

Success with Polish coal bed CO₂ sequestration

An international research project involving Australian expertise has successfully stored carbon dioxide (CO₂) in European coal beds, raising further promise that geological sequestration can be a viable strategy to help reduce greenhouse emissions from coal burning in Australia.

The RECOPOL project (Reduction of CO₂ emission by means of CO₂ storage in coal seams in the Silesian Coal Basin of Poland) was a field demonstration led by TNO-NITG in the Netherlands, but involved numerous research institutes, universities and industrial partners, including Australia's Energy Transformed Flagship and CSIRO Petroleum, which contributed reservoir modeling expertise on site characterisation, and coal bed fracture stimulation.

According to Dr Luke Connell of CSIRO Petroleum, while other trials for

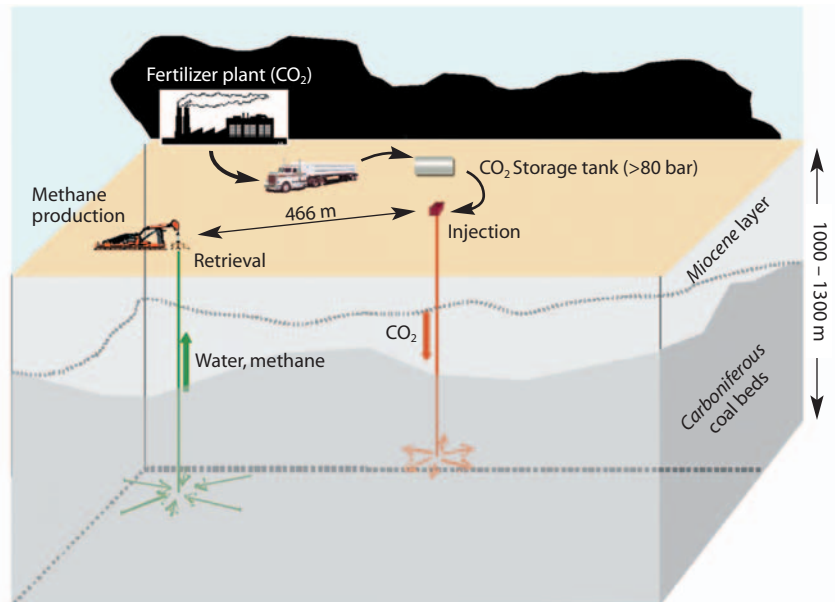
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sequestration in depleted oil and gas reservoirs or permeable formations, such as aquifers, have been successful in Norway, Canada, Algeria and the USA, the RECOPOL project was sequestering CO₂ in coal; the key difference is how the CO₂ is stored once injected.

'In oil and gas reservoirs the CO₂ is stored within the pore space of the rock, in a compressed form. In coal, the CO₂ is stored by adsorption to the surface of the coal. An attractive aspect to this is that being adsorbed, the CO₂ is not mobile and may not move back to surface. In oil and gas reservoirs the CO₂ is simply trapped by impermeable geological formations known as reservoir seals.

'While saline aquifers and depleted oil and gas formations have much greater storage capacity, large producers of CO₂ may be distant to these structures but close to coal formations (i.e. coal fired power stations). Coal is of particular interest for NSW where there are no suitable reservoirs and coal may represent the best option', Dr Connell said.

'The coal beds of interest with this



CO₂ sequestration to coal beds is an increasingly favoured approach for Australia. CSIRO Petroleum

approach are those unsuitable for mining due to their depth or other characteristics. These coal beds have a great capacity for storing CO₂ and it would be possible to use the injected CO₂ to displace methane that could be used for power generation. This combination could allow power generation with zero greenhouse gas emissions.'

In the RECOPOL project, CO₂ was injected via a well drilled down to the target coals which were at 1200 metres from surface. The CO₂ was pumped into the wells where pressure then pushed it into the coal, displacing water initially present. Because the coals had a very low permeability, to increase the rate at which the CO₂ could be injected, the wells were fracture stimulated. This is a standard method in the oil and gas industry where a well is pressurized until fractures are



A pumping head at the RECOPOL project site in Poland. CSIRO Petroleum

created in the geological formation of interest. Sand is then pumped into the fractures to hold them open. The fractures allow much greater contact with the coal and after the fracture stimulation was carried out at RECOPOL, the CO₂ injection rate increased significantly.

Dr John Wright, Director of the Energy Transformed Flagship said, 'This project demonstrates CO₂ sequestration in coal is possible. In Australia we now need a pilot project to ensure we can deal with CO₂ emissions in a responsible manner. Coal is still the cheapest and most effective means of power generation and as such, it will be with us for many years to come. If we can learn to deal with the downside of burning coal, then there will be significant benefits for Australians and the environment.'

In conclusion, Dr Connell said, 'The international scientific community, governments and industry all have a vested interest in finding viable solutions to a global problem. The RECOPOL project has significantly improved the scientific understanding of coal beds as reservoirs for CO₂ and the experience gained through the project will help the development of future projects.'

● James Porteous

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