



## TALKING 'FRACKING': SCOTTISH GOVERNMENT CONSULTATION ON UNCONVENTIONAL OIL AND GAS *A response from Ekklesia*

*The Scottish Government ran its consultation from 31 January to 31 May 2017. This was Ekklesia's response, published as part of the report updated on 3 October 2017. <https://consult.gov.scot/energy-and-climate-change-directorate/fracking-unconventional-oil-and-gas/>*

*On 3 October 2017, the Scottish Government announced that it will not support the development of Unconventional Oil and Gas in Scotland, meaning there is an effective ban on fracking in Scotland. The long-term effectiveness of that prohibition has been questioned legally.*

*Ekklesia, which supports a ban, for the environmental, ethical and science-driven reasons set out below, continues to monitor the situation closely.*

### **1. What are your views on the potential social, community and health impacts of an unconventional oil and gas industry in Scotland?**

Fundamental to this question is the issue of health. Social and community benefit cannot be established and achieved without clarity on health impact. Lawsuits have already begun in the United States, seeking compensation for health, environmental and climate impacts that, it should be noted, can mostly never be reversed.

Our view is that the demonstrable balance of evidence is that UOG/fracking (hydraulic fracturing) poses public health risks which cannot be responsibly taken on for current and future generations, and that fracking therefore threatens the safety, security, sociality and livelihood of communities across Scotland.

On the safety front, Health Protection Scotland's impact assessment has found evidence that a number of air and water-borne environmental hazards would be likely to occur as a result of UOG operations. It also confirmed that UOG workers' health could be at risk from the use of silica in fracking operations and that other hazards from the fracking industry could pose a risk to the health of nearby residents.

HPS stated that there is sufficient risk for concern: “that respirable crystalline silica, a component of fluids used in HF [hydraulic fracturing] processes, occurred at levels that could pose a risk to UOG workers’ health. There was also evidence that other UOG hazards occurred at levels that could pose a risk to the health of nearby residents ... This applied to airborne polycyclic aromatic hydrocarbons and tropospheric ozone and to waterborne total dissolved solids and metal ions. Waterborne methane occurred at levels that posed a potential explosive risk.”

We note that fracking companies have so far failed to disclose the full list of contaminants employed in their processes. Moreover, monitoring let alone preventing underground events (shifting, fault lines spreading, unforeseen well pressure, and so on) is exceptionally difficult, if not impossible. Without such knowledge it is not possible to assess potential hazards with any degree of certainty. This is a serious concern.

We also share with senior health researchers a severe unease about drawing conclusions from a hypothetical ‘best practice’. This is a common methodological error in UOG research, and one which has been persuasively critiqued by experts in the BMJ in the following terms:

“Global interest in developing unconventional natural gas reserves continues to increase, despite the paucity of empirical evidence on risks to the environment and human health. The operations required to produce natural gas from hydrocarbon reservoirs such as shale are spatially intense and sometimes occur close to human populations. Although research has been conducted to understand the potential impacts of gas development on public health, for the most part these efforts fall short. In addition, efforts to summarise the existing public health science tend to focus on regulations and engineering solutions, rather than on health outcome data and pathways of exposure. A focus on mostly hypothetical regulatory and engineering solutions may mistake best practices for actual practices, and supplants the empirical with the theoretical.” (See: Adam Law, clinical assistant professor of medicine, Jake Hays, programme director, Seth B. Shonkoff, executive director, Madelon L. Finkel, professor of clinical public health; Public Health England’s draft report on shale gas extraction, ‘Mistaking best practices for actual practices’, *British Medical Journal*, 17 April 2014).

In our view the balance of evidence is that fracking is likely to pose public health risks which we should not be enduring for current and future generations, and that it therefore threatens the safety, security and livelihood of communities across Scotland.

The Scottish Government has promised the people of Scotland that it will not lift the moratorium on fracking unless it can be shown beyond reasonable doubt to be safe. That standard of proof cannot be met.

