UK shale gas extraction could be reduced by limited space to develop wells

April 3 2017

Only a quarter of the shale gas contained in one of the UK's largest reserves might be recoverable because of limited space to develop the wells needed to extract it, according to new research.

Researchers from the ReFINE (Research Fracking in Europe) consortium looked at the impact of existing and immovable infrastructure—such as buildings, roads and rivers—on the capacity to remove gas from the Bowland Shale, a type of rock that is thought to hold the majority of the UK's shale gas reserves.

By mapping well pads on to an area licensed for potential shale gas extraction, the team saw how often these sites would clash with existing properties, roads and natural features.

They concluded that within a typical 10km by 10km licensed block there would be room to accommodate 26 wells, limiting the potential gas extraction by 74 per cent.This meant that an average of 26 per cent (211 km^3) of the shale gas reserve in the Bowland Basin might be recoverable, the researchers said.

To minimise land disruption and environmental impact, and to increase the potential for extracting shale gas, the sites should

- Be located as far apart as technically possible and;
- Operate on a multi-well basis where a number of wells are drilled on one site with a greater number of boreholes running laterally

below ground to extract the maximum amount of gas.

This approach would reduce the area required per well and ensure maximum use of horizontal drilling technology, the researchers said.

The research, led by Durham University, UK, as part of ReFINE, is published in the journal *Science of the Total Environment*.

Lead author Sarah Clancy, postgraduate student in the Department of Earth Sciences, Durham University, said: "For the first time we have looked at the capacity of the land above the Bowland Shale and where potential shale gas wells could be located, and the impact this could have on the probable amount of gas that could be extracted.

"Our findings suggest that the number of wells that could be developed could be limited by existing and immovable infrastructure, which in turn would reduce the amount of shale gas that could be extracted.

"Instead we recommend that wells should be situated in the best location to minimise their impact, but also to maximise their yield by adopting a multi-well approach."

The Bowland Shale is found throughout large parts of northern England, as well as parts of the Midlands, north Wales and the Isle of Man.

In 2013 a study by the British Geological Survey (BGS) said the central estimate for the gas resource in the Bowland Shale was 37,633 km3, though not all of this is extractable. The BGS study covered an area between Wrexham and Blackpool in the west of the UK, and Nottingham and Scarborough in the east.

To map the potential size of well sites in the latest study, the ReFINE researchers looked at existing conventional oil and gas wells in the UK,

the Netherlands and Poland, as well as the size of comparable sites such as petrol stations and wastewater treatment plants.

They also based their study on the requirement set by the State of Maryland, USA, that shale gas wells should be 152 metres from existing infrastructure.

Currently the UK and several other European countries have no legal or planning requirements stating the minimum distance that a well has to be sited from existing infrastructure.

Instead requirements are designated on a site-to-site basis with the ReFINE study finding that the average distance of an existing conventional well from a UK house was 447 metres, with the minimum distance being just 46 metres at a site in Gainsborough, Lincolnshire.

Research co-author Professor Fred Worrall, in the Department of Earth Sciences, Durham University, said: "With global population set to increase, new developments, such as housing and industrial sites, are going to be needed.

"This highlights the need for a systematic approach to where shale gas well sites are located, with minimum impact."

More information: S.A. Clancy et al, An assessment of the footprint and carrying capacity of oil and gas well sites: The implications for limiting hydrocarbon reserves, *Science of The Total Environment* (2017). DOI: 10.1016/j.scitotenv.2017.02.160

Provided by Durham University