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Precautionary principle should be applied to shale gas

According to UK researchers, caution must be taken in the use of shale gas until more is known about its environmental impacts. Using US data, they estimated the additional emissions associated with the extraction of gas from shale compared to that of conventional sources and highlighted concerns from the US that extraction could bring significant risks of ground and surface water contamination.

As conventional gas reserves decline, shale gas (which comes from 'fracturing' sedimentary rock beneath the surface) has emerged as a potentially new source of gas. It has been referred to in the US as a 'bridging fuel' to help the transition from conventional fossil fuels to a low carbon economy and between 1990-2008 shale gas production expanded from 1.4 per cent of the total US gas supply to 14.3. Whether it can live up to expectations depends on the greenhouse gas (GHG) emissions resulting from its extraction and other environmental impacts.

The extraction of shale gas requires hydraulic fracturing, which involves pumping liquid under high pressure, to crack the rock and release the gas trapped in the shale formation. While this technique is occasionally used in conventional drilling, it is a prerequisite for shale gas extraction and can be seen as a key reason why shale gas has a different environmental impact. Another key concern is the potential that significant shale gas production will exacerbate the exploration and drilling treadmill (and the related environmental impacts), since average production rates for shale gas wells are deemed to decrease rapidly over the first 4 to 5 years of production. Based on US measurements and production figures, the study indicated that the additional emissions associated with the hydraulic fracturing is equivalent to 0.14 to 1.63 tonnes of CO_2 per terajoule (10^{12} joules) of gas energy extracted. However, the overall value depends on the total amount of gas that is extracted per well and the number of times fracturing occurs and the figure does not include methane leakage during fracturing. Assuming that shale and natural gas produce the same amount of CO_2 emissions during combustion i.e. 57 tonnes per terajoule, then the additional emissions from extraction of shale gas amount to about 0.2 to 2.9 per cent of the emissions produced during combustion of the extracted shale gas. This is higher than conventional gas but not markedly so, suggesting that shale gas would have similar benefits to conventional gas in terms of reduced overall emissions relative to coal, which, when combusted, produces around 93 tonnes of CO_2 per terajoule compared to 57 tonnes per terajoule for natural (and by assumption) shale gas.

However, with conventional natural gas reserves declining, the researchers suggest that the relative emissions of shale gas and coal should be viewed within the wider context of the global energy demand. They hypothesise that without a global agreement to reduce emissions, shale gas could to be used in addition to, rather than replacing other fossil fuels. For example, if shale gas is used as a substitute for the gas that the UK imports from abroad, this previously imported gas could still be used elsewhere in the world, causing a global increase in emissions even if these decrease in the UK. Developing shale gas could also drive direct investment away from renewable energy.

Likewise, the assessment of potential local and cumulative environmental impacts is salient. Such impacts include the high levels of water required for hydraulic fracturing (to carry out all fracturing operations on a six well pad takes between 54 to 174 million litres of water; groundwater pollution from failure or loss of integrity of the well bore or if the fracturing fluid travels through subsurface pathways away from the fracturing zone; surface pollution from leaks and contaminant spills; noise pollution from drilling; increased road traffic associated with construction and landscape impacts (it is estimated that the construction of each well head would require between 4,300 to 6,500 truck visits). Compared to the sparsely populated areas around many of the shale sites in the US, the UK's population density and limited water resources make many of these impacts more pertinent.

The US Environmental Protection Agency (EPA) has launched research to improve understanding of shale gas risks. It is due to be finished at the end of 2012 and, in the meantime, this report suggests that the EU's precautionary principle should be applied to the extraction of shale gas until there is evidence of its environmental safety.

Source: Wood, R., Gilbert, P., Sharmina, M. *et al.* (2011) *Shale gas: a provisional assessment of climate change and environmental impacts*. A research report by The Tyndall Centre, University of Manchester with Sustainable Change Cooperative, commissioned by the Co-operative. Downloadable from: www.tyndall.ac.uk/publications/technical-report/2011/shale-gas-provisional-assessment-climate-change-and-environmental
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