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Seven questions about fracking in Scotland



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POLICY BRIEF

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Introduction

In January 2015, the Scottish Government placed a moratorium on the “granting of planning consents for unconventional oil and gas developments, including fracking” and, in October 2015, announced a timetable for a programme of research and public consultation. During the winter of 2016/17 there will be a 4-month period of public consultation followed by analysis in the spring of 2017. The aim is to have the results of the research process published before the consultation begins so that participants will have the opportunity to study the evidence before contributing to the consultation¹.

This IPPI Policy Brief is intended as a comment on what we view as the urgent need to improve on the quality of the ‘fracking debate’ that has been conducted in the public domain over the past year. Our argument is that, not only has the debate been somewhat polarised, but the questions raised and debated have been very narrowly focussed and lacking a wider contextual view. In particular, we argue that the issue needs to be set in terms of the broader question of ‘if we don’t get gas from shale, where do we get it from, and what are the alternatives?’, but also with the over-arching question of ‘what could fracking do for Scotland?’ We have identified seven questions that we believe must be answered in order for the process of consultation to come to a well-informed conclusion. We consider each of these in turn.

¹ Summary information can be found at <http://news.scotland.gov.uk/News/Moratorium-called-on-fracking-1555.aspx> n.b. This moratorium is distinct from the October 2015 Scottish Government moratorium on Underground Coal Gasification (UCG).

Question 1. What do we need gas for and how much will Scotland need in the future?

The shale gas debate constitutes a good example of how energy policy discussion tends to give insufficient attention to the demand side. Energy policy debate is often framed as being about electricity generation. However gas is also widely used for cooking and space heating in homes, industry and public buildings, and to provide heat in industrial processes. Gas (more properly, associated non-gas liquids produced with gas, such as ethane) is a key petrochemical feedstock in a range of industrial processes to produce goods and services that we consume every day.

This latter point is a key one in the context of the INEOS shipments of US shale gas ethane that began arriving in Scotland in September 2016. This ethane is to be used as a feedstock in the petrochemical industry at Grangemouth. These petrochemicals are used to make paints, household cosmetic products, plastics for medical instruments and a range of other products that we use as both luxuries and necessities every day of our lives. Due to the geology under the central belt, Scottish shale is likely to be richer in non-gas liquids than the English resource², meaning that there are implications in terms of the yield and, thus, the competitiveness of the potential domestic resource relative to imports from the rest of the UK or elsewhere.

More generally, the petrochemicals context highlights the fact that we use gas (and energy more generally) both directly and indirectly in much of our consumption activity. Of course there is much that we can do to reduce our reliance on plastics. Indeed, this is part of a wider environmental concern that plastics aren't biodegradable, as highlighted by the recent UK ban on microbeads. There are things we can do to improve our wider materials efficiency in terms of recycling, re-using and/or incentivising alternative

² See report by Monaghan commissioned by the British Geological Survey for Department of Energy and Climate Change in 2014 at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/360471/BGS_D_ECC_MVS_2014_MAIN_REPORT.pdf.

behaviours. However, once we get beyond the low hanging fruit of plastic bags and plastic cups, reducing demand and determining what can replace current plastic goods, becomes much more challenging. Alternative feedstocks such as biofuels come with other ethical issues, for instance the displacement of food crops by biofuels and their reliance on petrochemical-derived fertilisers.

Moreover, in the context of reducing reliance on gas in petrochemical processes at Grangemouth in Scotland, it is important to note that this activity is very much an upstream one, manufacturing plastic pellets that are used in production processes elsewhere. Thus, it is not only Scottish consumption of plastics that drives this activity; rather the issue is with the demand for plastics worldwide.

The broader point is that the context of the debate here in Scotland must be broadened from a simple focus on hydrocarbons versus renewables in electricity generation to a broader one that considers the ongoing requirement for gas as a resource and not just a fuel.

Question 2. Have the potential health impacts of fracking been considered in sufficient breadth and depth?

