

SCC Technical briefing on a UK shale gas industry, September 2013

OUR POSITION

The Stop Climate Chaos Coalition does not support shale gas extraction in the UK because the Government has failed to demonstrate convincingly that it will not compromise the UK's legally binding climate change targets, or its broader commitment to limiting global climate change to two degrees. Britain should be leading the world in moving to clean renewable power, not aiming to extract ever more inaccessible fossil fuels. The UK must act in line with its historical responsibility for climate change, which is already affecting the world's poorest people, and provide an example to the world.

Stop Climate Chaos is calling on the Government to reconsider its support for fracking for shale gas immediately and to focus its policy on making a rapid transition towards a sustainable low carbon energy system, which will put the UK on an economically sensible and beneficial pathway to meeting its climate change commitments.¹

BACKGROUND

What is shale gas?

Shale gas is a form of 'unconventional gas' which is trapped inside shale rock formations deep underground. It is chemically effectively the same as natural gas, being mainly methane. 'Unconventional' refers to where the gas is extracted from. It's harder to extract than conventional natural gas and up until now it hasn't made sense financially to do so. However, advances in drilling techniques mean that it's now a more attractive prospect and is being actively pursued by developers and our Government alike.

What is fracking?

Hydraulic fracturing (fracking) involves injecting fracturing fluid (99-99.5% water and sand, 0.5-1% chemicals) at high pressure down a borehole to create fractures in shale rock formations, which enable shale gas to be extracted. Advances in drilling techniques mean that several boreholes can be drilled from one 'well pad' and then extend horizontally in different directions to access as much of the shale rock as possible.

What does this mean for the UK?

Estimates vary dramatically about how much economically recoverable shale gas exists in total in the UK. It could extend to billions of cubic feet, however a recent analysis by the US Energy Information Agency (EIA) suggests only around 4% of the gas identified could actually be extracted - and that's if it is economic to do so.²

The UK Department of Energy and Climate Change has issued generic oil and gas drilling licenses across a wide area which could also be used for the extraction of unconventional oil and gas.³ Exploratory drilling has already taken place in Lancashire and Sussex, giving rise to considerable controversy and local opposition.

In some areas, notably Scotland, the main source of unconventional gas is likely to be coal-bed methane and local opposition to this is also strong.

POTENTIAL IMPACTS OF FRACKING

Climate Change Impacts

If current trends continue, the world is currently on track for a warming far in excess of 2°C. The impacts of global warming will disproportionately impact the world's poorest countries and communities, which have the least, ability to cope and adapt. These impacts would also severely undermine ecosystem services on which human society and the world economy are highly dependent. Yet the World Bank has warned that even if current commitments to reduce carbon emissions are met, there is a 20% chance that global warming will exceed 4°C by the end of the century. If the current commitments are *not* implemented, we could reach 4°C as early as the 2060s.⁴

Compromises commitments to limit global warming to 2°C: A dash for shale gas extraction is not compatible with commitments to limit the global rise in average temperatures to 2°C above pre-industrial levels.

Research by the International Energy Agency (IEA) suggests that if we are to meet the global goal of 2 degrees, over 60% of the world's proven gas supplies will need to be left in the ground between now and 2035 - and around 50% by 2050.⁵ This calculation does not include UK shale gas reserves, which are not proven or conventional: Proven gas supplies mean those which have been discovered and are known to be extractable at an economically viable cost.

This makes it likely that pursuing a shale gas industry in the UK and elsewhere will result in burning more gas than is compatible with avoiding catastrophic climate change. Indeed, a scenario which sees global gas supply from unconventional resources triple by 2035, could result in a global temperature rise of more than 3.5 °C.⁶ This would have devastating consequences for both people and wildlife.⁷

Compromises UK Climate Act targets: Investing in shale gas extraction for use in the UK also compromises our ability to meet the legally-binding targets laid out in the Climate Change Act: a reduction of carbon emissions by 80% by 2050 on 1990 levels.

The Committee on Climate Change advises that to meet the targets in the Climate Act, the UK power sector should be almost carbon free by 2030 with only a limited role for gas (no more than 10% of electricity demand by 2030), and that UK households must be almost entirely gas free by 2050. A study by Manchester's Tyndall centre has estimated that if the UK was to burn just 10% of the available shale gas resource identified in the Bowland-Hodder shale, the carbon emissions produced would occupy more than 80% of our remaining carbon budget to 2050.⁸

With studies suggesting that UK shale gas production will peak between the mid 2020s and 2035⁹, UK shale gas will come on line at exactly the moment that demand for gas should be declining if we are on the right trajectory to meet our climate targets.

