



Shale gas and fracking

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In the UK, drilling for shale gas is at only the exploratory phase. But the rapid development of shale gas resources in North America has transformed the world gas-market outlook.

The consensus seems to be that shale gas will not be a 'game changer' in the UK as in the US. There is, for example, less land available to drill on and landowners do not own the rights to hydrocarbons beneath their land. However, in June 2013 Centrica acquired a 25% stake in Cuadrilla's exploration licence in Lancashire and the Government and British Geological Survey published raised estimates of the shale gas resource in Northern England. The Government is also consulting on tax incentives for shale gas exploration, and has announced community financial benefits.

Existing onshore petroleum exploration and development licences, which are not specific to shale gas, are therefore more likely now to be explored for their shale potential. This note includes new tables showing petroleum exploration licences by constituency.

Shale gas is extracted from solid rock using a process called hydraulic fracturing, or 'fracking'. The Royal Society and Royal Academy of Engineering have [reviewed](#) the risks associated with fracking. They concluded that the health, safety and environmental risks can be managed effectively in the UK, by implementing and enforcing best operational practice. However, they made several recommendations including calling for more research on the carbon footprint of shale gas extraction.

A report on this was published by DECC in September 2013, in which shale gas emissions were said to be similar to those of conventional gas and lower than those of coal and LNG, leading the Secretary of State to describe shale gas as a 'bridge' to a low-carbon future.

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1 UK and World energy outlook

UK production of natural gas in 2012 was the lowest since 1985. The UK has been a net importer of gas since 2004, with historically high imports in 2011. In that year, for the first time since large scale gas extraction began, UK imports exceeded production.¹ The North Sea is mature, and last year UK oil output fell below 1 million barrels a day for the first time.²

The development of shale gas in North America has transformed the gas-market outlook. Even in its 2009 *World Energy Outlook*, the International Energy Agency (IEA) said that unconventional gas had “changed the game” in North America and elsewhere.³

¹ DECC, [Digest of UK Energy Statistics 2013](#) Chapter 4 Gas

² *Petroleum Economist* April 2013 Analysis North Sea work surges on high prices pp.4-7

³ IEA, [World Energy Outlook 2009, Executive Summary](#)

In the US, “unprecedented levels of domestic natural gas production” reduced net imports of natural gas into the US by a quarter in 2011, with several applications being made to the US Department of Energy for authorisation to export domestic LNG.⁴ The US is now expected by the IEA to be nearly self-sufficient in energy by 2035.⁵

The IEA [World Energy Outlook special report on gas](#) in 2011⁶ described a “golden age of gas” scenario in which natural gas overtakes coal by 2030, increasing to 25% of the global energy mix by 2035. Estimates suggest that the global technically recoverable resource of shale gas is over 97 trillion cubic meters, equivalent to around 23% of the estimated remaining recoverable resources of conventional gas – but with large variation between studies.⁷

2 Hydraulic fracturing, or fracking

2.1 A note on definitions

In short, ‘unconventional gas’ is natural gas, but from unconventional sources. ‘Shale gas’, as the name suggests, is found within organic-rich shale beds, which are actually layers of rock, rather a conventional ‘reservoir’ capped by shale or other beds.

The conventional view was that oil and gas would mature within these organic-rich and low-permeability rocks, and then migrate into conventional reservoirs from where they could be recovered. However, with advances in drilling and wellsite technology, and increases in the wholesale prices of hydrocarbons, production of gas directly from the shale beds is now commercially viable. The processes are described below.

DECC has produced a note on [Resources vs Reserves: What do estimates of shale gas mean?](#)⁸ The Parliamentary Office of Science and Technology (POST) has also published a POSTbox on [UK Shale Gas Potential](#). The following terms are used most commonly:

- **Total Resources:** the estimated total volume of oil and gas physically contained in the rock. One measure of total resources used commonly, including by the BGS, is the **Gas in Place (GIP)** which is an estimate of the total amount of gas that is trapped within the shale rock.
- **Reserves:** the amount of resources that are deemed to be technically and commercially recoverable.
- **Technically Recoverable Resource (TRR):** the estimated volume of gas that it is possible to extract from the total resource if not constrained by economics (and therefore larger than the reserves estimates).⁹

POSTnote 374, [Unconventional Gas](#) (April 2011), also gives some background.

⁴ US Energy Information Administration, [U.S. Natural Gas Imports & Exports 2011](#) July 2012

⁵ *Financial Times*, Budget 2013: Support for shale gas sector 20 March 2013

⁶ International Energy Agency “[Are we entering a golden age of gas?](#)” Special Report *World Energy Outlook 2011*

⁷ McGlade, C. et al., “[A review of regional and global estimates of unconventional gas resources: A report to the Energy Security Unit of the Joint Research Centre of the European commission](#)”, UKERC, September 2012, p25

⁸ DECC, 27 June 2013 (erroneously dated as 27 July 2013 on its cover)

⁹ DECC, [Resources vs Reserves: What do estimates of shale gas mean?](#) 27 June 2013 and [UK Shale Gas Potential](#), POSTbox July 2013

2.2 What is Fracking?

Gas held within shale beds is accessed through a technique called “hydraulic fracturing” or “fracking” for short. Water, containing sand, is pumped at high pressure into the rock. The sand keeps the small fractures in the rock open while the gas is extracted. According to the [British Geological Survey \(BGS\)](#):

After initial exploration of the shale deposits, a borehole is drilled into the shale horizon at a carefully selected site. It may be drilled horizontally to increase the volume of rock that can be accessed by the borehole. A process called hydraulic fracturing ('fracking') is undertaken. This involves pumping water into isolated sections of the borehole at pressures high enough to fracture the surrounding rock. Sand entrained in the water helps to 'prop' open the fractures, create permeability in the rock and allow the gas to flow into the borehole. Chemicals are also added to improve the efficiency of the fracking operation.¹⁰

Horizontal drilling is a technique used increasingly in conventional exploration and development. It gives access to harder-to-reach deposits and allows drilling (and fracking) in several directions from a single well bore.

3 The shale gas resource in the UK

3.1 Where is it, and how much is there?

Shale beds are not found all over the UK. A report for DECC by the BGS on the [Unconventional Hydrocarbon Resources of Britain's Onshore Basins – Shale Gas](#) shows the British formations with most shale gas potential.¹¹ The diagrams reflect geological maps, where the same outcrops or formations run roughly on a South-East/North-West axis, running for example from the North East of England down to the South/South West coast.

These include the Upper Bowland Shale (the source rock for the Irish Sea conventional fields, and where Cuadrilla were first exploring), and both the Kimmeridge Clay and Lias of the Weald Basin (source rocks for the North Sea and English Channel fields).

On 27 June 2013 the BGS/DECC published a [Bowland Shale Gas Study](#), including a gas-in-place (GIP) resource assessment for the Bowland shale formation in Northern England.¹² This is not therefore an assessment for the entire country. Nor is it an estimate of the commercially recoverable gas.

Their central estimate of GIP is 37.6 trillion cubic meters (tcm). A [POSTbox](#) shows how this can be extrapolated to potentially recoverable resources of 1,800-13,000 billion cubic meters (bcm) by assuming similar recovery factors to the US, of 8-20%. This compares to DECC's published figures of a current annual UK gas consumption of 77 bcm and potentially recoverable conventional gas resources of 1,466 bcm.¹³

These are much higher than earlier BGS estimates, although a 2013 report from the [US Energy Information Agency](#) had suggested the technically recoverable resource could be as high as 736 bcm.¹⁴

¹⁰ BGS website, [New shale gas resource figure for central Britain](#) accessed 11 July 2013

¹¹ DECC/BGS, [Unconventional Hydrocarbon Resources of Britain's Onshore Basins – Shale Gas](#), 2012

¹² Andrews, I.J. 2013. The Carboniferous Bowland Shale gas study: geology and resource estimation. British Geological Survey for Department of Energy and Climate Change, London, UK.

¹³ [UK Shale Gas Potential](#), POSTbox July 2013

¹⁴ EIA/ARI, [World Shale Gas and Shale Oil Resource Assessment](#), June 2013, XI-2, converted from original figure of 26 trillion cubic feet

A September 2012 [report](#) from the UK Energy Research Centre (UKERC) formed part of a larger study of unconventional gas resources by the Joint Research Centre of the European Commission.¹⁵ This noted many significant uncertainties in assessing the recoverable volumes of shale gas, at regional and global level. It notes also that recovery rates are much lower than for conventional gas, around 15-30% of original gas in place (OGIP) compared to perhaps 80% in conventional reservoirs.

The most accurate estimates can really be obtained by test drilling. A company called [Cuadrilla](#) started drilling shale gas exploration wells near Blackpool in August 2010.¹⁶ In September 2011 Cuadrilla [estimated](#) that 5.7 tcm of gas was in the Bowland shale under Lancashire.¹⁷ The BGS expressed scepticism about the accuracy of this estimate, and pointed out that recovery rates would be much lower.¹⁸ In August 2013 Cuadrilla started test drilling at Balcombe in West Sussex before scaling back drilling operations after a protest camp; it has recently submitted a new planning application for the area.¹⁹

In June 2013 [IGas](#), another company which has been conducting exploratory studies in the UK, [published estimates](#) of “gas initially in place” (or total resource) in shales in the North West (including the Bowland shale) with a “most likely” value of 102 trillion cubic feet (2.9 tcm). Drilling to be conducted in Q4 of 2013 was expected to further refine these estimates.²⁰

3.2 Economic implications

An Energy and Climate Change Select Committee (ECCC) [inquiry](#) in 2011 concluded that shale gas was unlikely to be a “game-changer” as in the US, or perhaps countries like Poland.²¹ A major factor is that there is less land available to drill on.²²

A follow-up inquiry by ECCC in 2013 into [the impact of shale gas on energy markets](#), recommended that further exploratory operations be encouraged to help establish reliable resource estimates. It found that it was “too early to say whether domestic production of shale gas could result in cheaper gas prices in the UK”, and that it would be wrong to assume that prices would come down as a result of domestic or foreign shale gas.²³

In October 2011 Cuadrilla published Regeneris Consulting’s [full economic assessment of the impact of shale gas exploration and production in Lancashire and the UK](#). This estimated that for test wells alone:

- A single test well operation, in 2011 prices, costs in the region of £10.5 million, made up of Cuadrilla’s own costs, that of its two internal service companies and expenditure on a range of first tier suppliers.
- Some 18% of expenditure is shown to be deployed on Lancashire workers/suppliers, with a third going overseas. Of all UK expenditure (circa £7

¹⁵ European Commission, Energy Security Unit of the Joint Research Centre [Unconventional Gas: Potential Energy Market Impacts in the European Union](#), 2012

¹⁶ <http://www.cuadrillaresources.com/what-we-do/locations/>

¹⁷ Cuadrilla Resources, [About natural gas](#), accessed 25 June 2013

¹⁸ “What the frack?” *Economist*, 1 October 2011

¹⁹ <http://www.cuadrillaresources.com/our-sites/balcombe/> accessed 9 September 2013

²⁰ IGas, [Shale Gas in place in IGas’ North West licences of up to ca.170Tcf](#), 3 June 2013

²¹ House of Commons Energy and Climate Change Committee, [Shale Gas](#), May 2011

²² British Geological Society [Shale Gas Prospectivity web pages](#)

²³ House of Commons Energy and Climate Change Committee, [The Impact of Shale Gas on Energy Markets](#), April 2013

million per test well), a third is deployed on labour costs, with 7% being utilised for subsistence expenditure of workers most of which flows to Lancashire businesses.