We therefore agree with Friends of the Earth Scotland’s conclusion that, “Given significant evidence from around the world of serious public health risks posed

by the industry, ranging from low birth weights to respiratory disease and cancers, the precautionary principle demands that unconventional gas extraction should not be allowed to go ahead."

## **2. What are your views on the community benefit schemes that could apply, were an unconventional oil and gas industry to be developed in Scotland?**

Since it is our evidenced conviction, as otherwise stated in this consultation response, that an unconventional oil and gas industry should not be developed in Scotland, we believe that effort, finance and other resources which would otherwise have been directed towards mitigating programmes (we note the report on 'Understanding and mitigating community level impacts from transportation'), together with other community benefit schemes, should be invested directly in community-based and funded sustainable and renewable energy projects.

## **3. What are your views on the potential impact of unconventional oil and gas industry on Scotland's economy and manufacturing sector?**

Research commissioned by the Scottish Government on economic scenarios indicates that far from replicating the US shale boom (the conditions for which are significantly different to the situation we face in Scotland), it is unclear if the industry would be commercially viable in Scotland, even in terms of the rather reductionist economic prospectus used to defend it by those who clearly hope to profit from it.

Report authors KPMG warn that even if the industry were to get underway commercially, it would only be expected to contribute on average 0.1% GDP, and that it would be unlikely to create plentiful skilled local jobs. Moreover, the case for alternative support and investment in renewables would be weakened and sidetracked by adoption of UOG, when the focus should be on environmentally sustainable energy consumption.

We note that "the KPMG report does not assign a value to environmental integrity, the amenities of nature trails and camping sites, does not include a price for areas of outstanding natural beauty, or an economic figure for the loss of public land through the desertification accompanying the placement of every fracking pad, the noise pollution and increased volume of heavy plant in what is, after all, a very small country [Scotland].

"In the worst case scenario, (based on a successful model), KPMG envisaged that the employment generated by fracking operations in Scotland would amount to 432 jobs. Its best-case scenario would provide less than 1,500. Entirely omitted from the report were in depth considerations of the possible negative, economic impacts." (Salyers, *ibid.*, 2016).

We also note the conclusion of Medact in north America that: "Although fracking may bring local benefits in the form of new jobs and increased revenue, it can harm other economic sectors such as leisure and tourism, and affect the value of

nearby homes. It is worth noting that employment generation associated with shale gas in the US has been over-stated and that initial economic booms often transform into long-term social and economic declines.” (‘Health and Fracking – The impacts and opportunity costs’, Medact, 2015.)

#### **4. What are your views on the potential role of unconventional oil and gas in Scotland's energy mix?**

Statistics published by the UK Department of Energy and Climate Change in March 2016 showed 57.7 per cent of Scotland’s electricity consumption came from renewables in 2015, 7.7 per cent ahead of the 50 per cent target. Scottish islands are now pioneering energy self-sufficiency, and community-owned renewable schemes have an installed capacity of 595mw.

Independent research has shown that it is possible for Scotland to move towards a secure, efficient electricity system, based on almost entirely renewable electricity generation, by 2030. Embracing that vision would maximise the opportunities to create new jobs, empower communities and support local economic renewal throughout the country.

This, not UOG or heavily subsidized and dangerous nuclear industry, is where the Scottish Government’s commitment should be directed, along with the search for the concomitant economic and wider energy policy powers that enable it to make the appropriate progress.

Presently, 47 per cent of Scotland’s total energy use comes from petroleum products largely extracted from Scotland’s North Sea oil platforms, while 27 per cent from domestic and imported natural gas for home heating.

Cutting oil use is the largest challenge the Scottish Government faces in hitting the tougher targets unveiled in January 2017 to reduce Scotland’s total greenhouse gas emissions by 66 per cent by 2032.

In this context, unconventional oil and gas production would not just be a distraction but a retrograde step. It has been argued that UOG could be part of a transition process away from a carbon economy. This is not a logical position. A carbon industry is not a pathway from carbon dependence, but an example of its continuing, damaging and unnecessary hold on energy policy.

