

How much shale gas could be extracted from the Bowland Shale?



This research is based on the article “An assessment of the footprint and carrying capacity of oil and gas well sites: The implications for limiting hydrocarbon reserves” by Sarah Clancy, Fred Worrall, Richard Davies and Jon Gluyas. The article was published in *Science of the Total Environment* and is available for free download at www.refine.org.uk.

What is fracking?

Fracking, or as it's more scientifically known 'hydraulic fracturing' is a process in which rock is deliberately fractured by a high pressured injection of fluid allowing fluids to flow through the hydraulically fractured rock more easily. This can be beneficial for the recovery of oil and gas from rock that normally wouldn't allow oil and gas to flow through at commercial rates, for example shales.

Public concern regarding its potential environmental impact has been raised, given its rapid growth in the USA and the possibility of its development within Europe. Researchers at Durham and Newcastle Universities have investigated where and how many shale gas sites can be located over the Bowland Shale given the UK is such a densely populated country with significant infrastructure. From this the volume of gas that could be extracted has been calculated (Figure 1).

How much land is needed for a shale gas site?

- The **surface footprint** is the area required for the well pads and access roads. It is largely determined by the well pad size which is

determined by the number of wells on the well pad. This study found the average conventional well site footprint in the UK to be 10,800 m² and the average access road was measured at 230 m.

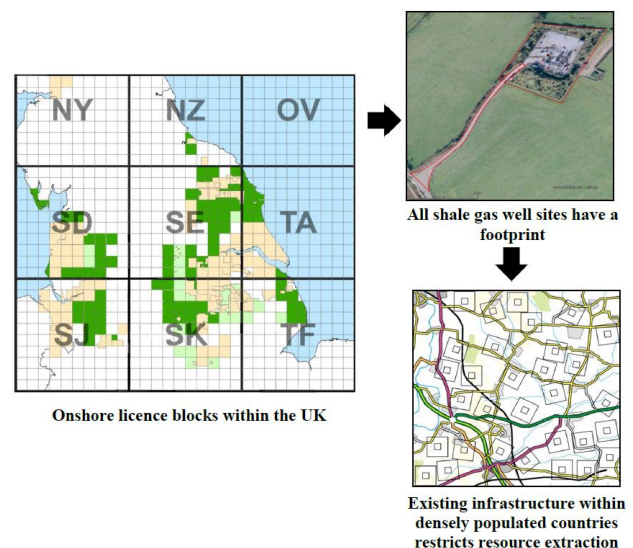


Figure 1: The UK is densely populated with significant existing infrastructure; consequently there is a limit to the number of wells that can be located and the volume of gas that can be extracted.

- The **setback distance** is the distance a well pad

has to be away from existing infrastructure. This study found the average setback distance from conventional onshore well pads is 329 m for any building, or 447 m for a house but it can be as low as 21 m and 46 m (Figure 2).



Figure 2: The conventional well Gainsborough 29 (A1) with a setback distance from borehole to the nearest house of 46 m.

- **The subsurface footprint** is the area required for the horizontal shale gas wells underground and is determined by the length of the wells.

How many shale gas sites could be located in the UK?

This study looks at the number of shale gas sites that could be located within an area, specifically the land over the Bowland Basin in the north west of England. The authors found that with a surface footprint of 10,800 m³, setback distances of 152 m, and a lateral length of 500 m the average licence block could contain 26 well sites.

How much gas could be extracted?

It has been predicted that the technically recoverable gas reserves for the Bowland Basin is 8.5 x 10¹¹ m³, therefore taking the average number of sites that can be located over the area, just 2.21 x 10¹¹ m³ of the gas is likely to be recoverable.

How does the impact on the land compare to other industries?

This study compared the surface footprint for a potential shale gas industry to that required for existing wastewater treatment works and petrol stations. The footprint required for the 8000 petrol stations currently located across the UK was less than a likely shale gas industry would be, however for the 9000 wastewater treatment works located within the UK the footprint is much larger (Figure 3).



Figure 3: Chapel-en-le-Firth wastewater treatment works, Derbyshire Peak District (UK).