- We estimate the test well activity will support some 250 FTE jobs across the UK over a 12 month period. Half of the jobs will occur within Cuadrilla and its extensive range of 1st tier suppliers.
- Some 15% of the jobs (circa 40) are estimated to be taken by Lancashire residents. ... At this stage very few of the specialist supply chain contractors make extensive use of local labour although this would change under a full commercial extraction scenario.²⁴

Cuadrilla's report estimated that test well activity might support 250 FTE jobs across the UK over a twelve month period. Also at the UK Level, the estimated FTE employment impact peaks at some 5,600 FTE jobs in the period 2016 through to 2019, with a build up in the years from 2013 onwards, if there is a move to a commercial extraction phase.²⁵

In June 2013 [Centrica acquired](#) a 25% interest in the Bowland exploration license from Cuadrilla.²⁶

A May 2013 [report](#) from the Institute of Directors presented a scenario where UK shale gas production attracts investment of £3.7 billion per year and supports up to 74,000 jobs, often focused in regions with currently high unemployment and in sectors such as manufacturing. It also potentially contributes significant tax revenue.²⁷

In a speech in September 2013 the Secretary of State repeated these IoD figures, and even proposed hypothecation of shale gas revenues, a policy normally opposed by Chancellors:

One policy proposal before our party conference is that a Low Carbon Transition Fund is established from some of the tax revenues from any future shale gas production²⁸

However, he noted that the uncertainties around the amount that could be commercially extracted were too great to know what effect shale gas would have on energy prices. Reporting the speech, [Business Green](#) noted that the Secretary of State was therefore being more cautious than the Prime Minister and the Chancellor, both of whom had argued shale gas could play a significant role in bringing down energy costs.²⁹

4 Regulatory regime

4.1 Petroleum exploration and development licences (PEDLs)

Shale gas drilling is currently only in the exploratory phase in the UK. It is covered by the normal UK regime for all oil and gas exploration and development. A UK Petroleum Exploration and Development licence (PEDL) allows a company to pursue a range of exploration activities, including exploration and development of unconventional gas, subject to necessary drilling/development consents and planning permission.³⁰

²⁴ Regeneris Consulting for Cuadrilla, *Economic Impact of Shale Gas Exploration & Production in Lancashire and the UK* September 2010 published 5 October 2011

²⁵ Ibid, p.44

²⁶ Centrica, [Centrica acquires a 25% interest in UK shale exploration licence](#), 13 June 2013

²⁷ IoD, [Infrastructure for Business: Getting shale gas working](#), 22 May 2013

²⁸ DECC, Speech by Ed Davey [The Myths and Realities of Shale Gas Exploration](#) 9 September 2013

²⁹ Business Green 9 September 2013 [Davey: UK shale gas is compatible with climate change targets](#)

³⁰ See http://www.decc.gov.uk/en/content/cms/meeting_energy/oil_gas/shale_gas/shale_gas.aspx#7 for more links to information on the regulatory regime

Oil and gas extraction starts with an exploration phase, which may include performing seismic surveys. A test bore may be drilled, to explore what is really underground and how rich the deposits are at different depths and formations. Only then might a company seek to move on to a phase of extraction or 'development'.

DECC outlines the onshore licensing system on its [oil and gas website](#).

These existing licenses, now that unconventional hydrocarbons are more attractive, may be re-examined for their potential.³¹ This will often be in terms of seismic surveys initially, but then possibly moving on to test drilling, where drills may be continued, through where conventional reservoirs are expected to be, to see if shale beds also have potential.

DECC advises that there is no a firm distinction between exploration for shale gas and exploration for other targets. Some companies who are drilling mainly for conventional oil and gas have decided to drill deeper than they otherwise might have, in order to see whether there is prospective shale in their licensed areas (coring is all that is envisaged in these cases and no fracking is involved).³²

DECC publishes drilling activity [figures](#) for exploration, appraisal and development wells drilled each year. Six onshore wells were drilled during the first half of 2013, but three of these were development wells, so these will be for conventional resources since shale gas drilling is only at exploratory phase at present.

4.2 Where are the PEDLs?

Any site where DECC issues consent to drill must have obtained planning permission first. After the last (13th) Onshore Licensing Round in 2008 and following the grant of planning permission, consent was given to drill for shale gas in five locations. Of these, consent for fracking of the shale was given to Cuadrilla at two sites at Poulton-le-Flyde. (Other permissions are required too; please see sections 4.3 and 4.4 below.)

A DECC [map](#) shows the onshore licences as of August 2013.³³ The yellow areas are those currently under licence. Zooming in on this map shows each PEDL number and the company to whom it was awarded. Comparing them to the geological maps may indicate where most shale gas potential is, bearing in mind that none are shale-specific, but since shale gas is only another hydrocarbon, all could in theory be explored for shale gas potential.

Appendix 1 to this note gives a list of all the current PEDL licences according to parliamentary constituency.

Finally, looking at the licence holding companies' websites often gives more detail about the operations being undertaken or planned.

In May 2013 the Energy Minister said that DECC expect to launch a new (14th) round of onshore licence applications in 2014 and that AMEC would carry out the Strategic Environment Assessment for this.³⁴

³¹ HL Deb 6 October 2011 c213WA

³² DECC pers. comm., August 2013

³³ DECC, [Oil and gas: onshore maps and GIS shapefiles](#),

³⁴ DECC press release 15 May 2013 [Robust regulation in place to accelerate shale development, says Energy Minister](#)

4.3 Planning permission

As with all other proposals for oil and gas developments, proposals for shale gas exploration or extraction are subject to the requirements of the *Town and Country Planning Act 1990* administered by the Minerals Planning Authority (MPA) for the area in which the development is located. DECC's consent for all drilling or production operations for oil and gas is given only once planning permission has been obtained.³⁵

The MPA will take the decision in accordance with the policies set out in the [National Planning Policy Framework](#) (NPPF) and the July 2013 Government guidance, [Planning practice guidance for onshore oil and gas](#).³⁶

The procedure used to determine these applications is set out in the *Town and Country Planning Act 1990* and the *Town and Country Planning (Development Management Procedure) (England) Order 2010* (SI 2010/2184). Under these rules planning applications must be publicised by site display and in local newspapers and information about the application must also be available on the relevant local authority website. This must include a section on how interested people can submit representations about the application, giving a period of at least 14 days.

The Government is currently [consulting](#) on changing how landowners and tenants are notified by applicants of applications for onshore oil and gas development. It would retain the requirement to serve notice on individual owners and tenants of land on the above ground area where works are required, but remove this requirement for owners of land beyond this area i.e. the owners of land where solely underground operations may take place. The consultation closes on 14 October 2013.³⁷

All representations must be submitted in writing, either on paper or electronically. Verbal comments are not accepted. If the planning application is to be determined at a planning committee meeting a constituent may be able to speak at a planning committee meeting.

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. The Government, in its July 2013 [Planning practice guidance for onshore oil and gas](#), listed the following as some "principal issues" for consideration:

- noise associated with the operation
- dust
- air quality
- lighting
- visual intrusion into the local setting and the wider landscape caused by any the placement of any building or structure within the application site area
- landscape character
- archaeological and heritage features
- traffic
- risk of contamination to land
- soil resources

³⁵ HC Deb 11 June 2012 c200W

³⁶ Department for Communities and Local Government, [Planning practice guidance for onshore oil and gas](#) July 2013

³⁷ Department for Communities and Local Government, [Revised requirements relating to planning applications for onshore oil and gas: Proposals for comment](#), 2 September 2013

- the impact on best and most versatile agricultural land
- flood risk
- land stability/subsidence
- internationally, nationally or locally designated wildlife sites, protected habitats and species, and ecological networks
- nationally protected geological and geomorphological sites and features
- site restoration and aftercare

While there is no definitive list of what is a material consideration, certain types of issue have been held by the courts *not* to be material considerations. These include issues such as loss of property value, loss of view and opposition to the principle of development – representations on these issues will not be considered when a planning decision is taken.

For more information about how to comment on a planning application see the Planning Aid England guide, [Commenting on Planning Applications](#).

MPAs must take relevant comments into account and make their decisions and the reasons for either accepting or refusing a planning application public.

In addition to this process, planning authorities should have a section on mineral extraction in their local plan. Government guidance directs that these plans should identify and include policies for extraction of mineral resources. The plan may identify particular sites in an area where the local authority believes such extraction would be suitable. The local plan would have gone through (or will go through if not yet in place) a period of public consultation. For more information about how the public consultation process works see the RTPI factsheet, [The Local Plan: why, when and how to get involved](#).

The July 2013 Planning practice guidance for onshore oil and gas

The Government published its [Planning practice guidance for onshore oil and gas](#) in July 2013 to try to give more certainty to local councils taking planning decisions on onshore oil and gas about the sorts of considerations they should take into account. The guidance has caused some controversy among some planning industry experts who have criticised it for limiting the issues that local councils can consider and have accused it of being “weighted in favour of granting permission”.³⁸

In a Westminster Hall debate, Green Party MP Caroline Lucas criticised the guidance for not having been consulted on first.³⁹ The Minister, Michael Fallon responded to this point by saying that “the Government do not normally consult on planning guidance. We consult on planning policy.”⁴⁰

Major infrastructure planning regime

In November 2012, the Government consulted on extending the major infrastructure planning regime to certain types of business and commercial development – to include onshore oil and gas extraction developments of over 500 tonnes per day for petroleum and 500,000 cubic metres per day for gas.⁴¹ This planning regime is different because for such projects, the Planning Inspectorate examines the application and will make a recommendation to the

³⁸ “Warning of fracking guidance ‘bias’, *Planning* 26 July 2013

³⁹ [HC Deb 18 July 2013 c357WH](#)

⁴⁰ [HC Deb 18 July 2013 c358WH](#)

⁴¹ Department for Communities and Local Government, [Nationally significant infrastructure planning: extending the regime to business and commercial projects: Consultation](#), 22 November 2012

relevant Secretary of State, who will make the final decision on whether to grant or to refuse development consent.

The Government published its consultation response in June 2013 and decided not to include these oil and gas extraction projects in the major infrastructure planning regime:

The Town and Country Planning Association were concerned that including coal, oil and gas within the business and commercial category raised questions about the Government's commitment to addressing climate change.

(...)

After considering the responses received and comments made during the passage of the Growth and Infrastructure Act, the Government has concluded that applications for planning permission for onshore oil and gas schemes, including any future planning proposals for shale gas development, should not be included in the new business and commercial category but will keep this under review.⁴²

4.4 Other permissions

The controls on fracking were outlined by DECC in its *Synopsis of main questions raised in responses to DECC consultation on mitigation of seismic risks from hydraulic fracturing for shale gas, with Government responses*.⁴³

PEDLs allow a company only exclusivity in an area to search for, bore for and get hydrocarbons. They are separate from all other permissions, including:

- Planning permission
- Any need to gain access rights from landowners
- Environmental permits, including for mining waste, from the Environment Agencies
- Health and safety regulations and permits from the HSE
- Consent to drill and frack, from DECC.