Lower-carbon emissions offset by methane leakage: Advocates say we should exploit shale gas because it has lower carbon emissions than coal and equal to natural gas. However, this doesn't take into account the risk of methane (a potent greenhouse gas) escaping during exploration and production. Recent studies indicated 'fugitive' methane emissions as high as 9%.¹⁰ The evidence is still being compiled, and leakage rates may be on average much lower, but it is estimated that leakage levels above 3.2% would nullify any emission advantage over coal.¹¹

Shale gas may be additional to fossil fuel use: Furthermore, shale gas may be used in addition to existing fossil fuel use, rather than replacing it. In the US, the switch from coal to gas has reduced domestic emissions, but the coal is still being extracted; it's just being exported, increasing emissions elsewhere. Shale gas in the UK may also be used in addition to and not instead of existing fossil fuel use.

Renewable alternatives may be ignored in favour of shale gas: The Committee on Climate Change has made a clear case that a rapid transition towards a low-carbon energy system will provide the most cost-effective way for the UK to meet its legally binding goal under the Climate Change Act¹², and could allow the UK to become an industrial leader in technologies such as offshore wind, wave and tidal power and electric cars¹³. Current tax breaks increase the economic incentives for fracking and weaken investor confidence in low-carbon solutions.

Shale gas is being supported in the UK at the same time as a large new generation of gas-fired power stations. This risks locking the UK in to a fossil-fuel based power system for decades to come.

Natural Environment & Health Impacts

Significant uncertainties remain over the potential ecological impacts of shale gas extraction in the UK but the cumulative impact could be extremely significant. Any potential impacts will be considerably greater when operating at a commercial scale:

Water pollution: The fracking process involves the use of a number of potentially hazardous substances in the fracking fluid and there is a risk of pollution of ground and surface waters. Pollution can result from faults in well-casings, leaks, spillages and migration down fractures.

Water stress: Fracking is a water intensive industry. One thousand wells would directly use 2 million litres of water a day.¹⁴ In water-stressed areas, it could put extra pressure on already limited resources.

Habitat fragmentation and loss: The construction, maintenance and use of thousands of 'well pads' and associated storage tanks, roads, pipes, parking and other infrastructure could have serious implications for nature conservation and landscapes.

Disturbance from noise & activity: Drilling a well pad of 10 wells takes between 5 and 10 months. During the drilling and fracking phases, truck movements will be high, potentially thousands truck movements for every well-pad.

Air pollution: Fugitive methane emissions can have negative impacts on air quality and are linked to health problems, reduced rates of plant and tree growth and reduced agricultural yields.¹⁵

Insufficient regulation: The regulatory framework for shale gas extraction and exploration needs to be improved significantly. Currently, it does not provide adequate safeguards against potential risks. It must be amended to protect particularly sensitive areas, require Environmental Impact Assessments for all developments and 'reduced emission completions equipment' to minimise methane emissions should be required as standard.

Impact on Fuel Bills, Jobs and the Economy

There are a number of claims being used by politicians, the shale gas industry and in the media which point to the benefits of fracking for fuel bills, job creation and the UK economy. Many of these claims remain unverified or disputed by experts, and in many cases amount to wishful thinking.

Fuel Bills: Despite oft-repeated claims that fracking will reduce UK fuel bills (including from David Cameron and Chancellor George Osborne), experts remain highly sceptical. Analysis by Poyry, Bloomberg and Deutsche bank suggest that with or without shale gas, the price of gas in the UK and the EU is unlikely to go down.¹⁶

Direct comparisons to falling bills in the US are not reliable. They ignore the higher operating costs for fracking companies in Europe and the numerous and complex global dynamics which affect gas prices. Also, gas prices fell so low in the US that drilling became economically unviable and many companies went bankrupt. A low gas price for consumers is not a recipe for a profitable shale gas sector in the UK.

Furthermore, UK shale gas production is unlikely to provide any immediate economic benefits, with a range of studies putting peak production between the mid 2020s and 2035.¹⁷

Jobs: Current estimates of the direct impact on jobs in the drilling and supply chain sector vary widely and lack independent verification¹⁸. Numbers can be over-stated and most employment is in the initial drilling stage. Comparisons with the impact of capital expenditure in the North Sea with the construction of onshore shale gas appear to be unwarranted given how much more labour intensive offshore drilling is.

