

## **The Environmental Impacts of Fracking,** in collaboration with IWater

The Society for the Environment (SocEnv) and The Institute of Water (IWater) recently held an open meeting to explore the potential environmental impact of shale gas extraction operations in the UK.

IWater member, **Jim Marshall**, Policy & Business Advisor at Water UK, chaired a panel consisting of **Rob Cunningham**, Head of Water Policy from the RSPB, **Tony Grayling**, Director, Technical and Cross-cutting, at the Environment Agency and **Steve Thompsett**, Executive Director, UK Onshore Operators Group.

**Rob Cunningham** outlined a report RSPB had commissioned to enable the emergent shale gas industry in the UK to benefit from lessons learned from experiences in the USA. The objectives of this report were to examine and review evidence on the potential environmental impacts of hydraulic fracturing and of shale gas extraction in general and secondly the adequacy of practices and policies currently being developed and implemented in the UK to mitigate these impacts.

Their research raises significant questions about compatibility of shale gas with climate change targets. For example, the International Energy Agency have demonstrated that if we are to constrain warming to within the 2 ° C generally (a figure generally accepted as “safe”) we would already have to leave over four fifths of proven global reserves of oil and gas in the ground; unless unproven Carbon Capture and Storage can be commercially developed.

Very little hard evidence or solid data is available since existing sites in the US were subject to ‘private agreements’ between landowners and the operators when settlements were made outside of court. Information available through the media, rarely addresses the issues of flow-back or saline waste water, which can contain metals and naturally occurring radioactivity and there is little information available about the technical challenge of the treatment and disposal of the waste water.

The research did reveal that environmental risks to the water table were mostly due to either technical failure of well casing or surface water spillages. Many of the reported problems from the USA appear to have been caused by operational failures and inadequacies in the US regulatory environment.

The research also revealed that many of the environmental risks were not unique, but that there may be an impact from the transportation of water to and from the site, as well as the technical issue of disposing of contaminated water. It was also shown that the environmental impact of fracking on water demand could be locally significant, but that it is difficult to determine the long term risks of habitat loss, fragmentation and disturbance. The risks could of course become cumulative if the industry was scaled up from the exploratory phase.

The RSPB team then looked at the adequacy of practices and policies in the UK to mitigate these impacts and whether existing UK regulation is fit for purpose to mitigate any risks.

RSPB would like legislation to include compulsory Environmental Impact Assessments for every well site and absolute transparency when it comes to clarity on methane emissions; what is being monitored and the benchmarks and baselines being used and, importantly, that this monitoring should be done by independent regulators rather than allowing the industry to self-regulate.

The RSPB would like to see regulation that would protect the landscape from environmental harm, and would recommend that the water industry become a statutory consultee in the planning process, as well as certain sites being ‘off-limits’ to licence applications. Strong liability requirements on operators are also recommended such as polluter pays and cost recovery through the regulatory system.

The RSPB conclude that the environmental impact of shale gas extraction on water might have a relatively low probability but come at a very high impact to surface and groundwater. The report concluded that well-regulated site management both during operations and during decommissioning will be paramount to

mitigating wildlife and water environmental impacts. Whether the fracking is compatible with climate change targets remains to be proven. More details can be found in the report '[Hydraulic fracturing for shale gas in the UK](#)' from the RSPB website.

**Tony Grayling**, Director, Technical and Cross-cutting, at the Environment Agency, gave a summary of the research and risk assessments that the Environment Agency had carried out, with respect to the exploratory phase of this new industry in the UK. Tony explained that all onshore oil and gas operators are subject to multiple regulatory frameworks from different bodies:

1. Onshore operations need a Licence from the Department of Energy and Climate Change;
2. Planning permission needs to be granted from the relevant minerals planning authority (usually the county council);
3. They need the relevant environmental permits from the Environment agency; and
4. Operators need to convince the Health & Safety Executive that plans for the design, structure and operation of the well site are safe and sound.