The terms of the PEDL licences require DECC's approval for the choice of operator. One of the issues DECC checks before approving an operator is coverage of relevant insurances.⁴⁴

All drilling operations are subject to notification to the Health and Safety Executive. Also, each site is assessed by the Environment Agency (SEPA in Scotland) who regulate discharges to the environment, issue water abstraction licences, and are statutory consultees in the planning process.⁴⁵ The Environment Agency has [issued guidance](#) on this which notes that a mining waste permit will be required for drill cuttings, spent drill muds and drill fluids, flowback fluids, waste gases and wastes left underground. A permit will also be needed if large quantities of gas are to be flared and for groundwater activities, depending on the local hydrology.⁴⁶

⁴² Department for Communities and Local Government, *Major infrastructure planning: extending the regime to business and commercial projects, Summary of responses and government response*, 21 June 2013

⁴³ 21 December 2012

⁴⁴ DECC pers. comm., 22 February 2013

⁴⁵ HC Deb 1 February 2011 c669w and <http://www.environment-agency.gov.uk/business/topics/126689.aspx>

⁴⁶ <http://www.environment-agency.gov.uk/business/sectors/148556.aspx> December 2012

The UK has, alongside Norway, one of the most stringent offshore drilling safety regimes in the World. According to the [HSE](#);

HSE monitors shale gas operations from a well integrity and site safety perspective. We oversee that safe working practices are adopted by onshore operators as required under the Health and Safety at Work Etc Act 1974, and regulations made under the Act. These specifically are:

- The Borehole Site and Operations Regulations 1995 (BSOR) applies to shale gas operations. (These regulations are primarily concerned with the health and safety management of the site).
- The Offshore Installations and Wells (Design and Construction, etc) Regulations 1996 (DCR) apply to all wells drilled with a view to the extraction of petroleum regardless of whether they are onshore or offshore.⁴⁷

In November 2012 the [Environment Agency](#) and HSE produced a [joint working strategy](#) on how they will work together to ensure a joined up approach and that there is appropriate monitoring and inspection of unconventional oil and gas operations.⁴⁸

5 Environmental considerations

In 2012 the Royal Society and Royal Academy of Engineering (RS/RAE) conducted a short [review of the risks associated with fracking](#). This unbiased and comprehensive report concluded that the health, safety and environmental risks can be managed effectively in the UK, by implementing and enforcing best operational practice. The report also made some specific recommendations however, referred to further below.

The May 2012 *World Energy Outlook* special report on unconventional gas, [Golden rules for a golden age of gas](#), summarises the concerns around fracking. While unconventional resources could boost energy diversity and security, this has to be done in an environmentally acceptable manner:⁴⁹

Producing unconventional gas is an intensive industrial process, generally imposing a larger environmental footprint than conventional gas development. More wells are often needed and techniques such as hydraulic fracturing are usually required to boost the flow of gas from the well. The scale of development can have major implications for local communities, land use and water resources. Serious hazards, including the potential for air pollution and for contamination of surface and groundwater, must be successfully addressed. Greenhouse-gas emissions must be minimised both at the point of production and throughout the entire natural gas supply chain. Improperly addressed, these concerns threaten to curb, if not halt, the development of unconventional resources.

The IEA has developed a set of 'golden rules' in response, which it estimates would add on 7% to the cost of developing a typical shale gas wellsite, but which it says would give the industry public and environmental acceptance and a 'social licence' to operate.⁵⁰

⁴⁷ HSE [The regulation of onshore unconventional oil and gas exploration \(shale gas\)](#) webpage accessed 13 August 2013

⁴⁸ HSE/Environment Agency, November 2012

⁴⁹ International Energy Agency, [Golden rules for a golden age of gas](#) WEO special report 29 May 2012

⁵⁰ Ibid, in text box on pages 13 and 14

5.1 Greenhouse gas emissions

It has been argued that generating electricity from natural gas is relatively clean in comparison to coal fired generation.⁵¹ It has been suggested that more gas could help bridge the gap to cleaner renewables or more nuclear generation.⁵² US carbon emissions have fallen by 9% since 2005, reversing a strong upwards trend, and the US Environmental Protection Agency (EPA) has attributed almost half of the reduction to shale gas use.⁵³

From the UK perspective, the IoD highlight the emissions benefits of domestic production over importing liquid natural gas (LNG), the potential of shale gas as a transport fuel and avoided emissions through supporting energy efficient manufacturing in the UK.⁵⁴

However, cheap gas may divert investment from more expensive (up-front) alternatives such as renewables and nuclear, weakening the case for reducing reliance on fossil fuels.⁵⁵ The former Director of the Tyndall Centre for Climate Change Research, Professor Kevin Anderson, has said that “From a climate-change perspective this stuff simply has to stay in the ground.”⁵⁶ A Tyndall Centre [report](#) published in November 2011 concluded:

... emissions from a fully developed UK shale gas industry would likely be very substantial in their own right. If the UK Government is to respect its obligations under both the Copenhagen Accord and Low Carbon Transition Plan, shale gas offers no meaningful potential as even a transition fuel.⁵⁷

A [letter to the Guardian](#) (27 September 2011) said that the lower CO₂ emissions of gas compared to coal or oil were countered by methane releases of up to 10% of production. However, in a [letter in response](#) (6 October 2011), a petroleum engineer said that methane leakage with frac fluids can be either captured or flared and leakage of 10% would not be tolerated by any commercial company.

The 2013 ECC Committee [final report](#) recommended that policies on flaring and venting of methane should be reviewed to keep fugitive emissions as close to zero as possible, and that these emissions should be monitored by DECC.⁵⁸

The RS/RAE in its [June 2012 report](#) considered that more work was needed to monitor this, and to explore the carbon footprint and climate risks associated with extraction and use.⁵⁹

In June 2013, Energy Minister Michael Fallon said that a study and report on this had been requested by the Secretary of State, to include recommendations to mitigate the impacts of shale gas exploration, production and use.⁶⁰ On 9 September 2013 DECC published a report

⁵¹ e.g. “[The case for shale and tight gas](#)”, Speech given by Malcolm Brinded, Executive Director, Upstream International, at the Foundation for Science and Technology, London, England, November 9, 2011

⁵² Pearce, F., “[Fracking: the monster we greens must embrace](#)”, *Guardian*, 15 March 2013, accessed 14 June 2013

⁵³ “Frack to the Future”, *New Scientist*, 10 August 2013 pp. 36-41

⁵⁴ IoD, [Infrastructure for Business: Getting shale gas working](#), 22 May 2013

⁵⁵ Schrag, D.P., “[Is shale gas good for climate change?](#)” *Daedalus*, 141(2), 72-80, 2012

⁵⁶ “What the Frack?” *The Economist*, 1 October 2011 p.34 and “Natural Gas: Should fracking stop?” *Nature* Volume 477, pp 271–275 15 September 2011

⁵⁷ Tyndall Centre for Climate Change Research, [Shale gas: an updated assessment of environmental and climate change impacts](#), Executive summary, November 2011, p7

⁵⁸ House of Commons Energy and Climate Change Committee, [The Impact of Shale Gas on Energy Markets](#), April 2013

⁵⁹ RS/RAE [Shale gas extraction in the UK: a review of hydraulic fracturing](#) June 2012

⁶⁰ [HC Deb 3 June 2013 cc942-3W](#)

by its Chief Scientific Adviser, Professor David Mackay, and Dr Timothy Stone on the [Potential Greenhouse Gas Emissions Associated with Shale Gas Extraction and Use](#).

This concludes that local emissions should not be significant if properly regulated, compared to the overall emissions from burning shale gas. It found that shale gas's overall carbon footprint was comparable to gas extracted from conventional sources, lower than that of LNG, and, when used for generating electricity, significantly lower than that of coal.

Responding to the report on the same day in a [speech to the Royal Society](#), the Secretary of State said this meant that gas was 'part of the answer to climate change', as a bridge in our transition to a green future. Indigenous 'on-shore' production would allow the UK to control the emissions better rather than off-shoring them, contribute to energy security, and maintain tax revenues as the North Sea wound down. He said:

The continued use of gas is perfectly consistent with our carbon budgets over the next couple of decades.

If shale gas production does reach significant levels we will need to make extra efforts in other areas.

Because by on-shoring production we will be on-shoring the emissions as well.⁶¹

This overall effect on keeping within Carbon Budgets is likely to be challenged by those who say that any dash for gas risks these.⁶²

5.2 Pollution incidents in the US and implications for the UK

The situation in North America

The [Chartered Institution of Water and Environmental Management](#) considers that "Many apprehensions over fracking in the UK are a result of the experience of regulation in the US", where "each State regulates separately and to varying levels of stringency."⁶³

Anecdotal instances of pollution in the USA received prominence through the Gasland film. Some states (e.g. [New York](#)) have put in place moratoriums on fracking, as have some countries including Northern Ireland and France.⁶⁴

The RS/RAE report noted differences in practice between the UK and North America:

Studies in North America have used well data to identify key factors affecting leakage, especially the number of casings and the extent to which these casings were cemented. Some of the leaky wells In a Canadian study had only a single casing or were left uncased except in the section from the surface casing down to just below the aquifer (Watson and Bachu 2009). Others had not been cemented at all or the cementation had not reached the required height (Watson and Bachu 2009). Several percent of older oil and gas wells leaked, while fewer than 0.5% of those constructed since 2000 according to stricter standards were found to be leaky (Watson and Bacchu 2009).

In the USA, it is common to have two strings of casings. When intermediate casing is not installed, cementing the production casing to the surface should be considered

⁶¹ DECC, Speech by Ed Davey [The Myths and Realities of Shale Gas Exploration](#) 9 September 2013

⁶² See for example BBC 19 March 2012 [Has the 'greenest government ever' gassed itself?](#)

⁶³ CIWEM position paper [Hydraulic Fracturing \(Fracking\) of Shale in the UK](#) October 2012

⁶⁴ Reuters, [New York State Assembly votes to block fracking until 2015](#) 6 March 2013 or see list on p.53 of Policy Exchange 24 February 2012 [Gas Works? Shale gas and its policy implications](#)

(API 2009). Intermediate casing is not always cemented all the way back to the surface. At a minimum, the cement should extend above any exposed water or hydrocarbon bearing zones (API 2009). In some states, such as Pennsylvania and Texas, there is a requirement to cement casing to approximately 75 ft below any aquifers. Failure to do this can lead to groundwater contamination as occurred in Pavillion, Wyoming (DiGiulio et al 2011). In the UK, standard practice is to have three strings of casing with at least two (intermediate and production casing) passing through and thereby isolating any freshwater zones. Best practice is to cement casings all the way back to the surface, depending on local geology and hydrogeology conditions.⁶⁵

Given this, public concern and the proliferation of fracking, the US EPA has embarked on studies on the '*Potential Impacts of Hydraulic Fracturing on Drinking Water Resources*', publishing a [progress report](#) in December 2012 and with a final draft report due in 2014.⁶⁶

The EPA notes that it is hard to compile and isolate statistics on incidents due to fracking (compared to 'conventional' leaks) given also that there is no national database in the US, with many data recorded at State level.

The EPA has also said that it is "supporting the State of Wyoming in its further investigation of drinking water quality in the rural area east of Pavillion, Wyoming".⁶⁷

In 2011, the former Energy Minister Charles Hendry noted that the investigated US incidents of water pollution were explained by accidents on the surface rather than underground leaks, and said that the UK would learn from this. Regarding US methane leaks,

Also, some incidents of methane contamination of water were not attributable to oil or gas operations at all; they were caused by methane of recent biological origin.

