Environmental Audit Committee

Environmental risks of fracking

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CIWEM
The Chartered Institution of Water and Environmental Management

Background to CIWEM

1. The Chartered Institution of Water and Environmental Management (CIWEM) is the leading professional and qualifying body for those who are responsible for the management of environmental assets. The Institution provides independent comment on a wide range of issues related to water and environmental management, environmental resilience and sustainable development.

2. CIWEM welcomes the opportunity to submit written evidence to the Environmental Audit Committee on the environmental risks of fracking. In formulating this response we have consulted with our members that work in the water, waste, air and energy sectors. In 2014 CIWEM published an in-depth review of the implications of a shale gas industry on the water environment, entitled Shale Gas and Water. This report if available to download from www.ciwem.org/shalegas.

Response to consultation questions

The risks from fracking operations in the UK, including potential risks to water supplies and water quality, emissions, habitats and biodiversity, and geological integrity

3. An understanding of the likely size of any shale gas industry, together with its geographical focus is essential in order to appreciate the impact of its activity on the wider environment. However, despite the absence of this picture, we can identify the key risks and assess impacts across a likely scale.

4. The volume of water used in hydraulic fracturing for shale gas when viewed in isolation appears large. However, when set in the context of national or regional water supply, it constitutes a very small fraction and compares with other industrial uses. The water industry does not for the time being appear concerned about its ability to supply a shale gas industry as a customer and there are other options for supply, such as direct abstraction, should supply from a water company not be appropriate.

5. There may be local consequences should a significantly sized production industry develop, particularly in some catchments in the south east which are already water stressed. It will be up to the water companies to decide if they are able to supply the water or the relevant environmental agency if it is to be abstracted. Where there is overlap between water stressed catchments and shale gas licence areas, operators will need to be aware of the risk that there may be fewer volumes available in the future. The likelihood of water shortages may increase and such incidences may restrict the industry's operations.

6. However there is the potential for drilling and fracturing processes to be timed as to when volumes of water are available. Furthermore, research is ongoing into methods to increase the proportion of flowback water that could be treated and reused directly on site.

7. It is therefore considered that water supply issues will be local and early engagement by shale gas companies with the environment agency and water companies is essential to establish the nature of any risks and manage them accordingly.

8. Shale gas wells may be drilled in areas where there is also groundwater present. It is essential that these water resources are protected from contamination and the risk of this occurring will need to be thoroughly assessed during the planning and permitting stages.

9. Other risks to groundwater quality, such as contamination from mobilisation of methane, are generally considered to be low in the UK where target shales often exist at considerable depths below aquifers and gas would be required to migrate many hundreds of metres between source rock and sensitive groundwater. Where the source rocks are shallower, CIWEM considers a detailed risk assessment is needed to examine the relationship between the shale and the aquifer including a thorough evaluation of geological and hydrogeological setting.

10. Other risks relate to the management of flowback and produced water on site. Any negligence associated with storage, transportation and operational spills represent the greatest threats to surface water, as well as to groundwater. These can be effectively managed through robust best practice and there is no reason why this should not be achievable. Close monitoring and scrutiny by regulators, allied to strict enforcement, is essential to ensure that the industry acts in an appropriately responsible manner. Treatment of produced and flowback water is an area where technology is rapidly developing and may enable extensive on-site treatment by the time an industry is in any way mature in the UK. Otherwise, a supply-chain of specialist treatment facilities will need to develop to meet market need where this cannot already be provided by larger public wastewater treatment sites.

11. During the drilling and operation of shale gas wells air emissions can come directly from the well, as well as from the large number of on-site diesel powered engines on site. These emissions combined with other natural (biogenic) and anthropogenic emissions in the region can together form ozone, other photochemical oxidants, and particles in the atmosphere. High concentrations of ozone and other oxidants in the atmosphere near the ground are of concern because of the adverse effects on human health and damage to vegetation, while particles impact on human health.

12. Public Health England has produced a draft review of the potential public health impacts of exposures to chemical and radioactive pollutants as a result of the shale gas extraction and concludes the risks to public health are low if operations are properly run and regulated.

13. There are few studies on the quantities of volatile organic compounds (VOCs) produced from hydraulic fracturing which have the ability to create photochemical smog under certain conditions. Also, if these are later flared then this will increase the emission of oxides of nitrogen. Further research is needed here.

14. The difference in the UK compared to Australia and the United States is that shale gas extraction may be nearer to greater densities of populations creating a much more noticeable impact on the community and the local environment. The industry requires considerable industrial activity such as trucking, moving rigs and fluids; all of which can have an impact on local amenity, landscape value, aesthetics and noise. Amenity is important for leisure and tourism in the UK and this sector generates considerable economic benefits that should not be compromised by fossil fuel development, especially in environmentally sensitive areas (National parks, areas of outstanding national beauty, sites of special scientific interest, etc.).

Necessary environmental safeguards, including through the planning/permitting system

15. The UK Government has committed to a tightly controlled industry and this must continue. Guidance to the regulatory regime currently only applies to the exploration phase

and may need to be modified for production to reflect the more intensive conditions associated with it. Regulation must clearly distinguish between the different impacts associated with exploration and that of production. There will be different requirements for regulation, control, monitoring and local issues for both contexts, i.e. whether there are one or two wells or several hundred.

