CO_2 Sequestration and Enhanced Methane Recovery with Respect to Gas Reservoir Properties of Australian Coals

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Since 1995 coal seam methane (CSM) production in Australia has increased significantly, particularly in Queensland where currently about 40% of the state's gas consumption is supplied from coal seam methane; Queensland has CSM resources of about 150 to 500 kPJ (~250 TCF) and reserves of up to 6 kPJ (6 TCF). Carbon capture and sequestration may allow Australian dependence upon coal and gas for electricity generation to continue to rise without consequential major increases in atmospheric carbon dioxide levels. However NSW and Queensland are deficient in suitable geological structures, for CO_2 sequestration, such as depleted oil and gas reservoirs, close to the main sources of CO_2 production, in particular power plants. In the absence of these geological reservoirs, extensive coal formations, particularly deep, unmineable seams, potentially with CSM potential, are favourable for sequestration.

Both storage and flow properties of reservoirs are vital to the success of CO_2 enhanced coalbed methane recovery (CO_2-ECBM), with the ultimate aim of CO_2 sequestration in coal seams. Reservoir characterization of about forty Australian coals from the Sydney and Bowen Basins were extensively measured and studied to enable the evaluation of their suitability for CO_2 sequestration and ECBM. Coal rank for the samples varies from low volatile bituminous to high volatile bituminous (Ro max of 0.6 to 1.7%). The sample depths vary from less than 100 m to more than 1000 m. Using a newly developed system for measuring gas storage and flow properties at the appropriate depth/pressure conditions gives improved assessments of CO_2 and CH4 flow behaviours.