However, there were cases in which gas leaks had occurred. That was attributed to unsatisfactory well construction or cementing. That confirms, if any confirmation were needed, that drilling for shale gas—like drilling for any other kind of oil or gas—is a hazardous operation that requires careful and consistent regulation. However, that also supports the Committee's conclusions that there is no evidence that the fracking process itself poses a direct risk to underground water resources, and that the risks are related to the integrity of the well and are not different from those encountered in conventional oil and gas extraction.⁶⁸

Controls in the UK

The Environment Agency describes fracking as an established technology.⁶⁹ The 2011 Tyndall Centre report set out concerns about ground and surface water contamination, possibly even affecting quality of drinking water and wetland habitats, depending on factors such as the connection between ground and surface waters.

The depth of shale gas extraction gives rise to major challenges in identifying categorically pathways of contamination of groundwater by chemicals used in the extraction process.⁷⁰

⁶⁵ RS/RAE *Shale gas extraction in the UK: a review of hydraulic fracturing* June 2012 page 26

⁶⁶ <http://www.epa.gov/hfstudy/index.html> accessed 17 December 2012

⁶⁷ EPA website [Pavillion groundwater investigation](#) accessed 9 September 2013

⁶⁸ HC Deb 3 November 2011 c363WH

⁶⁹ <http://www.environment-agency.gov.uk/business/topics/126689.aspx>

⁷⁰ Tyndall Centre for Climate Change Research, *Shale gas: an updated assessment of environmental and climate change impacts*, November 2011, pp9-10

The ECC Committee's 2011 inquiry found no evidence that fracking poses a direct risk to underground water aquifers provided the drilling well is constructed properly.⁷¹ In its response to the Committee, the Government noted:

The technologies used in shale gas operations are not generically novel or unfamiliar. Hydraulic fracturing, water injection and lateral drilling, individually or in combination, are all familiar techniques that DECC and the other regulators have had to deal with robustly for a long time.⁷²

The RS/RAE considered that because fracking takes place many hundreds of metres or even several kilometres below aquifers, it is very unlikely that fracking will affect those aquifers. However, more likely causes of possible contamination include faulty wells, and the report called for the same stringent controls for offshore wells to be applied onshore:

Ensuring well integrity must remain the highest priority to prevent contamination. The probability of well failure is low for a single well if it is designed, constructed and abandoned according to best practice. The UK's well examination scheme was set up so that the design of offshore wells could be reviewed by independent, specialist experts. This scheme must be made fit for purpose for onshore activities.⁷³

According to an answer in June 2011, the fluids used by Cuadrilla have comprised: fresh water and sand—99.96% and polyacrylamide friction reducers—0.04%. Other potential additives include hydrochloric acid, typically at a concentration of 0.125%, or biocide at a concentration of 0.005% if required to purify the local water supply.⁷⁴

5.3 Water use

The Tyndall Centre highlighted excessive water use for fracking as a particular problem “given that water resources in many parts of the UK are already under pressure”.⁷⁵ For its exploration sites Cuadrilla anticipated using approximately 1,600 m³ of water for each hydraulic fracture operation.⁷⁶ The RS/RAE report recommends recycling and re-use of wastewaters and that water disposal options should be planned from the outset.

Because shale gas reserves are more diffuse than conventional reservoirs, productivity at each well falls relatively quickly. The IEA considers that, apart from local community buy-in, the most important above-ground considerations for unconventional gas developments are the availability of sufficient land and water. Shale gas drilling leaves “a large and comparatively invasive footprint on the landscape” because of the large number of wells needed. The IEA also notes that access to water may be a barrier to unconventional gas developments, although technology is starting to reduce the amount required.⁷⁷

In its [response](#) to the 2011 ECC Committee inquiry, the Government said that “Adverse effects on water resources as a result of possible expansion of the shale gas industry in the

⁷¹ Committee Press Release, *Shale gas gets support from MPs in new report*, 23 May 2011 <http://www.parliament.uk/business/Committees/Committees-a-z/commons-select/energy-and-climate-change-Committee/news/new-report-shale-gas/>

⁷² Energy and Climate Change - *Seventh Special Report Shale Gas: Government Response to the Committee's Fifth Report of Session 2010-12* 19 July 2011

⁷³ RS/RAE *Shale gas extraction in the UK: a review of hydraulic fracturing* June 2012 page 4

⁷⁴ [HC Deb 29 June 2011 c853w](#)

⁷⁵ Tyndall Centre for Climate Change Research at Manchester University, *Shale gas: a provisional assessment of climate change and environmental impacts*, January 2011, p6-7

⁷⁶ [HC Deb 29 June 2011 c853w](#)

⁷⁷ IEA *World Energy Report 2009* Chapter 11, p.415

UK are not expected.”⁷⁸ Any operator will also need a licence to abstract water from the Environment Agency who will assess existing abstraction levels and licences.⁷⁹ Because abstraction is controlled in the UK, the RS/RAE consider that water use can be managed sustainably.⁸⁰

5.4 Seismic events

In April and May 2011 there were some small earth tremors near Blackpool.⁸¹ Cuadrilla issued a [statement](#) on 31 May 2011 saying it was postponing fracking operations while it interpreted seismic information. In its July 2011 response to the ECCC report,⁸² the Government agreed that a pause in hydraulic fracturing operations was appropriate.

‘Induced seismicity’ can occur in previously aseismic areas following oil and gas activities. Thousands of induced earthquakes are registered annually, and operators can take steps to reduce or control seismicity.⁸³ Natural or mining-induced earthquakes in the UK are not uncommon with around 150 earthquakes recorded on average each year.⁸⁴

The BGS said in January 2012 that the risks to groundwater and of earthquakes had been exaggerated, with the minor earthquakes caused by fracking “Comparable in size to the frequent minor quakes caused by coal mining. What’s more, they originate much deeper in the crust so have all but dissipated by the time they reach the surface”.⁸⁵

Cuadrilla funded a geomechanical study by the BGS which was given to DECC to consider. In April 2012 DECC [published the report](#), which said:

The report concludes that minor earth tremors detected in the area of Cuadrilla's Preese Hall operations near Blackpool in April and May last year were caused by fracking and, among other measures, recommends a real time seismic monitoring system and a "traffic light" control regime based on this monitoring.⁸⁶

A consultation period was announced, and in the meantime the Environment Agency continued studies to ensure it had all the information it needed to regulate the industry. On 13 December 2012 the Secretary of State [announced](#) that exploratory hydraulic fracturing for shale gas could resume in the UK.⁸⁷ New regulatory requirements for operators seeking consent under licences for fracking are related to seismicity only and are to:

- Conduct a prior review of information on seismic risks and the existence of faults;
- Submit to DECC a frac plan showing how any seismic risks are to be addressed;
- Carry out seismic monitoring before, during and after the frac;

⁷⁸ Energy and Climate Change - *Seventh Special Report Shale Gas: Government Response to the Committee's Fifth Report of Session 2010-12*, 19 July 2011

⁷⁹ HC Deb 23 April 2012 c614W

⁸⁰ RS/RAE *Shale gas extraction in the UK: a review of hydraulic fracturing* June 2012
http://royalsociety.org/uploadedFiles/Royal_Society_Content/policy/projects/shale-gas/2012-06-28-Shale-gas.pdf

⁸¹ “Gas drilling on hold after earth tremor”, *Daily Post (Liverpool)* 1 June 2011 p.14

⁸² Op cit.

⁸³ *Petroleum Review* April 2012 p.16 “Shakin’ all over”

⁸⁴ http://www.earthquakes.bgs.ac.uk/publications/annual_reports/2011_22nd_annual_report.pdf

⁸⁵ *New Scientist* “Fracking risk is exaggerated” 11 January 2012

⁸⁶ HC Deb 23 April 2012 c617WA

⁸⁷ HC Deb 13 December 2012 c44WS

- Implement a “traffic light” system which will be used to identify unusual seismic activity requiring reassessment, or halting, of operations.⁸⁸

6 Government policy on and support for the industry

During a [Westminster Hall debate](#) on the Government’s response to the ECC Committee’s 2011 report on shale gas, the overall consensus was that the Committee, which was broadly supportive of the industry, had taken a balanced and cautious approach.⁸⁹

In the 2012 Autumn Statement, the Chancellor set out the overall Government policy:

Today, we publish our gas strategy to ensure that we make the best use of lower-cost gas power, including new sources of gas under the land. We are consulting on new tax incentives for shale gas and announcing the creation of a single office so that regulation is safe but simple. We do not want British families and businesses to be left behind as gas prices tumble on the other side of the Atlantic.⁹⁰

The Government’s [Gas Generation Strategy](#) noted that shale gas production might commence in the second part of this decade, but production was likely to grow more slowly than in the US. There were two main commitments:

- A new DECC Office for Unconventional Gas and Oil, to join up responsibilities across Government, ensure a simplified and streamlined regulatory process, and engage with communities.
- A ‘fair tax regime’ for future shale gas production.⁹¹

[Budget 2013](#) said that the Government would introduce a new field allowance for shale gas and consult on the detail.⁹² In July 2013 the Government launched its consultation on [tax incentives for drilling companies](#).⁹³

Energy Minister Michael Fallon said in June 2013 that the Government would soon be consulting on community benefits “through grants or expenditure, or, better still, through discounts on their bills, which could be significant”.⁹⁴ Details of the package were announced on 27 June 2013:

- The Government has also welcomed a package of community benefits that has been brought forward by industry today. Companies have pledged to engage with communities early (prior to any application for planning permission), and to provide community benefits in areas where shale is commercially extracted.
- These will include £100,000 for communities situated near each exploratory (hydraulically fracked) well, and 1% of revenues from every production site.⁹⁵

These all send clear signals of Government support for the industry. The [Energy Bill 2012-13 to 2013-14](#), currently in the Lords, includes an Emissions Performance Standard set at a

⁸⁸ DECC press release [New controls announced for shale gas exploration](#) 13 December 2012.

⁸⁹ HC Deb 3 November 2011 c399WH

⁹⁰ [HC Deb 5 December 2012 c881](#)

⁹¹ DECC Gas Generation Strategy 5 December 2012 Cm 8407 p.52

⁹² DECC, [New Office to look at community benefits for shale gas projects](#), 20 March 2013

⁹³ HM Treasury and DCLG press release 19 July 2013 [Shale gas: government unveils plan to kick start investment with generous new tax breaks](#)

⁹⁴ [HC Deb 6 June 2013 c1655](#)

⁹⁵ DECC press release 27 June 2013 [Estimates of shale gas resource in North of England published, alongside a package of community benefits](#)

level to allow new gas generating plant to be built. More detail can be found in the Library Research Paper on the [Energy Bill \(Committee Stage Report\)](#).⁹⁶

In the Secretary of State's December 2012 [Written Statement](#) announcing the resumption of fracking, he said that the Government would also act on the [RS/RAE] recommendations regarding regulation of a future production phase and environmental risk assessment:

...the academies have in addition recommended that an environmental risk assessment should be mandatory for all shale gas operations, involving the participation of local communities at the earliest possible opportunity, and that this assessment should address risks across the entire lifecycle of shale gas extraction.

DECC will therefore take steps to enhance the existing frameworks for consultation and consenting to these activities, in line with these recommendations. Licensees will be required to carry out a comprehensive high-level assessment of environmental risks, including risks to human health, and covering the full cycle of the proposed operations, including well abandonment; and to consult with stakeholders including local communities, as early as practicable in the development of their proposals.⁹⁷

Cuadrilla would, he said, be asked to do this in Lancashire. Even as exploratory drilling resumes in Lancashire, or begins in West Sussex⁹⁸, this is some way away from full commercial development, as the then Energy Minister Charles Hendry noted in July 2012. This is not least because the situation regarding ownership of underground resources is different.⁹⁹ In the UK, the Crown holds the right to gold and silver, and the State to oil, petroleum and natural gas - landowners hold only the remaining mineral rights.