#### **5. What are your views on the potential environmental impacts of an unconventional oil and gas industry in Scotland?**

We have very considerable concerns. It is not encouraging that the scope of research for this consultation has not made space for a stand-alone report on environmental impacts. Dedicated research into the probable as well as potential environmental impact of unconventional oil and gas extraction in Scotland appears to be absent or, so far, unpublished. We note, however, that the environmental impact of fracking in the United States and other parts of the

world has understandably been an issue of considerable public concern, no less in Scotland than elsewhere.

Those risks include and the potential contamination of ground and surface water, methane emissions, air pollution, migration of gases and hydraulic fracturing chemicals and radionuclides to the surface, the potential mishandling of solid waste, drill cuttings, increased seismicity and associated effects on human and ecosystem health. A number of instances involving groundwater contamination have been documented, despite industry claims that this is not a problem.

Regarding the report on understanding and monitoring induced seismic activity, it is clear that there is much that we do not know and that we would need to know before it would be possible to 'mitigate the risk of induced seismic activity'. The report would therefore appear to amount to little more than a 'best guess' scenario. The likelihood that this 'best guess' is unreliable is evident from the data (and lack of it) included in the report itself.

We are also concerned that there has, to our knowledge, been no dedicated report produced which appraises the likely environmental impacts for flora, fauna, areas of scenic beauty, areas of special ecological importance, et cetera.

## **6. What are your views on the potential climate change impacts of unconventional oil and gas industry in Scotland?**

This is a major issue for Ekklesia. Anthropogenic global warming is one of the most serious threats to humanity in the foreseeable future. It is a huge ethical issue concerning our relationship to one another as human beings, our relationship to the earth (understood as gift rather than exploitable commodity within Christianity and other reasoned belief traditions) and our responsibility to the poorest and most vulnerable on our planet.

Moving ahead with fracking in Scotland would seriously damage the Scottish Government's important efforts to tackle climate change. With a large proportion of Europe's off- and on-shore renewable energy resources, the nation's future has to be as a cutting edge 'green tech' economy within northern Europe.

The UK Climate Change Committee's report makes it clear that allowing the unconventional oil and gas (UOG) industry to go ahead would make it significantly harder to meet our vital climate targets, and (we would add) for Scotland to continue to set a clear and positive example in that regard.

In the context of the global climate crisis it would not be responsible for a country like Scotland, with a carbon intensive past and abundant renewable resources, to open up a new frontier for fossil fuels.

Instead, with the prospects of either independence within the European Union or further devolution within the United Kingdom still up for political consideration, the Scottish Government has the opportunity to make it plain that its intention is

to transition away from a carbon economy, and to establish a pathway towards a sustainable, green, healthy and prosperous future for Scotland.

In our view, and in the view of many climate scientists and other experts working for a sustainable and renewable energy future, fracking is not part of that future, nor is it an appropriate or defensible part of the transition needed towards it.

## **7. What are your views on the regulatory framework that would apply to an unconventional oil and gas industry in Scotland?**

We are not confident that an adequate regulatory framework can be developed for UOG extraction in Scotland, given the balance of evidence in relation to climate change, environmental, health and other deleterious impacts. This is partly because of our concern that risks and dangers are likely to be significantly underestimated in pressing ahead with direct UOG extraction. For example, we note from the Scottish government website, in summary of its final pre-consultation report, the following statement:

“In terms of potential implications for global emissions, the report found that the overall emissions footprint of Scottish UOG, if tightly regulated [our emphasis] is likely to be broadly similar to that of imported gas and that initial evidence suggests that tightly regulated shale gas production is likely to have a broadly neutral impact on global emissions, with emissions savings due to switching from higher-carbon fossil fuels approximately offsetting emissions increases due to increased use of unabated gas.”