The Environment Agency's approach was described as serious, careful and step by step at this early stage as new techniques are explored. Hydraulic fracking is an emerging technique in the UK but there is an already established onshore oil and gas industry with 200 wells currently in operation in the UK.

The Environment Agency undertook an environmental risk assessment of all the processes and activities involved with hydraulic fracking operations and mapped those risks against the regulatory controls at their disposal. The EA concluded that they already have all the regulatory controls necessary to cover all the environmental risks identified, certainly during the exploratory phase and these regulations provide a triple lock on protection of ground water. Beyond that phase, then further development of regulation would be needed.

The Environment Agency identified 'well case/bore hole integrity' as one of the key risk issues associated with the operation. In order to extract water from the environment, an operator will need an abstraction licence from the Environment Agency and that the EA would not allow unsustainable levels of water extraction.

1. No drilling will be allowed in environmentally sensitive areas for drinking water, namely Source Protection Zones 1 i.e. where it would be too close to supplies of drinking water.
2. The Environment Agency will require the operator to hold a ground water permit and will place conditions on their permits on a case by case basis; unless a hydro-geological assessment shows that there is no significant risk to groundwater.
3. Full Disclosure of chemicals used in the process. Under existing regulations, the operator is required by the Environment Agency to disclose the chemicals they propose to use. The use of certain chemicals that EA considered potentially damaging to ground water will not be permitted.

Management of waste will be in line with the waste hierarchy so any waste gases/liquids must be put to productive uses where possible and treated. EA does not allow uncontrolled venting of gases. Solid, Liquid and gaseous waste is also subject to controls and in the UK has to be stored in closed environments.

Tony concluded that the Environment Agency's research and risk assessment found the existing UK regulation to be adequate to protect and mitigate against environmental harm during the exploratory stage of this industry, but is keeping this under review as the industry develops towards a commercial scale. In that regard the Environment Agency are currently developing standard rules and guidelines for some of the low risk activities associated with hydraulic fracturing.

**Steve Thompsett** advised there are currently more than 200 onshore conventional oil and gas wells in operation in the UK, producing around 25,000 barrel equivalents per day. There are around 120 sites

exploiting 30 fields of gas and oil. He explained that the 'Bowland Basin' contains approximately 1,300tcf (Trillion Cubic Feet) of shale 'gas in place' and the Weald Basin some 4.4 billion barrel equivalents of shale oil. The petroleum in these shales is bonded within the rock and requires stimulation to release it – the main stimulation process applied to shales is known as High Volume Hydraulic Fracturing (HVHF), also referred to as 'fracking'. The HVHF process involves pumping water 95%, sand 4% (as a propanant) and chemical additives 1% into the well under high pressure to fracture the source rock; the water flows back to the surface and is captured for reuse or treatment. Oil and/or gas should then flow up the well.

Well stimulation techniques are already used in conventional oil and gas operations onshore in the UK. Of the 200 operating wells onshore in the UK, some are situated in environmentally sensitive areas. The largest onshore oil well in Europe, is currently located at Wytch Farm, near Poole in Dorset. The site is next to some of the most highly desirable property in the south, Sandbanks. Steve explained that the industry is used to working in a range of different environments and described how the well sites are well designed and are screened by trees and how after decommissioning, the land is returned to its original state and purpose.

Steve also confirmed that the UK has a very comprehensive regulatory system, with multiple environmental directives/permits/licenses required for operators, which ensure well-regulated site management and operations. The industry is committed to carrying out early stage Environmental Impact Assessments and is committed to monitoring sites to establish baselines up-front, and monitoring during and after operations.

The meeting was then opened up to questions from the audience which included chartered environmentalists and a professional from a wide array of the Society's licensed bodies.

Although this discussion was not wholly conclusive, those present enjoyed the learning and networking opportunity and left with a better understanding of the environmental impacts and risks associated with this emerging industry as well as an insight into how the UK's regulatory system is able to mitigate them.