The Secretary of State has stressed again the very early natures of current onshore exploration, and has said that it "might be the 2020s before we feel any benefits in full".¹⁰⁰

7 Appendix; extant onshore PEDL licences by constituency

The tables overleaf show the results of overlying DECC's onshore PEDL licence areas with constituency boundary data.

These are all current extant PEDL licenses, none of DECC's licences distinguish between shale gas or other forms of hydrocarbons. Comparing these to the geological maps may indicate which are in areas of shale gas potential. However, as mentioned in section 4.2 above, the best way of determining whether there are any plans to explore for shale gas is to contact the company holding the licence, or check its website.

⁹⁶ [Energy Bill: Committee Stage Report - Commons Library Research Paper](#), 9 April 2013

⁹⁷ HC Deb 13 December 2012 c51WS

⁹⁸ <http://www.cuadrillaresources.com/our-sites/balcombe/>

⁹⁹ HC Deb 12 July 2012 c441

¹⁰⁰ DECC, Speech by Ed Davey [The Myths and Realities of Shale Gas Exploration](#) 9 September 2013

Onshore licences located within parliamentary constituencies, by constituency, as at August 2013

Constituency	% of constituency covered by licence block	Licence Operator	Round awarded under	Licence AS
Aberavon	1.0%	UK METHANE	13	PEDL214
Aberavon	3.0%	ADAMO	13	PEDL218
Aberavon	4.9%	UK METHANE	0	PEDL148
Aberavon	28.5%	UK METHANE	0	PEDL149
Aberavon	28.7%	UK METHANE	13	PEDL215
Aberavon	30.6%	ADAMO	9	PEDL100
Airdrie and Shotts	47.5%	REACH	13	PEDL162
Altrincham and Sale West	25.0%	IGAS	13	PEDL193
Alyn and Deeside	1.0%	BIOGAS	0	EXL203
Alyn and Deeside	5.6%	DART	13	PEDL187
Alyn and Deeside	11.2%	IGAS	13	PEDL184
Alyn and Deeside	34.6%	DART	12	PEDL147
Amber Valley	42.4%	LOW	13	PEDL199
Arundel and South Downs	0.0%	IGAS	0	PL240
Arundel and South Downs	0.7%	KEY	0	PL241
Arundel and South Downs	2.8%	IGAS	0	PL205
Arundel and South Downs	3.3%	CELTIQUE	13	PEDL243
Arundel and South Downs	3.3%	CUADRILLA	13	PEDL244
Arundel and South Downs	6.3%	CELTIQUE	13	PEDL232
Arundel and South Downs	10.5%	IGAS	13	PEDL233
Arundel and South Downs	17.4%	CELTIQUE	13	PEDL234
Ashfield	0.4%	ALKANE	9	PEDL001 Kings Mill
Ashfield	0.4%	C.E.	0	C.E.
Ashfield	9.3%	DART	0	EXL290 Area 2
Ashfield	22.5%	LOW	13	PEDL199
Barnsley Central	1.1%	ALKANE	9	PEDL037 Monk Bretton
Barnsley Central	1.9%	ALKANE	9	PEDL037 Monckton
Barnsley East	0.1%	ALKANE	9	PEDL037 Monckton
Barnsley East	0.5%	ALKANE	9	PEDL037 Monk Bretton
Barnsley East	1.2%	ALKANE	9	PEDL011
Barnsley East	1.2%	ALKANE	9	PEDL011
		HUMBLY GROVE GAS		
Basingstoke	0.0%	STORAGE	0	PL116
Bassetlaw	0.0%	IGAS	0	ML007
Bassetlaw	0.1%	ALKANE	9	PEDL001 Welbeck
Bassetlaw	0.2%	SCOTTISH	0	PL162 Area 2
Bassetlaw	0.4%	IGAS	0	PL178
Bassetlaw	0.6%	COURAGE	9	PEDL090 Area 1
Bassetlaw	0.7%	DART	13	PEDL207
Bassetlaw	0.9%	DART	13	PEDL210
Bassetlaw	0.9%	IGAS	0	ML006
Bassetlaw	1.9%	IGAS	0	ML004 Area 2
Bassetlaw	2.6%	IGAS	0	ML004 Area 1
Bassetlaw	6.9%	DART	9	PEDL012
Bassetlaw	7.2%	IGAS	9	PEDL006 Area 1
Bassetlaw	9.4%	DART	12	PEDL139
Bassetlaw	17.3%	DART	13	PEDL200
Bassetlaw	23.6%	DART	12	PEDL140
Beaconsfield	3.6%	FAIRFAX	13	PEDL236
Beckenham	95.8%	NORTHDOWN	13	PEDL245
Berwickshire, Roxburgh and Selkirk	0.0%	DART	12	PEDL159
Beverley and Holderness	0.2%	DART	13	PEDL176
Beverley and Holderness	85.8%	RATHLIN	13	PEDL183
Bexhill and Battle	4.7%	CUADRILLA	13	PEDL247
Birkenhead	28.1%	IGAS	13	PEDL184
Blackpool North and Cleveleys	97.4%	BOWLAND	13	PEDL165
Blackpool South	89.2%	BOWLAND	13	PEDL165
Bognor Regis and Littlehampton	0.1%	KEY	0	PL241
Bognor Regis and Littlehampton	47.4%	CELTIQUE	13	PEDL232
Bolsover	0.0%	LOW	13	PEDL199
Bolsover	0.1%	ALKANE	9	PEDL001 Markham
Bolsover	0.4%	ALKANE	9	PEDL001 Shirebrook
Bolsover	0.4%	ALKANE	9	PEDL001 Whitwell
Bolsover	0.4%	ALKANE	9	PEDL001 Bolsover
Bolsover	1.0%	ALKANE	0	PL213
Bolsover	8.9%	C.E.	0	C.E.
Bolton West	2.1%	BOWLAND	13	PEDL165

Onshore licences located within parliamentary constituencies, by constituency, as at August 2013

Constituency	% of constituency covered by licence block	Licence Operator	Round awarded under	Licence AS
Bootle	2.7%	EDP	13	PEDL164
Bournemouth East	0.2%	PERENCO	0	PL259
Bournemouth East	98.3%	NWE	13	PEDL238
Bournemouth West	5.9%	PERENCO	0	PL259
Bournemouth West	94.0%	NWE	13	PEDL238
Brecon and Radnorshire	0.1%	UK METHANE	0	PEDL148
Brecon and Radnorshire	0.2%	ADAMO	13	PEDL212
Bridgend	11.2%	COASTAL	13	PEDL217
Bridgend	38.6%	COASTAL	13	PEDL216
Bridgend	47.0%	ADAMO	9	PEDL100
Brigg and Goole	0.0%	SCOTTISH	0	PL161 Area 3
Brigg and Goole	0.4%	EUROPA	0	DL001
Brigg and Goole	0.6%	BLACKLAND PARK	13	PEDL209
Brigg and Goole	2.6%	EGDON	13	PEDL241
Brigg and Goole	3.0%	EUROPA	13	PEDL180
Brigg and Goole	3.9%	DART	12	PEDL140
Brigg and Goole	5.2%	DART	13	PEDL179
Brigg and Goole	5.6%	EGDON	13	PEDL182
Brigg and Goole	6.2%	DART	0	PL162 Area 1
Brigg and Goole	7.6%	DART	13	PEDL173
Brigg and Goole	8.0%	DART	13	PEDL178
Brigg and Goole	10.5%	DART	13	PEDL174
Brigg and Goole	10.9%	SCOTTISH	0	PL162 Area 2
Brigg and Goole	18.6%	EUROPA	13	PEDL181
Bristol East	17.2%	UK METHANE	13	PEDL228
Bristol North West	0.0%	SONOREX	13	PEDL224
Bristol South	11.8%	UK METHANE	13	PEDL228
Bristol South	46.8%	UK METHANE	13	PEDL226
Bromley and Chislehurst	53.0%	NORTHDOWN	13	PEDL245
Broxtowe	56.5%	LOW	13	PEDL199
Burton	2.0%	DART	13	PEDL198
Caithness, Sutherland and Easter Ross	1.8%	CAITHNESS	12	PEDL158
Canterbury	3.6%	COASTAL	13	PEDL249
Canterbury	13.8%	COASTAL	13	PEDL250
Cardiff West	3.4%	COASTAL	13	PEDL219
Cardiff West	18.6%	COASTAL	13	PEDL220
Carlisle	3.8%	DART	12	PEDL159
Carmarthen East and Dinefwr	0.0%	ADAMO	13	PEDL212
Carmarthen East and Dinefwr	0.2%	DART	13	PEDL211
Carshalton and Wallington	99.1%	NORTHDOWN	13	PEDL245
Charnwood	0.6%	EGDON	13	PEDL201
Chesterfield	1.7%	ALKANE	9	PEDL001 Markham
Chesterfield	5.5%	ALKANE	0	PL213
Chichester	0.1%	KEY	0	PL241
Chichester	0.5%	IGAS	0	PL211
Chichester	3.4%	IGAS	13	PEDL233
Chichester	3.4%	IGAS	13	PEDL235
Chichester	3.6%	CELTIQUE	13	PEDL232
Chichester	4.2%	IGAS	0	PL240
Chichester	4.4%	NORTHERN	12	PEDL155
Chichester	12.3%	CELTIQUE	13	PEDL234
Chichester	12.4%	NORTHERN	11	PEDL126
Chichester	19.9%	CELTIQUE	13	PEDL231
Chorley	50.3%	BOWLAND	13	PEDL165
Christchurch	54.4%	NWE	13	PEDL238
City of Chester	4.0%	IGAS	13	PEDL190
City of Chester	4.7%	DART	13	PEDL187
City of Chester	8.3%	DART	13	PEDL188
City of Chester	24.9%	IGAS	13	PEDL184
City of Chester	25.9%	DART	12	PEDL147
City of Chester	32.2%	DART	13	PEDL189
Cleethorpes	0.4%	EGDON	13	PEDL241
Cleethorpes	78.5%	EUROPA	13	PEDL181
Clwyd South	1.0%	DART	13	PEDL187
Clwyd South	10.2%	DART	13	PEDL185
Clwyd South	13.9%	DART	13	PEDL186
Coatbridge, Chryston and Bellshill	28.0%	REACH	13	PEDL162

Onshore licences located within parliamentary constituencies, by constituency, as at August 2013