Have a full range of public health concerns around fracking been given sufficient attention? There have been significant adverse health impacts on humans and livestock from fracking in the US. These have often been due to practices that are either not permitted in Scotland/UK/EU or are not necessary to the process and can therefore be regulated against or scoped out during the planning and Environmental Impact Assessment phases of any development. It is essential that any fracking activity in Scotland is regulated and conducted in a way that avoids or mitigates the negative outcomes experienced to date in the US.

There is also a question as to the existing state of the environment in areas where fracking may occur. Hydrocarbon extraction often takes place in areas already associated with water quality issues. Indeed, high levels of methane in groundwater can be used as a prospecting tool – indicating that there is a hydrocarbon resource at depth. It is therefore necessary to ensure that any

additional impacts that can be attributed to fracking can be clearly identified and measured. With Scotland's industrial legacy leaving significant health issues in areas of Scotland, any health impacts assessment must consider a proper baseline to unpick the complex societal factors contributing to public health.

If North Sea gas continues to decline and we become more reliant on imported gas, what will this do to domestic heating bills and fuel poverty, and what would be the resulting health impacts? Scottish Government data³ show that changes in energy poverty in Scotland have been closely linked to changes in energy prices. Until a few test wells have been drilled and fracked, we will not know the magnitude of Scotland's shale gas resource that could potentially enter the domestic gas supply, and the operational cost of extracting it. However, over time, could domestic shale gas extraction help to provide a 'buffer' to externally imported gas price increases and related impacts on fuel poverty?

Taking an even broader view, when discussing extraction and the use of hydrocarbons, of course it is necessary to also consider the long term global health impacts of climate change. However, this adds a further layer of complexity because these impacts may be felt first in other countries, and thus receive – rightly or wrongly – less attention in the public debate about the potential health impacts of fracking activity or reducing energy poverty here in Scotland.

Question 3. What is the Scottish context for assessing the potential economic benefits of fracking?

Given the decline in off-shore activity in the North Sea, does Scotland have an unemployed, or soon- to-be unemployed skills-base that could be deployed in a new on-shore industry? If it does, this would imply potentially greater benefits for Scotland from gas extraction and linked supply chain/support activity than in

³ See <http://www.gov.scot/Topics/Statistics/Browse/Housing-Regeneration/TrendFuelPoverty>.

other UK regions. However, the question must be asked as to how and to what extent would this skills-base be utilised by an onshore hydrocarbon industry?

It is possible that skilled workers might be brought in from outside of Scotland to conduct drilling and fracking operations, and supply chain and support requirements could be imported rather than sourced locally. There are crucial questions in terms of the likely timeframes over which a fracking industry may exist in any one location and make use of existing supply chain activity. Even if activity is relatively short-lived (thereby limiting opportunities for existing Scottish skills and supply chain capacity), fracking activity may add value through infrastructure development.

Another question to be considered is the potential legacy of fracking activity once sites cease to operate. A future industry must be regulated in such a way that the cost of decommissioning and monitoring fracking sites is borne by the industry and does not fall to the taxpayer. However, it is worth considering that given the legacy of Scotland's industrial past, development on contaminated brownfield sites might result in an overall positive benefit. As an example, the sites developed for the Glasgow Commonwealth Games were remediated brownfield sites, which resulted in an overall reduction of vacant and derelict land in the East End of Glasgow⁴.

Again in the context of the current shipments of shale gas from the US to Scotland, a crucial point arises with the use of the shale gas at Grangemouth. This is in production activity involving highly skilled and high value jobs, and which supports significant local supply chain activity and further jobs. The Grangemouth site, one of only four chemical sites in the EU capable of using ethane gas to manufacture ethylene, is accounted to be responsible alone for around 4% of Scotland's GDP according to INEOS's own figures⁵.

⁴ See <http://www.gov.scot/Publications/2015/07/5517/10>

⁵ See 'Facts and Figures' at <http://www.ineos.com/sites/grangemouth/about>.

Thus, if the use of shale gas is enabling this activity to continue in Scotland, a crucial issue is the preservation of this activity and permitting the employment and wage income it generates to be spent in the Scottish economy. If the shale gas used in Scottish petrochemical plants were sourced domestically rather than being imported it would support additional direct and supply chain jobs linked to the on-shore industry.

