ABSTRACT

Health & Fracking

The impacts & opportunity costs

health professionals for a
safer, fairer & better world

Background

Authors

This report has been written by Dr David McCoy and Dr Patrick Saunders.

Contributions to certain sections of the report have also been made by: Dr Frank Rugman (chapter 3, section 3.1), Mr Mike Hill (chapters 2, 4 and 5) and Dr Ruth Wood (Chapter 3, section 3.2).

Section 3.2 has also benefited from a paper written upon the request of Medact by Dr Christophe McGlade and Professor Paul Ekins (UCL Institute for Sustainable Resources and UCL Energy Institute, University College London); Professor Michael Bradshaw (Warwick Business School, University of Warwick); and Professor Jim Watson (UK Energy Research Centre). It is available here.

The report has benefited from the expert advice of PSE Healthy Energy in the United States, notably from Dr Adam Law and Mr Jake Hays. PSE Healthy Energy is a leading inter-disciplinary research and policy institute focused on the adoption of evidence-based energy policy.

Further biographical information is provided in Appendix 1.

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This report builds on the knowledge, expertise and work of many scientists and individuals whose papers, reports and reviews are referenced in this report.

Declaration of interests

This report deals with a controversial topic. While fracking is an activity that can produce social and economic benefit; it also produces a variety of health hazards, and impacts negatively on the natural world. Inevitably there are questions about the distribution of risk and benefit across society as well as about trade-offs between short-term and long-term costs and benefits. These cannot solely be dealt with as a technical or scientific issue, and involve making judgements. Furthermore, as with many other areas of public policy, there are limits to data and knowledge.

For these reasons, it is important to state that Medact has received no dedicated funding to produce this report. Medact declares no conflict of interest with regard to any of the issues discussed in this report. It only declares an interest in promoting human and environmental health for the general good.

Disclaimer

The overall conclusions and opinions expressed in this report are the responsibility of the lead authors and do not necessarily reflect those of other contributors or their affiliated institutions.

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Cuadrilla drilling site, Balcombe, West Sussex, UK, 2013.

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Executive Summary

Background

The United Kingdom (UK) is presently set to expand 'hydraulic fracturing' of shale formations ('fracking') as a means of extracting unconventional gas. Proponents of fracking have argued that it can be conducted safely and will bring benefits in the form of: a) energy that is cleaner in climate terms than coal and oil; b) greater energy security; c) lower energy prices; d) more energy diversity and competition; and e) local employment and economic development. However, fracking has proven to be controversial and there are serious concerns about its safety and impact on the environment.

This report reviews fracking and its associated activities through a comprehensive public health lens. It examines the direct and immediate effects of fracking on health; the adequacy and capacity of the regulatory system; and the relationship between fracking and climate change.

It builds on a number of existing reviews of the evidence and interviews with various academics and experts (in the UK and abroad). Medact also requested short papers in particular subject areas to inform the production of this report. Given that much of the literature about fracking has been derived from experience in the United States (US), this report also highlights the specific features of the UK that need to be considered.

Fracking and its risks and threats

The word 'fracking' is used to denote high volume hydraulic fracturing (HVHF) and related activities. It describes a relatively new technology that is not to be confused with other forms of hydraulic fracturing that have been in use for decades. The term 'unconventional' describes the fact that the gas embedded in shale formations does not flow out as easily as in the case of conventional sources of gas. To extract unconventional gas, the shale needs to be fractured (or pulverised) by large volumes of fluid (water combined with various additives) injected into the ground under high pressures.

In doing so, fracking and its associated activities create multiple actual and potential sources of pollution. Leaks of gas can occur across the entire process of extraction, treatment, storage and transportation. There are also emissions from diesel engines, compressors and heavy transport vehicles; as well as the potential release of silica into the air. Oxides of nitrogen, hydrogen sulphide, formaldehyde, benzene, ethylene, toluene, particulate matter and ground-level ozone are among the more significant airborne health hazards. Surface and ground water can also be contaminated by gas, fracking fluid, or wastewater which consists of original fracking fluid combined with a range of new materials generated from underground (including lead, arsenic, chromium, cadmium; and naturally occurring radioactive material).

The health effects of these different hazards vary depending on the type and pattern of human exposure. But they include increased risks of cancer, respiratory disease and birth defects.

Shale gas development involves continuous activity conducted over a sustained period of time for the entire course of a day, seven days a week. Noise (from compressors, generators, drilling and heavy trucks); light pollution; bad odours; and heavy traffic can cause distress and negative health impacts on nearby communities, especially in the context of quiet rural and semi-rural areas.

The introduction of a temporary and intensive extractive industry will also disrupt and divide the social fabric of local communities, compounding both the mental and physical effects of other hazards. When conducted on an industrial scale, it will also alter the character and aesthetic of the local area and potentially affect wildlife and biodiversity as well.

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.

Assessing the level of risk and threat

There are now over 450 peer-reviewed publications in this field, consisting of studies, reviews and commentaries. A significant majority indicate potential risks or actual adverse health effects associated with shale gas development.

However, the precise level of risk to health cannot be known with certainty for a number of reasons. First, there is incomplete knowledge about the toxicity of a number of potential pollutants. Second, fracking itself is a new activity for which there are limited data and incomplete understanding. Third, the level of risk will depend on a range of geological, geographic, social, demographic, agricultural and economic factors that will vary from site to site.

The location, number and density of wellpads and boreholes; the size and proximity of surrounding communities; the presence and relative location of aquifers; the operating practices of fracking companies, including how they treat and dispose of waste; and the adequacy and effectiveness of the regulatory system are key variables. There are also features that are specific to shale formations. In the UK, shale formations are thick and geologically faulted, features that increase health and environmental risks associated with fracking when compared to the US.

While there is much uncertainty about risk, one can conclude that the regulatory system for fracking is presently incomplete and inadequately robust. Additionally, there are indications that the capacity of regulators is being further eroded by budget and staff cuts.

We can also say that if fracking is characterised by a high number and concentration of boreholes within relatively small rural and semi-rural areas that are well populated, the risk to public health would be considerable.

Climate change and greenhouse gas emissions

Shale gas extraction also has indirect health effects by virtue of its contribution to greenhouse gas emissions. The impact of climate change on health worldwide is already serious and threatens to be potentially catastrophic. Fracking threatens to perpetuate our reliance on fossil fuel and make it more difficult to meet our greenhouse gas (GHG) emission reduction targets.

The claim that shale gas is a clean source of energy that can aid the transition towards a low carbon energy system does not withstand scrutiny. Shale gas can only be considered as such, under very specific conditions. Among these are that shale gas would displace coal-powered electricity generation on a permanent and worldwide basis and do so within a relatively short timeframe. These conditions are not met in the UK. If anything, shale gas extraction will hinder the development of renewable and zero-carbon energy.

Adopting sensible and precautionary measures

The risks and serious nature of the hazards associated with fracking, coupled with the concerns and uncertainties about the regulatory system, indicate that shale gas development should be halted until a more detailed health and environmental impact assessment is undertaken.

Such an assessment has not been conducted yet, and would need to: account for all the potential risks to health, including their cumulative and compound effects on each other; be tailored to the specific geological, economic, environmental and social characteristics of the areas targeted for fracking; be based on projected levels of fracking at an industrial scale; and be conducted by a body that is entirely independent of the shale gas industry. The cost of an adequate regulatory system would also need to be factored in.

But given that shale gas may deepen the serious threats posed by climate change, there are compelling and important grounds to abandon the policy of shale gas development altogether.

Instead, we must embark upon a policy of encouraging faster development of clean energy and implementing plans to reduce energy consumption and ecological damage.