Constituency	% of constituency covered by licence block	Licence Operator	Round awarded under	Licence AS
Congleton	30.0%	CELTIQUE	13	PEDL197
Crawley	1.9%	MAGELLAN	13	PEDL246
Crawley	3.1%	CUADRILLA	13	PEDL247
Crawley	20.2%	MAGELLAN	12	PEDL137
Crawley	74.8%	CELTIQUE	13	PEDL243
Crewe and Nantwich	0.3%	IGAS	9	PEDL040 Rest
Croydon Central	100.0%	NORTHDOWN	13	PEDL245
Croydon North	85.4%	NORTHDOWN	13	PEDL245
Croydon South	62.6%	NORTHDOWN	13	PEDL245
Cumbernauld, Kilsyth and Kirkintilloch East	69.8%	REACH	13	PEDL162
Cynon Valley	1.1%	UK GAS	9	PEDL014 Tower
Cynon Valley	1.7%	ADAMO	13	PEDL218
Dartford	5.0%	NORTHDOWN	13	PEDL245
Delyn	6.4%	IGAS	10	PEDL107
Delyn	18.0%	IGAS	13	PEDL184
Don Valley	0.0%	DART	12	PEDL140
Don Valley	0.5%	DART	0	EXL288 Area 3
Don Valley	1.7%	DART	0	EXL288 Area 2
Don Valley	2.5%	DART	13	PEDL173
Don Valley	4.9%	SCOTTISH	0	PL162 Area 2
Don Valley	5.5%	DART	13	PEDL174
Don Valley	11.4%	ALKANE	13	PEDL169
Don Valley	14.1%	SCOTTISH	0	PL161 Area 3
Don Valley	17.6%	ALKANE	9	PEDL043
Don Valley	21.9%	DART	12	PEDL139
Doncaster Central	4.1%	SCOTTISH	0	PL161 Area 3
Doncaster Central	4.9%	ALKANE	0	EXL288 Area 1 Trumfleet
Doncaster Central	52.9%	ALKANE	13	PEDL169
Doncaster North	0.0%	ALKANE	9	PEDL011
Doncaster North	0.0%	ALKANE	9	PEDL011
Doncaster North	0.1%	ALKANE	9	PEDL011
Doncaster North	0.1%	ALKANE	9	PEDL043
Doncaster North	0.3%	DART	0	EXL288 Area 3
Doncaster North	0.4%	ALKANE	9	PEDL011
Doncaster North	0.5%	ALKANE	13	PEDL169
Doncaster North	2.6%	DART	0	EXL288 Area 2
Doncaster North	3.2%	DART	0	EXL288 Area 1 Fenwick
Doncaster North	3.8%	DART	0	EXL288 Area 1 Rest
Doncaster North	3.9%	ALKANE	0	EXL288 Area 1 Trumfleet
Doncaster North	6.5%	DART	13	PEDL174
Doncaster North	6.9%	ALKANE	0	PL161 Area 2
Doncaster North	7.8%	DART	0	EXL288 Area 1 Rest
Dover	11.0%	COASTAL	13	PEDL250
Dover	20.1%	COASTAL	13	PEDL252
Dover	29.5%	COASTAL	13	PEDL251
Dover	34.6%	COASTAL	13	PEDL249
Dumfriesshire, Clydesdale and Tweeddale	2.4%	DART	12	PEDL159
Dunfermline and West Fife	20.7%	DART	9	PEDL133
Dunfermline and West Fife	30.7%	DART	13	PEDL163
East Dunbartonshire	35.2%	REACH	13	PEDL162
East Hampshire	0.5%	NORTHERN	11	PEDL126
East Hampshire	5.7%	HUMBLY GROVE GAS STORAGE	0	PL116
East Hampshire	51.9%	CELTIQUE	13	PEDL231
East Surrey	1.5%	CUADRILLA	0	EXL189 Lingfield
East Surrey	1.9%	NORTHDOWN	13	PEDL245
East Surrey	2.9%	CUADRILLA	0	EXL189 Cowden
East Surrey	4.4%	MAGELLAN	12	PEDL137
East Surrey	4.9%	IGAS	0	ML018
East Surrey	6.0%	CUADRILLA	13	PEDL247
East Surrey	7.2%	IGAS	0	ML021
East Surrey	12.5%	CUADRILLA	0	PL055
East Surrey	14.4%	IGAS	0	PL182
East Surrey	16.4%	MAGELLAN	13	PEDL246

Onshore licences located within parliamentary constituencies, by constituency, as at August 2013

Constituency	% of constituency covered by licence block	Licence Operator	Round awarded under	Licence AS
East Yorkshire	0.3%	CAYTHORPE	0	PL234
East Yorkshire	1.1%	VIKING	0	PL081
East Yorkshire	3.1%	RATHLIN	13	PEDL183
East Yorkshire	10.5%	DART	13	PEDL176
Eddisbury	0.0%	DART	13	PEDL187
Eddisbury	2.0%	IGAS	13	PEDL190
Eddisbury	5.6%	DART	13	PEDL185
Eddisbury	7.3%	DART	13	PEDL189
Eddisbury	11.1%	DART	13	PEDL188
Ellesmere Port and Neston	0.0%	ALKANE	13	PEDL191
Ellesmere Port and Neston	3.7%	DART	13	PEDL189
Ellesmere Port and Neston	39.2%	IGAS	13	PEDL190
Ellesmere Port and Neston	50.5%	IGAS	13	PEDL184
Elmet and Rothwell	0.0%	ALKANE	9	PEDL037 Wheldale
Elmet and Rothwell	0.1%	ALKANE	9	PEDL037 Newmarket
Elmet and Rothwell	0.4%	ALKANE	9	PEDL037 Ackworth
Epsom and Ewell	39.8%	NORTHDOWN	13	PEDL245
Erewash	19.4%	LOW	13	PEDL199
Falkirk	27.0%	REACH	13	PEDL162
Falkirk	53.4%	DART	9	PEDL133
Fareham	5.3%	NORTHERN	0	PEDL256
Folkestone and Hythe	3.6%	COASTAL	13	PEDL249
Fylde	8.7%	CUADRILLA	0	EXL269 Area 1
Fylde	18.1%	CUADRILLA	0	EXL269 Area 2
Fylde	71.8%	BOWLAND	13	PEDL165
Gainsborough	0.0%	IGAS	0	PL199 Area 1
Gainsborough	0.1%	IGAS	9	PEDL006 Area 1
Gainsborough	0.1%	EUROPA	12	PEDL150 Area 1
Gainsborough	0.2%	DART	12	PEDL140
Gainsborough	0.3%	EUROPA	13	PEDL180
Gainsborough	0.3%	IGAS	0	PL179 Area 1
Gainsborough	0.3%	EUROPA OIL & GAS (WEST FIRSBY) LTD	0	DL003
Gainsborough	0.6%	ALTAQUEST	0	DL005 Area 2
Gainsborough	0.7%	IGAS	0	AL009
Gainsborough	0.8%	CIRQUE	0	EXL294 Area 1 Eastern Part
Gainsborough	0.9%	COURAGE	0	EXL294 Area 1 Western Part
Gainsborough	0.9%	COURAGE	9	PEDL090 Area 2
Gainsborough	1.3%	IGAS	0	ML004 Area 2
Gainsborough	1.8%	SCOTTISH	0	PL162 Area 2
Gainsborough	2.9%	IGAS	0	ML004 Area 3
Gainsborough	5.0%	BLACKLAND PARK	13	PEDL209
Gainsborough	5.8%	EGDON	13	PEDL241
Gainsborough	5.9%	EGDON	13	PEDL253
Gainsborough	6.6%	DART	13	PEDL210
Gainsborough	7.7%	IGAS	9	PEDL006 Area 2
Gainsborough	8.5%	IGAS	0	PL179 Area 2
Gainsborough	8.7%	EUROPA	13	PEDL181
Garston and Halewood	31.8%	IGAS	10	PEDL116
Garston and Halewood	52.5%	ALKANE	13	PEDL191
Gedling	2.0%	ALKANE/NEWTON	13	PEDL254
Gedling	11.8%	LOW	13	PEDL199
Gedling	64.5%	ALKANE/NEWTON	13	PEDL255
Glasgow North East	0.2%	REACH	13	PEDL162
Glenrothes	3.4%	DART	13	PEDL161
Glenrothes	36.8%	DART	13	PEDL163
Gower	1.3%	ADAMO	13	PEDL212
Gower	4.5%	UK METHANE	13	PEDL214
Gower	24.7%	DART	13	PEDL211
Grantham and Stamford	5.0%	NEWTON	13	PEDL208
Great Grimsby	100.0%	EUROPA	13	PEDL181
Guildford	1.3%	EUROPA	12	PEDL143
Guildford	2.4%	CELTIQUE	13	PEDL243
Guildford	3.4%	IGAS	0	DL004
Guildford	25.2%	CELTIQUE	13	PEDL234

Onshore licences located within parliamentary constituencies, by constituency, as at August 2013

Constituency	% of constituency covered by licence block	Licence Operator	Round awarded under	Licence AS
Haltemprice and Howden	12.3%	DART	13	PEDL179
Haltemprice and Howden	18.4%	DART	13	PEDL176
Haltemprice and Howden	32.9%	RATHLIN	13	PEDL183
Halton	0.2%	IGAS	10	PEDL116
Halton	0.8%	IGAS	13	PEDL190
Halton	3.6%	IGAS	12	PEDL145 Area 3
Halton	22.8%	IGAS	12	PEDL145 Area 1
Halton	24.0%	BIOGAS	0	EXL276
Halton	34.8%	ALKANE	13	PEDL191
Havant	0.4%	IGAS	0	PL211
Havant	12.8%	NORTHERN	0	PEDL256
Havant	29.0%	NORTHERN	12	PEDL155
Hemsworth	0.0%	ALKANE	9	PEDL037 Monckton
Hemsworth	0.5%	ALKANE	9	PEDL011
Hemsworth	0.7%	ALKANE	9	PEDL037 Allerton Bywater
Hemsworth	0.7%	ALKANE	9	PEDL037 Nostell
Hemsworth	0.7%	ALKANE	9	PEDL037 Featherstone
Hemsworth	0.7%	ALKANE	9	PEDL037 South Kirby
Horsham	7.8%	CUADRILLA	13	PEDL244
Horsham	12.9%	CELTIQUE	13	PEDL234
Horsham	14.1%	CUADRILLA	13	PEDL247
Horsham	60.3%	CELTIQUE	13	PEDL243
Isle of Wight	1.8%	NORTHERN	13	PEDL240
Isle of Wight	43.1%	NWE	13	PEDL239
Kingston and Surbiton	27.0%	NORTHDOWN	13	PEDL245
Kingston upon Hull East	88.5%	RATHLIN	13	PEDL183
Kingston upon Hull North	100.0%	RATHLIN	13	PEDL183
Kingston upon Hull West and Hessle	78.5%	RATHLIN	13	PEDL183
Kingswood	9.6%	UK METHANE	13	PEDL228
Kirkcaldy and Cowdenbeath	56.9%	DART	13	PEDL163
Knowsley	1.8%	ALKANE	13	PEDL191
Knowsley	3.5%	IGAS	10	PEDL116
Lancaster and Fleetwood	23.1%	BOWLAND	13	PEDL165
Leigh	1.1%	ALKANE	9	PEDL039 West Leigh
Leigh	1.3%	ALKANE	0	EXL253 Golborne
Leigh	1.5%	ALKANE	9	PEDL039 Parsonage
Leigh	1.5%	ALKANE	9	PEDL039 Bickershaw
Leigh	1.6%	DART	0	EXL273
Leigh	53.4%	IGAS	13	PEDL193
Lewes	2.2%	CUADRILLA	13	PEDL247
Lewes	4.7%	CUADRILLA	13	PEDL244
Lewisham West and Penge	23.0%	NORTHDOWN	13	PEDL245
Lichfield	27.7%	IGAS	10	PEDL115
Lincoln	1.9%	COURAGE	0	EXL294 Area 1 Western Part
Lincoln	2.3%	IGAS	0	PL179 Area 2
Lincoln	6.2%	IGAS	0	PL199 Area 1
Lincoln	6.4%	EUROPA	12	PEDL150 Area 1
Lincoln	46.0%	DART	13	PEDL210
Linlithgow and East Falkirk	10.1%	DART	9	PEDL133
Linlithgow and East Falkirk	18.9%	REACH	13	PEDL162
Liverpool, Wavertree	16.9%	ALKANE	13	PEDL191
Llanelli	1.4%	DART	13	PEDL211
Loughborough	1.4%	IGAS	0	PL220 Area 2
Loughborough	17.3%	EGDON	13	PEDL201
Louth and Horncastle	0.7%	EUROPA	13	PEDL181
Louth and Horncastle	0.8%	EGDON	9	PEDL005 Keddington Gas
Louth and Horncastle	0.9%	EGDON	9	PEDL005 North Somercotes
Louth and Horncastle	2.1%	WINGAS	9	PEDL005 Saltfleetby Gas
Louth and Horncastle	8.5%	EGDON	13	PEDL253
Macclesfield	31.4%	CELTIQUE	13	PEDL197
Maidenhead	7.1%	FAIRFAX	13	PEDL236
Makerfield	0.5%	ALKANE	9	PEDL039 West Leigh
Makerfield	0.5%	IGAS	13	PEDL193
Mansfield	0.8%	ALKANE	9	PEDL001 Kings Mill
Mansfield	0.8%	ALKANE	9	PEDL001 Welbeck
Mansfield	1.3%	ALKANE	9	PEDL001 Sherwood
Mansfield	1.3%	ALKANE	9	PEDL001 Warsop
Mansfield	1.3%	ALKANE	9	PEDL001 Mansfield