Until test wells have been drilled and fracked it is not possible to determine whether extraction of shale gas may be economically viable in Scotland nor of the magnitude of Scottish shale gas reserves. Without information to properly assess potential revenue streams and costs, industry cannot make plans as to how extraction could be done, or from where labour and supply chain requirements could be sourced. Therefore, it is difficult to properly assess the potential wider economic benefits.

Uncertainty is a wider problem still in an energy supply context. Delays and/or uncertainty around government decisions on energy supply issues inevitably impact on the ability, and willingness, of private sector firms to invest, plan and play the part we need them to in meeting our energy needs.

Question 4. What is the likely distribution of risks and rewards from fracking in Scotland?

Those who stand to enjoy the economic benefits of an on-shore gas extraction industry will not necessarily be the same people who bear the costs of having fracking activity close by their homes. This general point is true of any industrial activity or installation and with benefits and costs accruing to a range of different groups, from CEOs to workers (those directly employed and those involved in supply chain activities) and from residents and communities to wildlife populations. Indeed almost all (if not all) economic developments will have some distributional consequences, economic and otherwise. However, activity associated with energy supply tends to stimulate particular debate over the compensation of 'winners and losers', most often due to environmental and

health concerns and considerations. So the question arises as to whether there is an effective and fair way to share gains and/or deliver compensation.

In the case of on-shore wind farms, which have attracted controversy due to their visual impact on local communities, community ownership models can play a role in making potential 'losers' into beneficiaries, changing the nature of the stakeholder relationship. However, this means of 'compensation' is dependent on commercial conditions. In the case of fracking, one issue is whether or not companies should and/or will sign up to a government-backed industry pledge to make up-front payments to communities hosting wells. In terms of the post-exploration stage (i.e. when commercial drilling begins), a 'Shale Wealth Fund' is under consultation (but not yet confirmed) which may involve setting aside up to 10% of the tax proceeds from fracking to benefit those communities who host wells. In August of 2016, the new Prime Minister announced that she is now considering paying money directly to individual households instead of community benefits packages delivered via councils and local trusts.

Could Scotland emulate the Shale Wealth Fund currently under consultation by the UK government? In terms of government taking responsibility for assuring that returns/compensation to affected communities are actually delivered, a more basic question that needs to be addressed is whether whatever process and rate of return is decided upon will be considered adequate and equitable by those affected by fracking, and by the wider public.

Question 5. Just what is covered by Scottish regulation of fracking?

Several key reports have concluded that the risks of onshore extraction of shale gas are minimal, provided best practice is followed and the industry is well regulated⁶. Many of the concerns about environmental and health impacts are

⁶ See report by the Royal Society and Royal Academy of Engineering published in 2012 at <http://royalsociety.org/policy/projects/shale-gas-extraction/report/> Also see report by the Australian Council of Learned Academies (ACOLA) at <http://www.acola.org.au/PDF/SAF06FINAL/Final%20Report%20Engineering%20Energy%20June%202013.pdf> .

already covered by existing regulation, though the Scottish government expert group report did highlight some gaps⁷.

In order to make an informed decision about the potential risks of onshore unconventional gas in Scotland we need to understand what is covered by existing regulation, what gaps there are, and how the regulators plan to resource their activities. If an industry was to take off at scale, would there be enough skilled and well-resourced regulators in place to ensure that best practice is followed? It is also necessary to consider the impact of the Brexit vote in terms of the continued applicability, or not, of EU regulations.

Concerns have been raised, in the context of the shipments of US shale gas to Scotland, of the morality of using a resource that has been fracked in other countries. In assessing the wider concern of the environmental 'footprint' of our energy consumption, a fundamental point to consider is that, if we want to take responsibility for the environmental consequences of our own consumption, the only way that we can do so effectively and fully control the impacts is to "do it at home".⁸ Only then could the Scottish government fully control the environmental, health and safety regulatory practices of such unconventional gas extraction⁹.

Question 6. Are the potential risks and benefits of fracking being set in proportion and in context?