Any potential jobs benefits should also be weighed against possible costs to the local economy, including agriculture, tourism and house prices.¹⁹

Furthermore, research from the US shows that investing \$1 million in renewable energy creates more than two to three times as many jobs as investing the same amount in gas.²⁰

Wider economic implications: Stranded assets: If the world does take action on climate change, UK shale gas will come on stream just as the International Energy Agency predicts that global gas demand and prices will decline.²¹ An IEA scenario in which there is global action to tackle climate change suggests that wholesale gas prices may be below the cost of UK shale gas extraction by the time it comes on stream, leaving shale gas assets stranded or in need of financial support. Put another way, betting on the future profitability of UK shale gas is betting on a world where catastrophic climate change is inevitable.

Stop Climate Chaos is calling on the Government to reconsider its support for fracking for shale gas immediately and to focus its policy on making a rapid transition towards a sustainable low carbon energy system, which will put the UK on an economically sensible and beneficial pathway to meeting its climate change commitments.

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- ¹ Although this paper focuses on shale gas, the concerns expressed also apply broadly to coal-bed methane.
- ² Energy Information Agency, [‘Technically recoverable shale gas and shale oil reserves’](#), 2013; EIA total gas in place 623TCF, extractable (assuming economic) 26TCF - around 4.1%.
- ³ Greenpeace UK, [‘Fracking in the UK \(Update 2\)’](#), 2012
- ⁴ World Bank, [‘Turn down the heat’](#), 2012, p. xiii
- ⁵ International Energy Agency, [‘Redrawing the Climate-Energy Map’](#), 2013, pp. 98-99
- ⁶ International Energy Agency, [‘Golden Rules for a Golden Age of Gas’](#), 2012, p. 91
- ⁷ World Bank, [‘Turn down the heat’](#), 2012
- ⁸ Provisional figures, Broderick & Anderson, Tyndall Centre, Manchester University
- ⁹ Institute of Directors, [‘Getting shale gas working’](#), 2013; Navigant for DECC, [‘Unconventional Gas’](#), 2013; Poyry, [‘How will Lancashire shale gas impact the GB energy market?’](#), 2012; these sources estimate peak shale gas production to be in the mid 2020s, 2030 (at low levels) and 2035 respectively.
- ¹⁰ Nature, [‘Methane leaks erode green credentials of natural gas’](#), 2013
- ¹¹ Alvarez, Pacala, Winebrake, Chameides & Hamburg, [‘Greater focus needed on methane leakage from natural gas infrastructure’](#), Proceedings for the National Academy of Science USA 109, 2012, pp. 6435–6440.
- ¹² Committee on Climate Change, [‘The Fourth Carbon Budget’](#), 2010
- ¹³ Committee on Climate Change, [‘Building a low-carbon economy: the UK’s innovation challenge’](#), 2010
- ¹⁴ Water UK, [‘Understanding the impacts of shale gas on the UK water industry’](#), 2013
- ¹⁵ Broderick J., et al, Tyndall Centre, University of Manchester, [‘Shale gas: an updated assessment of environmental and climate change impacts’](#), p. 75
- ¹⁶ Poyry, [‘How will Lancashire shale gas impact the GB energy market?’](#), 2012; Bloomberg New Energy Finance, [‘UK shale gas no “Get Out Of Jail Free” card’](#), 2013; Deutsche Bank, ‘European Gas: The Changing Landscape For Shale Gas’, 2013
- ¹⁷ Institute of Directors, [‘Getting shale gas working’](#), 2013; Navigant for DECC, [‘Unconventional Gas’](#), 2013; Poyry, [‘How will Lancashire shale gas impact the GB energy market?’](#), 2012; these sources estimate peak shale gas production to be in the mid 2020s, 2030 (at low levels) and 2035 respectively.
- ¹⁸ Regeneris Consulting for Cuadrilla, [‘Economic Impact of Shale Gas Exploration & Production in Lancashire and the UK’](#), 2011; Institute of Directors, [‘Getting shale gas working’](#), 2013; Research for Cuadrilla shows that the number of jobs created at around 1,600 in Lancashire and 5,600 in the UK for four years from 2016 to 2019, falling to under 200 from 2022 onwards. The Institute of Directors present an illustrative scenario which shale gas replaces the production of North Sea oil to support 74,000 jobs.
- ¹⁹ Food & Water Watch, [‘Fracking and the food system’](#), 2012; The Observer [‘Worry for homeowners who face the threat of fracking’](#), June 23rd 2012
- ²⁰ Political Economy Research Institute, University of Massachusetts, [‘The economic benefits of investing in clean energy’](#); Investing \$1 million dollars in gas creates 5 jobs compared to 13 for wind, 14 for solar and 17 for building retrofits from the same amount of investment.
- ²¹ International Energy Agency, [‘Redrawing the Climate-Energy Map’](#), 2013