Onshore licences located within parliamentary constituencies, by constituency, as at August 2013

Constituency	% of constituency covered by licence block	Licence Operator	Round awarded under	Licence AS
Meon Valley	0.9%	NORTHERN	12	PEDL155
Meon Valley	4.8%	IGAS	9	PEDL070
Meon Valley	5.9%	IGAS	0	PL211
Meon Valley	6.1%	NORTHERN	0	PEDL256
Meon Valley	9.8%	NORTHERN	11	PEDL126
Mid Derbyshire	3.2%	LOW	13	PEDL199
Mid Dorset and North Poole	5.7%	EGDON	0	PL090
Mid Dorset and North Poole	25.9%	NWE	13	PEDL238
Mid Dorset and North Poole	54.4%	PERENCO	0	PL089
Mid Sussex	0.4%	CELTIQUE	13	PEDL243
Mid Sussex	26.3%	CUADRILLA	13	PEDL247
Mid Sussex	45.1%	CUADRILLA	13	PEDL244
Middlesbrough	0.6%	EGDON	9	PEDL068 Kirkleatham
Middlesbrough South and East Cleveland	0.0%	EGDON	9	PEDL068 Kirkleatham
Mitcham and Morden	88.5%	NORTHDOWN	13	PEDL245
Mole Valley	1.9%	IGAS	0	DL004
Mole Valley	2.4%	KEY	9	PL235
Mole Valley	8.8%	CELTIQUE	13	PEDL243
Mole Valley	11.8%	MAGELLAN	12	PEDL137
Mole Valley	24.2%	EUROPA	12	PEDL143
Monmouth	0.8%	SONOREX	13	PEDL224
Morley and Outwood	1.2%	ALKANE	9	PEDL037 Newmarket
Motherwell and Wishaw	0.1%	REACH	13	PEDL162
Neath	2.7%	DART	13	PEDL211
Neath	6.3%	UK METHANE	0	PEDL149
Neath	14.2%	UK METHANE	13	PEDL215
Neath	33.2%	ADAMO	13	PEDL212
Neath	33.4%	UK METHANE	0	PEDL148
New Forest West	0.1%	NWE	13	PEDL239
New Forest West	5.8%	NWE	13	PEDL238
Newark	0.0%	BLACKLAND PARK	0	PL199 Area 2
Newark	0.0%	BLACKLAND PARK	0	PL215 Area 2
Newark	0.1%	COURAGE	0	EXL141 Area 3
Newark	0.2%	EGDON	11	PEDL130
Newark	0.3%	EGDON	10	PEDL118
Newark	0.4%	COURAGE	0	EXL141 Area 1
Newark	0.5%	EGDON	13	PEDL203
Newark	0.6%	ALKANE/NEWTON	13	PEDL254
Newark	0.9%	IGAS	0	ML006
Newark	1.1%	IGAS	9	PEDL006 Area 1
Newark	1.2%	ONSHORE	0	PL215 Area 1
Newark	1.2%	ALTAQUEST	0	DL005 Area 2
Newark	1.7%	IGAS	0	ML007
Newark	1.9%	NEWTON	13	PEDL208
Newark	2.9%	ALKANE	13	PEDL202
Newark	3.3%	COURAGE	9	PEDL090 Area 1
Newark	3.6%	DART	13	PEDL207
Newark	3.7%	IGAS	0	ML003
Newark	4.1%	NEWTON	13	PEDL204
Newark	4.3%	COURAGE	9	PEDL090 Area 2
Newark	5.6%	ALKANE/NEWTON	13	PEDL255
Newark	7.6%	EUROPA	12	PEDL150 Area 1
Newark	14.3%	EGDON	13	PEDL206
Newcastle-under-Lyme	2.7%	ALKANE	9	PEDL057
Newcastle-under-Lyme	7.6%	IGAS	9	PEDL056 Rest
Newcastle-under-Lyme	8.7%	ALKANE	9	PEDL040 Siverdale
Newcastle-under-Lyme	11.6%	IGAS	9	PEDL040 Rest
Newcastle-under-Lyme	33.0%	ALKANE	9	PEDL056 Silverdale
Newport East	17.5%	SONOREX	12	PEDL157
Newport East	43.8%	SONOREX	13	PEDL224
Newport West	6.6%	SONOREX	12	PEDL157
Normanton, Pontefract and Castleford	1.2%	ALKANE	9	PEDL037 Wheldale
Normanton, Pontefract and Castleford	1.2%	ALKANE	9	PEDL037 Prince of Wales
North Dorset	0.3%	NWE	13	PEDL238
North Dorset	3.0%	PERENCO	0	PL089

Onshore licences located within parliamentary constituencies, by constituency, as at August 2013

Constituency	% of constituency covered by licence block	Licence Operator	Round awarded under	Licence AS
North East Derbyshire	0.0%	C.E.	0	C.E.
North East Derbyshire	0.0%	ALKANE	0	PL213
North East Fife	11.8%	DART	13	PEDL161
		HUMBLY GROVE GAS		
North East Hampshire	19.5%	STORAGE	0	PL116
North East Somerset	17.6%	UK METHANE	13	PEDL227
North East Somerset	22.4%	UK METHANE	13	PEDL226
North East Somerset	27.6%	UK METHANE	13	PEDL228
North Shropshire	0.3%	DART	13	PEDL186
North Shropshire	1.1%	IGAS	9	PEDL040 Rest
North Shropshire	1.5%	IGAS	9	PEDL078 Area 1
North Shropshire	9.8%	DART	13	PEDL185
North Somerset	22.8%	UK METHANE	13	PEDL226
North West Hampshire	6.6%	IGAS	9	PEDL021
Nottingham East	3.7%	ALKANE/NEWTON	13	PEDL255
Nottingham East	8.1%	ALKANE/NEWTON	13	PEDL254
Nottingham North	40.7%	LOW	13	PEDL199
Nottingham South	0.2%	LOW	13	PEDL199
Ochil and South Perthshire	4.0%	DART	13	PEDL163
Ochil and South Perthshire	5.3%	DART	9	PEDL133
Ogmore	0.0%	COASTAL	13	PEDL217
Ogmore	0.4%	COASTAL	13	PEDL219
Ogmore	0.5%	UK GAS	9	PEDL014 Wyndham
Ogmore	0.5%	UK GAS	9	PEDL014 Pontycymer
Ogmore	7.7%	COASTAL	13	PEDL220
Ogmore	13.5%	ADAMO	13	PEDL218
Ogmore	14.8%	UK METHANE	0	PEDL149
Ogmore	62.5%	ADAMO	9	PEDL100
Old Bexley and Sidcup	0.1%	NORTHDOWN	13	PEDL245
Orpington	79.6%	NORTHDOWN	13	PEDL245
Penrith and The Border	5.8%	DART	12	PEDL159
Pontypridd	0.1%	ADAMO	13	PEDL218
Pontypridd	1.4%	COASTAL	13	PEDL219
Pontypridd	3.0%	ADAMO	9	PEDL100
Pontypridd	61.7%	COASTAL	13	PEDL220
Poole	8.5%	PERENCO	0	PL089
Poole	23.5%	PERENCO	0	PL259
Poole	65.1%	NWE	13	PEDL238
Portsmouth North	18.5%	NORTHERN	0	PEDL256
Preston	100.0%	BOWLAND	13	PEDL165
Redcar	38.4%	EGDON	9	PEDL068 Kirkleatham
Reigate	0.1%	IGAS	0	ML021
Reigate	0.3%	MAGELLAN	13	PEDL246
Reigate	3.7%	NORTHDOWN	13	PEDL245
Reigate	31.7%	MAGELLAN	12	PEDL137
Rhondda	1.0%	COASTAL	13	PEDL220
Rhondda	2.0%	UK GAS	9	PEDL014 Cwmparc
Rhondda	59.9%	ADAMO	13	PEDL218
Ribble Valley	7.5%	BOWLAND	13	PEDL165
Richmond (Yorks)	0.1%	EGDON	9	PEDL068 Westerdale
Richmond Park	5.6%	NORTHDOWN	13	PEDL245
Romsey and Southampton North	2.5%	IGAS	0	DL002
Romsey and Southampton North	2.6%	IGAS	9	PEDL021
Romsey and Southampton North	3.4%	IGAS	0	PL233
Rother Valley	7.2%	ALKANE	9	PEDL043
Rother Valley	18.6%	DART	13	PEDL200
Runnymede and Weybridge	7.9%	FAIRFAX	13	PEDL236
Rushcliffe	2.3%	IGAS	0	PL220 Area 2
Rushcliffe	4.7%	ALKANE/NEWTON	13	PEDL255
Rushcliffe	9.6%	NEWTON	13	PEDL204
Rushcliffe	15.0%	EGDON	13	PEDL201
Rushcliffe	30.3%	ALKANE/NEWTON	13	PEDL254
Rutland and Melton	0.4%	IGAS	0	PL220 Area 1
Rutland and Melton	2.7%	EGDON	13	PEDL201
Rutland and Melton	3.7%	NEWTON	13	PEDL204
Rutland and Melton	3.9%	NEWTON	13	PEDL208
Salford and Eccles	19.7%	IGAS	13	PEDL193

Onshore licences located within parliamentary constituencies, by constituency, as at August 2013