Shale gas could add to the greenhouse gases we produce in basically two ways. Burning more fossil fuels will result in more CO₂ in the atmosphere. But methane itself is a greenhouse gas and is 32 times more potent as a greenhouse gas than carbon dioxide. CO₂ and methane emissions from a Scottish industry are not likely to be the same as those that have been reported because of the different regulatory framework and infrastructure. Moreover,

⁷ See www.scotland.gov.uk/Resource/0045/00456579.pdf

⁸ The Centre for Energy Policy has previously commented on the issue of securing Scotland's electricity supply via imports generated using nuclear technology. See point (1) on p.6 at http://strathprints.strath.ac.uk/53933/1/Turner_etal_IPPI_2015_scotlands_energy_needs.pdf

⁹ The Royal Society of Edinburgh published an Advice Paper in 2015 that includes focus on this issue. See <https://www.royalsoced.org.uk/cms/files/BriefingPaper15-01.pdf>

any future Scottish industry would utilise recent technological advances that restrict or capture emissions¹⁰.

What share of total greenhouse gas emissions would potential greenhouse gases from fracking sites account for? For instance animal husbandry currently accounts for a greater share of emissions than the *combined* conventional and unconventional oil and gas industry.

Similarly water consumption and water treatment demands are often cited as being a “significant” issue; yet we are happy to accept the impact such activities as farming, or the food and drink industry. One estimate puts the amount of water consumed by a single shale gas well for 10 years as equivalent to that last lost by leakage by United Utilities in the North East of England in one hour¹¹.

All industrial activity has risks and these risks must be seen in the context of the benefits that such activity brings to society and by the regulation put in place to mitigate them. One issue is that substantial benefits seen in terms of reduced energy prices in the US are not likely to be replicated to the same extent in the UK due to the different structure of the gas markets¹².

Question 7. Has the Scottish government’s moratorium on fracking been placed on the right thing?

As noted in the introduction, the Scottish government has placed a moratorium on “granting of planning consents for unconventional oil and gas developments, including fracking”. It is not a moratorium on fracking itself.

¹⁰ See report by Bond et al. (2014) published by Climate Change at [www.climatechange.org.uk/files/2514/1803/8235/Life-cycle Assessment of Greenhouse Gas Emissions from Unconventional Gas in Scotland Full Report Updated 8.Dec.14.pdf](http://www.climatechange.org.uk/files/2514/1803/8235/Life-cycle%20Assessment%20of%20Greenhouse%20Gas%20Emissions%20from%20Unconventional%20Gas%20in%20Scotland%20Full%20Report%20Updated%208.Dec.14.pdf)

¹¹ See <https://policyexchange.org.uk/publication/gas-works-shale-gas-and-its-policy-implications/>

¹² See report Pearson et al. (2012) on potential energy market impacts of unconventional gas in the EU at http://publications.jrc.ec.europa.eu/repository/bitstream/JRC70481/regno_jrc70481_unconventional%20gas%20potential%20energy%20market%20impacts%20in%20the%20european%20Union.pdf

Fracking is a technique, not an industrial activity, and it is used in a range of other industrial activities. Banning 'fracking' could limit the development of other industries, in particular the development of geothermal energy from rocks with relatively low-grade heat, known as enhanced geothermal systems. Many of the environmental and safety objections that have been raised against fracking are equally valid for other geological engineering applications such as geothermal heat extraction and geological storage of CO₂. The latter technology - carbon capture and storage (CCS) - could be a key to providing a bridge from our current reliance on fossil fuels to a truly renewable energy system. In all of these industries engineering solutions exist to minimise or mitigate the risks and ongoing investment in research will continue to bring down costs and drive risk mitigation solutions.

A closing thought

The debate around energy supply in the UK and Scotland is too often hijacked by over-simple questions. If you ask "should we have fracking for shale gas?", or "should we build new nuclear power stations", or "should we develop large windfarms or tidal lagoons", the answer too often appears to be "no", for various environmental, societal or safety reasons. However, all activity has risks and consequences, and an over-rigorous application of the precautionary principle would result in us doing nothing. Doing nothing is simply not an option: the country needs energy for heating our homes, cooking our food, powering our industries, and in the case of gas, as a feedstock for consumer goods. A much more useful approach, though a considerably harder question to answer, is to consider the energy system as a whole. In this context, we must ask what the best way is to continue to provide a decent standard of living for all while minimising the environmental impact on our planet.

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