16. Experience from the US and Australia shows that without good baseline data, it is hard to scientifically establish a cause of contamination and this fosters conjecture, commonly leading to a polarised discussion lacking in robust evidence. Regulators must ensure that an environmental baseline is fully established before any commencement of drilling activity and this should include both deep and shallow aquifers for radio-nuclides and other contaminants. Full details of the environmental monitoring programme should be disclosed.

17. The long-term monitoring of relative conditions to the environmental baseline in the vicinity of the well and nearby receptors throughout the lifetime of the well will be important to detect any contaminants. In developing production guidance, parameters on the frequency, locations and time scale of measurements should be included. Independent well examinations must take place.

18. Risks to groundwater from wellbore failure must be seriously considered by all appropriate regulators and construction closely monitored to ensure that best practice is followed. The term failure does not necessarily indicate the leakage of contaminants to the environment. Even so, where there is any doubt over risk to potable groundwater, the Environment Agency must adopt a precautionary approach. Rigorous well testing can help to identify any potential problems that can then be repaired.

19. Standard permits will help speed up permitting but public opposition to the planning process could present a major barrier to the industry's development.

20. The Environment Agency needs to be properly funded to undertake its current work of establishing a regulatory regime and not left to rely on payments from permit applications that will arise in the future. The regulatory regime must be firmly established before the industry is allowed to develop.

The implications for our carbon emissions reduction obligations

21. The UK Government has expressed a commitment to facilitate exploration for shale gas and is putting in place a regulatory regime which it hopes will provide appropriate safeguards to communities, employees and the environment, whilst at the same time avoiding obstruction to the industry to a level that would discourage interest in this exploration.

22. Exploration involving drilling is necessary to properly understand the size of the shale gas resource and, in the event that this is sufficiently large, how economically the gas might be extracted. Until such exploration has taken place a reliable estimate of the likely size and nature of any subsequent production industry is extremely uncertain.

23. Natural gas is used to generate electricity, is a key feedstock to the chemicals industry and is the gas used in domestic heating and cooking in homes. Since the early 1990s, investment in gas electricity generation infrastructure has been a key component of investment in the energy sector, accounting for nearly 70 per cent of new capacity coming online between 2000 and 2011. Currently 80 per cent of our domestic heat comes from gas.

24. The extraction of shale gas in the UK may not necessarily mean that it will be consumed in greater volumes on our shores and this is really a question of wider energy policy. However given

that it would reduce our dependence on imports (the prices of which are likely to rise) and help to meet the UK's continued gas demand in industry and for heat in buildings it is likely that it would play a contributing role.

25. Shale gas, like other forms of gas, cannot be regarded as a low-carbon fuel source. Pursuing a more carbon based fuel strategy will make it more difficult to reach our climate change commitments and potentially our renewable energy targets. In the longer term any electricity generation infrastructure for gas will have to have Carbon Capture and Storage technology if it is to provide significant amounts of generation as part of a low-carbon energy mix. This has not yet proven to be technically or commercially viable.

26. CIWEM considers gas will continue to play a part in our energy mix, especially for its role in heating, in the medium term, but measures to minimise lifecycle emissions will be needed. We will also need commitment to global climate policies to avoid an increase in cumulative GHG emissions and the risk of climate change. Sustained investment in renewables is needed to decarbonise the electricity sector; developing gas generation infrastructure must not detract from energy efficiency, local combined heat and power and clean renewable energy investment in sources such as solar, wind, biomass, wave and tidal power.

27. We should move from market-distorting subsidies for non-fossil energy to taxing emissions from fossil fuels. This would encourage maximising efficiency of fossil fuel usage, carbon capture and storage and non-fossil alternatives.

28. The greenhouse gas footprint of shale gas consists of the direct emissions of carbon dioxide (CO_2) from end use consumption, indirect emissions of carbon dioxide from fossil fuels used to extract, develop, and transport the gas, and methane fugitive emissions and venting. The independent Committee on Climate Change's view is that shale gas can have lower lifecycle emissions than imported liquefied natural gas, if it is transported by pipeline and if there are appropriate measures to manage methane released during production.

29. Methane can be emitted from unconventional gas extraction during several steps of the gas production process. These fugitive emissions are a concern because methane has a very high global warming potential (25 times more than CO_2 over a 100 year time period). Due to conflicting reports on fugitive emissions, a government commissioned study reviewed all the available evidence and found that if adequately regulated, local greenhouse gas emissions from shale gas operations should represent only a small proportion of the total carbon footprint of shale gas. There still remain questions over fugitive emissions and how effective green completion technologies will be, and if in fact they will be required in the UK.

30. The industry must adopt the UK Onshore Operators Group (UKOOG) guidelines commitment to eliminating all unnecessary flaring and venting of gas and implement best practices such as 'green' completions. Monitoring must commence prior to drilling to establish background levels of methane, during drilling operations for leak detection and fenceline measurements to evaluate the performance of an individual installation and also as part of aftercare and maintenance of capped wells. CIWEM considers landfill permits offer a suitable model in terms of aftercare.