UK onshore CSS sink plays – a regional subsurface perspective
Fully funded, 4-year PhD opportunity

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Project Description:

Carbon capture & storage (CCS) is widely considered a critical development necessary to meet the 2 °C Paris Agreement (Edwards & Celia 2018). As a result, in recent years, a total of $7.5 billion have been invested in CCS technologies globally (CleanTechnica Report 2019). Despite the substantial investment, high cost of CSS has prevented this technology to be deployed at large scale. In the UK, an issue that drives these high costs is the ‘source to sink distance’ that would require additional CO₂ transport infrastructure in place to link power plants on land to offshore sites, mainly depleted oil fields in the Northern and Central North Sea (Element Energy Limited report 2013). Therefore, there is a need to understand the potential of cheap sinks onshore.

This project focuses on assessing the feasibility of CCS sites onshore UK leveraging the UK Onshore Geophysical Library (UKOGL) which contains an extensive subsurface database of reflection seismic and well data. The research takes the form of a regional subsurface evaluation for ‘sink’ plays in areas near UK power plants. Potential reservoirs, seals and trapping mechanisms will be evaluated by integrating field data from available geological maps and UKOGL subsurface data.
Key stratigraphic markers from well data will be interpreted along seismic lines. From these, time structure maps and thickness maps will be generated in order to understand the distribution of reservoir and seal units in the regions. These, together with detailed interpretation of seismic lines, will also serve to document structural styles and potential structural traps in the areas under investigation. Seismic data enhancement through post-stack processing will enable detailed analysis of seismic facies for key units. This will inform predictions of lithologies away from well locations as well as to reconstruct the depositional history of the basin(s). Potential leads in the vicinity of power plants will be carefully analysed and presented, providing initial estimates of volumes of CO₂ that could be sequestered. The UKOGL dataset covers the vicinity of key power plants (Drax, West Burton, Staythorpe C, Ratcliffe on Soar, Fiddlers Ferry) with a grid of 2D lines and wells. Seismic quality is variable but generally good in the shallow section, where sink targets would need to be located. In places, line spacing is less than a kilometre, allowing for detail mapping in those areas. Several 3D datasets are available in proximity of few of the power plants (e.g. Drax, West Burton and others).

Benefits:

This proposal is part of the multi-University, industry-funded Doctoral Training Centre in “The role of Geoscience in facing the low carbon energy transition and the challenge of net-zero”. The successful applicant will therefore be on a PhD programme with exceptional benefits including:

- Fees and maintenance fully funded for 4 years.
- Additional £20k of research support funding (e.g. for conference attendance).
- 20 weeks of vocational training and industry links to enhance employability.
- Industry links.

References:


Please contact the lead supervisor directly for further details

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