

Carbon sequestration in coal seams and in situ fire-free gasification of coal

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Researches and developments have been started in Japan to develop new type of coal mines for CO₂-enhanced coal gas recovery. Coal seams are promising CO₂ storage and sources of hydrocarbon gas. Researches are devoted to a deeper understanding of CO₂-coal interaction, to monitoring of CO₂ behavior in coal seams, etc. Geological data suggests large CO₂ storage potential of coal seams offshore in Tertiary sedimentary basins around the Japanese archipelago.

Supercritical CO₂-enhanced coal seam gas recovery (CO₂-ECGR) and in situ fire-free microbial gasification of coal can produce sufficient amount of methane for the CO₂ emission-free closed-circuit power plant and new type of coal mines without underground works even in gas-short coalfields. Underground biogeochemical carbon recycling makes zero-emission closed-circuit power and heat generation possible, while coal seams and saline aquifers are capacious enough to accommodate large volume of CO₂ from burning of fossil fuels and refuse-derived fuels (RDF). Tertiary sedimentary basins are suitable as CO₂ storages, hydrocarbon gas reservoirs and possible CO₂-CH₄ converter. Subsurface biogeochemical carbon recycling may realize greenhouse gas control with restoration of energy resources.