Constituency	% of constituency covered by licence block	Licence Operator	Round awarded under	Licence AS
Scarborough and Whitby	3.7%	VIKING	0	PL077
Scarborough and Whitby	4.9%	MOORLAND	10	PEDL120
Scarborough and Whitby	5.2%	EGDON	9	PEDL068 Westerdale
Scunthorpe	0.4%	DART	0	PL162 Area 1
Scunthorpe	1.6%	EGDON	13	PEDL182
Scunthorpe	3.3%	EUROPA	0	DL001
Scunthorpe	3.8%	SCOTTISH	0	PL162 Area 2
Scunthorpe	5.9%	DART	13	PEDL178
Scunthorpe	11.5%	EGDON	13	PEDL241
Scunthorpe	16.0%	DART	13	PEDL173
Scunthorpe	41.9%	EUROPA	13	PEDL180
Sefton Central	1.2%	BOWLAND	13	PEDL165
Sefton Central	52.1%	EDP	13	PEDL164
Selby and Ainsty	0.1%	DART	13	PEDL176
Selby and Ainsty	0.1%	HARWORTH	0	EXL250 Stillingfleet
Selby and Ainsty	0.2%	DART	0	EXL288 Area 1 Fenwick
Selby and Ainsty	1.1%	DART	0	EXL288 Area 1 Rest
Selby and Ainsty	8.1%	DART	12	PEDL146
Sevenoaks	1.1%	MIDMAR	13	PEDL248
Sevenoaks	2.3%	CUADRILLA	13	PEDL247
Sevenoaks	6.9%	IGAS	0	PL182
Sevenoaks	41.2%	NORTHDOWN	13	PEDL245
Sherwood	0.0%	ONSHORE	0	PL215 Area 1
Sherwood	0.2%	IGAS	0	ML006
Sherwood	0.3%	ALKANE	9	PEDL001 Rufford
Sherwood	0.3%	ALKANE	9	PEDL001 Clipstone
Sherwood	2.2%	EGDON	13	PEDL203
Sherwood	2.8%	EGDON	10	PEDL118
Sherwood	6.9%	ALKANE/NEWTON	13	PEDL255
Sherwood	9.1%	LOW	13	PEDL199
Sherwood	14.2%	EGDON	11	PEDL130
Sherwood	20.9%	ALKANE	13	PEDL202
Sleaford and North Hykeham	0.0%	BLACKLAND PARK	0	PL215 Area 2
Sleaford and North Hykeham	0.2%	DART	13	PEDL210
Sleaford and North Hykeham	0.2%	COURAGE	0	EXL294 Area 1 Western Part
Sleaford and North Hykeham	0.4%	BLACKLAND PARK	0	PL199 Area 2
Sleaford and North Hykeham	0.4%	CIRQUE	0	EXL294 Area 1 Eastern Part
Sleaford and North Hykeham	4.6%	EUROPA	12	PEDL150 Area 1
Sleaford and North Hykeham	9.8%	NEWTON	13	PEDL208
Slough	31.0%	FAIRFAX	13	PEDL236
Somerton and Frome	3.8%	UK METHANE	13	PEDL227
Somerton and Frome	9.0%	FAIRFAX	13	PEDL225
South Dorset	0.1%	PERENCO	0	PL259
South Dorset	4.0%	PERENCO	0	ML005
South Dorset	6.7%	EGDON	13	PEDL237
South Dorset	37.7%	EGDON	0	PL090
South Dorset	44.8%	PERENCO	0	PL089
South Ribble	96.6%	BOWLAND	13	PEDL165
South Staffordshire	0.8%	DART	13	PEDL195
South Thanet	20.9%	COASTAL	13	PEDL252
South Thanet	29.4%	COASTAL	13	PEDL250
South West Surrey	0.0%	IGAS	0	DL004
South West Surrey	6.3%	CELTIQUE	13	PEDL234
South West Surrey	11.9%	CELTIQUE	13	PEDL231
South West Surrey	30.4%	IGAS	13	PEDL235
Southport	84.9%	BOWLAND	13	PEDL165
St Helens North	0.0%	ALKANE	0	EXL253 Hermitage Green
St Helens North	1.0%	ALKANE	0	EXL253 Parkside
St Helens North	1.6%	IGAS	13	PEDL193
St Helens North	13.6%	DART	0	EXL273
St Helens South and Whiston	3.3%	IGAS	12	PEDL145 Area 2
St Helens South and Whiston	7.7%	BIOGAS	0	EXL276
St Helens South and Whiston	9.9%	ALKANE	13	PEDL191
St Helens South and Whiston	27.6%	DART	0	EXL273

Onshore licences located within parliamentary constituencies, by constituency, as at August 2013

Constituency	% of constituency covered by licence block	Licence Operator	Round awarded under	Licence AS
Stafford	0.0%	DART	13	PEDL198
Stafford	0.1%	DART	13	PEDL196
Stafford	2.5%	IGAS	9	PEDL078 Area 2
Stafford	17.5%	DART	13	PEDL195
Stafford	41.5%	IGAS	10	PEDL115
Staffordshire Moorlands	0.6%	DART	0	AL010
Staffordshire Moorlands	0.6%	CELTIQUE	13	PEDL197
Staffordshire Moorlands	18.8%	SEVEN SEA	12	PEDL141
Stirling	2.8%	DART	9	PEDL133
Stockton North	3.9%	EGDON	9	PEDL068 Kirkleatham
Stoke-on-Trent Central	1.2%	DART	0	AL010
Stoke-on-Trent Central	5.0%	SEVEN SEA	12	PEDL141
Stoke-on-Trent Central	16.4%	ALKANE	9	PEDL057
Stoke-on-Trent North	5.2%	SEVEN SEA	12	PEDL141
Stoke-on-Trent South	41.2%	ALKANE	9	PEDL057
Stoke-on-Trent South	55.3%	DART	0	AL010
Stone	0.7%	ALKANE	9	PEDL057
Stone	0.8%	ALKANE	9	PEDL056 Silverdale
Stone	1.6%	ALKANE	9	PEDL040 Siverdale
Stone	1.7%	IGAS	9	PEDL078 Area 2
Stone	1.9%	IGAS	9	PEDL056 Rest
Stone	4.1%	IGAS	9	PEDL040 Rest
Stone	7.5%	DART	13	PEDL195
Stone	8.6%	DART	0	AL010
Stone	11.3%	DART	13	PEDL198
Stone	12.0%	DART	13	PEDL196
Stone	12.8%	IGAS	10	PEDL115
Stone	13.9%	IGAS	9	PEDL078 Area 1
Streatham	3.2%	NORTHDOWN	13	PEDL245
Stretford and Urmston	85.5%	IGAS	13	PEDL193
Sutton and Cheam	100.0%	NORTHDOWN	13	PEDL245
Swansea East	2.5%	ADAMO	13	PEDL212
Swansea East	7.0%	DART	13	PEDL211
Swansea East	10.2%	UK METHANE	13	PEDL215
Swansea East	79.8%	UK METHANE	13	PEDL214
Swansea West	86.1%	UK METHANE	13	PEDL214
Tamworth	4.9%	IGAS	10	PEDL115
Tatton	0.0%	IGAS	12	PEDL145 Area 1
Tatton	9.5%	IGAS	13	PEDL193
Tatton	11.7%	CELTIQUE	13	PEDL197
Telford	8.6%	IGAS	9	PEDL078 Area 2
The Wrekin	22.5%	IGAS	9	PEDL078 Area 2
Thirsk and Malton	0.2%	VIKING	0	DL005
Thirsk and Malton	0.4%	EGDON	9	PEDL068 Westerdale
Thirsk and Malton	0.8%	VIKING	0	PL080 Area 2
Thirsk and Malton	0.9%	VIKING	0	PL077
Thirsk and Malton	0.9%	VIKING	0	AL006
Thirsk and Malton	1.7%	VIKING	13	PEDL177
Thirsk and Malton	3.8%	VIKING	0	PL080 Area 1
Thirsk and Malton	4.3%	VIKING	0	PL079
Thirsk and Malton	4.7%	VIKING	0	PL081
Thirsk and Malton	5.4%	DART	12	PEDL146
Thirsk and Malton	9.2%	MOORLAND	10	PEDL120
Tonbridge and Malling	0.0%	CUADRILLA	0	EXL189 Lingfield
Tonbridge and Malling	0.9%	NORTHDOWN	13	PEDL245
Tonbridge and Malling	9.8%	CUADRILLA	13	PEDL247
Tonbridge and Malling	11.1%	CUADRILLA	0	EXL189 Cowden
Tonbridge and Malling	22.9%	MIDMAR	13	PEDL248
Tunbridge Wells	8.1%	CUADRILLA	13	PEDL247
Tunbridge Wells	11.3%	MIDMAR	13	PEDL248
Vale of Glamorgan	0.0%	COASTAL	13	PEDL220
Vale of Glamorgan	0.5%	ADAMO	9	PEDL100
Vale of Glamorgan	4.6%	COASTAL	13	PEDL216
Vale of Glamorgan	28.0%	COASTAL	13	PEDL217
Vale of Glamorgan	29.8%	COASTAL	13	PEDL219
Wallasey	8.8%	IGAS	13	PEDL184

Onshore licences located within parliamentary constituencies, by constituency, as at August 2013

Constituency	% of constituency covered by licence block	Licence Operator	Round awarded under	Licence AS
Warrington North	0.1%	IGAS	12	PEDL145 Area 2
Warrington North	0.2%	ALKANE	0	EXL253 Parkside
Warrington North	1.0%	ALKANE	0	EXL253 Hermitage Green
Warrington North	17.8%	DART	0	EXL273
Warrington North	78.7%	IGAS	13	PEDL193
Warrington South	1.3%	BIOGAS	0	EXL276
Warrington South	1.7%	DART	0	EXL273
Warrington South	12.4%	IGAS	12	PEDL145 Area 1
Warrington South	20.8%	IGAS	12	PEDL145 Area 2
Warrington South	57.6%	IGAS	13	PEDL193
Wealden	0.1%	MIDMAR	13	PEDL248
Wealden	0.6%	CUADRILLA	13	PEDL244
Wealden	60.2%	CUADRILLA	13	PEDL247
Weaver Vale	0.2%	IGAS	13	PEDL193
Weaver Vale	0.5%	ALKANE	13	PEDL191
Weaver Vale	10.7%	IGAS	13	PEDL190
Weaver Vale	15.0%	IGAS	12	PEDL145 Area 1
Wells	9.9%	UK METHANE	13	PEDL227
Wells	10.3%	UK METHANE	13	PEDL226
Wells	19.8%	FAIRFAX	13	PEDL225
Wentworth and Dearne	0.6%	ALKANE	9	PEDL043
Wentworth and Dearne	1.1%	ALKANE	9	PEDL011
Wentworth and Dearne	1.1%	ALKANE	9	PEDL011
West Dorset	4.2%	EGDON	0	PL090
West Dorset	7.9%	EGDON	13	PEDL237
West Lancashire	18.1%	EDP	13	PEDL164
West Lancashire	41.9%	BOWLAND	13	PEDL165
Weston-Super-Mare	2.6%	UK METHANE	13	PEDL226
Wigan	18.0%	BOWLAND	13	PEDL165
Wimbledon	44.9%	NORTHDOWN	13	PEDL245
Winchester	0.1%	IGAS	0	DL002
Winchester	4.8%	IGAS	0	PL249
Winchester	5.1%	IGAS	9	PEDL070
Winchester	13.7%	IGAS	0	PL233
Windsor	43.8%	FAIRFAX	13	PEDL236
Wirral South	43.7%	IGAS	13	PEDL184
Wirral West	60.5%	IGAS	13	PEDL184
Worsley and Eccles South	64.2%	IGAS	13	PEDL193
Wrexham	0.0%	DART	12	PEDL147
Wrexham	4.7%	DART	13	PEDL185
Wrexham	9.7%	DART	13	PEDL188
Wrexham	10.7%	DART	13	PEDL186
Wrexham	17.9%	BIOGAS	0	EXL203
Wrexham	57.0%	DART	13	PEDL187
Wyre and Preston North	1.3%	CUADRILLA	0	EXL269 Area 1
Wyre and Preston North	98.1%	BOWLAND	13	PEDL165
Wythenshawe and Sale East	15.2%	IGAS	13	PEDL193
York Central	55.2%	DART	12	PEDL146
York Outer	1.2%	DART	13	PEDL176
York Outer	31.9%	DART	12	PEDL146

Sources:

Ordnance Survey. Boundary-Line.

Department of Energy & Climate Change. Onshore licences.