Confronting the fracking furore with facts

Shale gas fracking is not really my fight: I do not have (and never have had) any vested interests in the industry's success or failure in the UK or elsewhere. Indeed a resurgence of cheap gas would be inimical to the two new geo-energy industries I *have* been trying to pioneer – namely obtaining renewable heat from deep geothermal reservoirs, and decarbonised industrial feedstocks from *in situ* conversion of coal into synthesis gas, with capture and storage of the carbon arising, far beneath the seabed. If successful, shale gas would likely outcompete both of these industries in the short term. So I am not a natural advocate for shale gas.

However, what I learned over many years of research and practice in preventing and remediating pollution from the once-vast UK coal mining industry has given me good insights into what is and isn't likely to occur as a result of large-scale subsurface fracturing. It was on the basis of that background that, in 2011 I was invited to serve on an expert panel convened jointly by the Royal Society and the Royal Academy of Engineering (of which I am a Fellow) at the request of the UK government. They wanted to know whether the two small tremors caused by an early attempt to hydraulically fracture the Bowland Shale in Lancashire were early symptoms of something far more worrying. Could shale gas be developed safely in the UK, without any significant environmental damage? Our report, which was published in June 2012, concluded that existing best practice and regulations in force in the UK are more than capable of coping with shale gas industry, provided the regulators are properly resourced by government. I subsequently served on the Independent Expert Panel on Unconventional Gas convened by the Scottish Government, which reported (at greater length, but to the same effect) in June 2014. So far, so unremarkable.

Despite all of the well-researched evidence, shale gas fracking has become ever-more controversial. Like any industrial development, there may well be reasons for rejecting shale gas developments – most notably carbon emissions issues, and the noise, accident risks and air quality issues associated with increased traffic movements. These are all matters which the UK planning system deals with routinely for myriad developments. Yet the loud protests against shale gas have tended to focus particularly on the supposed risk of fractures propagating upwards through kilometres of low-permeability strata to cause pollution of groundwaters. Nowhere has this theory been more vociferously proclaimed than in Scotland – where the government responded to protests with an indefinite moratorium. Yet in Scotland the country's few aquifers don't even occur in the same part of the country as the prospective shale gas deposits! Aghast at the gross misrepresentation of my area of scientific expertise in the press and social media, I have made several attempts to explain how unreasonable the fears of the deep subsurface activities actually are. Yet after publishing a paper pointing out that the UK government's hastily-introduced regulations on fracking-induced seismicity are in effect 40,000 times stricter than the long-established rules on vibration from quarry blasting, I received so many hate-tweets that I closed my Twitter account, and was even the recipient of a death-threat!

It was thus a great pleasure to give the London Lectures on May 18th 2016. Two full houses took a lively interest in the lengthy explanation of the issues from first principles, supported by a detailed analogue case-study of the Selby Coalfield – where far greater fracturing than any fracker could ever achieve was undertaken over twenty years beneath an area of 285 km^2, and as close as 80m to the nearest major aquifer *without a single problem being caused to the aquifer.* No-one expressed any hatred; no-one threatened to kill me. In fact it was a thoroughly enjoyable experience of being a normal scientist explaining the fruits of my education to members of the public that funded it in the first place. The Geological Society is a very special organisation, headquartered in a remarkable building; it is very comforting to know that, despite all the sound and fury around fracking, that

there is still a keen audience for reasoned argument and civil debate. Yet one of the final questions hit the nail on the head: until such time as a number of boreholes have been tested, we will not know how productive UK shale gas reservoirs might be – all of this fuss might yet be over nothing!