As researcher Sara Salyers notes (*ibid.*, 2016) these conclusions, which represent a ‘best guess’ at their most definite, do not match the findings of the report prepared by the Committee on Climate Change, which noted that –

1. Methane is a more potent greenhouse gas than carbon dioxide (CO<sub>2</sub>), trapping more heat in the atmosphere molecule-for-molecule. But it is much shorter-lived: it decays on a timescale of around 12 years, whereas around a fifth of the effect from CO<sub>2</sub> remains even after 1,000 years ... In contrast, the same unit emission of methane will have little effect on the climate in 2100, but a stronger effect on the climate of the next few decades. ... If we look instead at the effect on global temperature, such as the Global Temperature Potential (GTP), we find quite different values for methane than that suggested by the GWP. For example, methane is about four times stronger than CO<sub>2</sub> after 100 years. ... After just 20 years, the effect of methane on temperature is 67 times stronger than that of CO<sub>2</sub>.

2. A recent study has further highlighted a 30 per cent increase in atmospheric methane (both anthropogenic and biogenic) concentrations between 2002 and 2014 in the US. Although the paper does not attempt to identify the source, this period coincides with the development of unconventional oil and gas.

3. Domestic production of unconventional oil and gas will lead to some additional Scottish emissions, even if fossil fuel consumption is not affected and emissions relating to production are strictly limited through tight regulation and monitoring. The size of these extra emissions depends on the size of the future industry, about which there is considerable uncertainty.

4. US experience also indicates that an important contributor to methane emissions has been so-called 'super-emitters': large methane leaks left unchecked for extended periods of time. As a consequence, a small number of wells have been found to contribute disproportionately to emissions. Limiting emissions therefore requires that the monitoring regime catches the super-emitters quickly and significantly limits the quantity of methane released to the atmosphere, alongside the technologies to limit known sources of emissions.

Our concern about the summary of the report of the Scottish Government is that "tight regulation" is seen as delivering protection or mitigation for dangers which have been misstated or in all likelihood, in view of the authoritative Committee on Climate Change report, underestimated in the first place. This is but one example of the probable difficulties involved in securing adequate regulation. As elsewhere, it is also clear that the UOG industry will seek all means, political and legal, to ensure that regulation is not damaging to their own vested interests.

We have noted below the limits of regulation in our comments on the handling of decommissioning, site restoration and aftercare (question 9). We would also draw attention to the inability of regulation in many instances to deal adequately with the consequences of *in situ* industry practices; the predictive (in)abilities of researchers with regard to geological conditions and responses; the ability of governments to monitor underground activities, impacts and changes; the ability of environmental agencies to deliver the person-power required for above ground monitoring; the willingness of the industry to disclose the chemicals involved in the process; and the lack of any fully safe and effective method of disposal for the enormous quantities of contaminated waste water.

### **8. Overall, and in light of the available evidence, what do you think would be the main benefits, if any, of an unconventional oil and gas industry in Scotland?**

Overall, our view is that the claimed benefits, especially economic and community ones, are either exaggerated or misplaced. Industry claims, in particular, have not adequately considered the alternative economic, environmental and energy future that a climate-focused, post-carbon future requires.

We are concerned that the 'independent evidence' commissioned by, and presented to, the Scottish Government has not always been helpful in making balanced and rational assessments on this and other questions. Input from corporate and industry bodies either sympathetic to, or with a vested interest in, the UOG industry was provided to the researchers in several key areas. For

example, the US transnational corporation AECOM completed the report on decommissioning and cleanup, while AECOM and KPMG provided data for climate change research. Greenpeace, Friends of the Earth, Medact and other independent scientists and special interest groups who question UOG, and who have collected detailed, verifiable and specific research on the ground, were not invited to contribute. This is unfortunate, to say the least.

### **9. Overall, and in light of the available evidence, what do you think would be the main risks or challenges, if any, of an unconventional oil and gas industry in Scotland?**

We believe the balance of evidence indicates that there are significant risks, challenges and dangers in the areas of health impact, environmental impact, climate change impact and economic impact from the unconventional oil and gas industry in Scotland. The final report from the Scottish Government tends to underestimate these in a number of ways, as indicated at different points in our submission.

In particular, and as just one practical example, we are concerned about the AECOM authored report on decommissioning, site restoration and aftercare, which has influenced the final report leading up to this consultation to state that “international and UK experience shows that the risk of leakage from abandoned UOG wells is likely to be low provided best practice is implemented during well construction and abandonment operations under a strong regulatory regime.”

