light system for monitoring induced seismicity.<sup>107</sup>

In November 2018 West Lancashire MP Rosie Cooper wrote an [open letter to the then Energy Secretary \(Greg Clark\)](#) (co-signed by a number of local Labour MPs) calling for a moratorium on fracking until such point that the Government could be “fully assured that there will be no more man made earthquakes in England or Wales as a result of fracking”.<sup>108</sup>

A PQ response from the Government on 6 November 2018 stated:

The independent oil and gas regulator, the Oil and Gas Authority (OGA), is responsible for ensuring operators mitigate the risk of induced seismicity. The OGA is continually monitoring operations around the Preston New Road site to ensure they remain in line with Cuadrilla’s Hydraulic Fracture Plan, which was independently approved by the OGA, Environment Agency and the Health and Safety Executive (HSE) before the commencement of hydraulic fracturing operations.

The Traffic Light System dictates that if an event of 0.5M<sub>i</sub> or above is detected and causally linked to operations, Cuadrilla must pause operations for 18 hours and reduce well pressure. Operations are only allowed to resume once regulators are satisfied that any risks have been appropriately mitigated. The very minor seismic events recorded at the Preston New Road site cannot be felt at the surface.<sup>109</sup>

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<sup>103</sup> BBC News, [Fracking in Lancashire: 1.1 magnitude tremor halts work](#), 29 October 2018

<sup>104</sup> See: the Independent, [Fracking earthquake laws could be reduced as government aims to encourage gas extraction](#), 10 October 2018 [accessed 1 November 2018]

<sup>105</sup> Guardian, [Minor earthquakes emerge as major threat to UK fracking](#), 31 October 2018 [accessed 1 November 2018]

<sup>106</sup> HC Deb 31 October 2018 [Col 401WH](#)

<sup>107</sup> [HL10619](#) [on fracking] 25 October 2018

<sup>108</sup> Labour, Rosie Cooper pages, [West Lancashire MP Rosie Cooper calls for immediate halt to fracking](#), 2 November 2018 [accessed 6 November 2018]

<sup>109</sup> [PQ 185662](#) [on fracking: earthquakes] 6 November 2018

## 5. Glossary

**Shale gas:** is a natural gas mostly composed of methane, which can be found trapped in shale with very low permeability.

**Gas in Place (GIP):** means the entire volume of gas contained in a rock formation regardless of the ability to produce it (also referred to as “Total Resource”).

**Proved Reserves:** means that volume of technically recoverable resources demonstrated to be economically and legally producible under existing economic and operating conditions.

**Technically Recoverable Resource (TRR):** means the volume of gas considered to be recoverable with available technology.

**PEDL:** means petroleum exploration and development licences. See Section 3.1 of the Paper.

**OGA:** means the Oil and Gas Authority (an executive agency of the Department for Business, Energy and Industrial Strategy Department).

**UKOOG:** means United Kingdom Onshore Oil and Gas, representing the onshore industry.

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