We do not share that apparent confidence, not least because of the subjective and one-sided nature of the AECOM study, which contains some sweeping and unchallenged assertions, such as: “Decommissioned oil and gas wells are unlikely to leak gases (including methane) or other fluids from the sub-surface to groundwater or to the atmosphere if constructed and abandoned to comply with international standards and industry best practice.”

The study continues: “The key to preventing leaks from the sub-surface is ensuring well integrity in both the short and long-term. Experience in the United States, Canada and the UK suggests that long-term well integrity can be achieved by implementing best practice during well construction and abandonment operations under a strong regulatory regime. The risk of leakage from abandoned UOG wells is therefore likely to be very low. However, in those UOG wells where there are permeable rocks overlying the target shales or coals that contain hydrocarbons under pressure, there remains a residual risk of leakage if there is a failure of well integrity.”

This is not a sustainable position because experience in the USA and Canada, suggests no such thing, while experience in the UK is too recent to provide the useful long-term data that would be needed. What is known is that, despite detailed geological surveys, rock underground rock structure has repeatedly proven more difficult, more complex and less suitable for hydraulic extraction than was believed to be the case prior to drilling. Sara Salyers (‘Response to Independent Research Produced for the Scottish Government on Unconventional

Gas and Oil Extraction, UGOE, (including hydraulic fracking)', November 2016), comments: "The truth is, 'pressure of permeable rock putting wells under pressure which then leak over time' is simply impossible to rule out, no matter what practices are employed."

Data from fracking wells in Pennsylvania from 2010 to 2012 show a 6 to 7 per cent rate of well failure due to compromised structural integrity. Pressure from injection wells may cause underground rock layers to crack, accelerating the migration of wastewater into drinking water aquifers. At two injection wells in Ohio, toxic chemicals pumped underground in the 1980s, supposedly secure for at least 10,000 years, migrated into a well within 80 feet of the surface over the course of two decades. Investigators believe that excessive pressure within the injection well caused the rock to fracture, allowing chemicals to escape. ('Fracking by the Numbers' report, see below)

Claims about landscape remediation likewise appear vague and lacking in realism, ignoring the permanent desertification caused by the land clearance required for each pad and by the long term contamination of the surrounding areas by radioactive and aggressively toxic chemicals used in the fracking process. Similarly, the environmental impact of the requirement to isolate and contain for radioactive and otherwise contaminated water (in the millions of gallons) is omitted in the AECOM study.

Overall, we share the environmental concerns and warnings outlined in the report 'Fracking by the Numbers: The Damage to Our Water, Land and Climate from a Decade of Dirty Drilling', released by Environment America Research & Policy Center on 14 April 2016.

**10. If you have any other comments on the issues discussed in this consultation, please provide them here.**

While we are concerned about the status and reliability of some of the 'independent evidence' used in this enquiry (as indicated above), we very much welcome the cautious, evidence-focused approach the Scottish Government has taken towards fracking, its responsible implementation of a moratorium, and its recognition of the key environmental, safety, health, economic and democratic issues at the heart of the fracking (UOG) debate.

We have set out above why, in our view, the Scottish Government should now move from moratorium towards a ban on fracking within a legally enforceable and democratically accountable framework.

We agree with Friends of the Earth Scotland's conclusion that, "Given significant evidence from around the world of serious public health risks posed by the industry, ranging from low birth weights to respiratory disease and cancers, the precautionary principle demands that unconventional gas extraction should not be allowed to go ahead." That concern is amplified by evidence in a number of other areas, as we have outlined.

We are therefore calling on the Scottish Government to act urgently to reject and prohibit unconventional oil and gas extraction now and in the foreseeable future.

*Simon Barrow*

*Director*

*Ekklesia*

*30 May 2017*

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**About Ekklesia:** Founded in 2002, Ekklesia is an independent think tank and change network promoting transformative ideas for a better world – particularly in relation to religion, belief, ethics and values in public life. We are based in Edinburgh. <http://www.ekkleisia.co.uk> and <http://www.ekklesiapublishing.co.uk>