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Effect of Coal Seams Thickness on the Performance of CO_2 Sequestration for Enhanced Coalbed Methane Recovery

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Coalbed methane (CBM) is one of a promising unconventional energy for fulfilling of future Indonesia's gas demand. Sequestering CO_2 in coal seams is benefit to enhance coalbed methane recovery (CO_2-ECBM) and mitigate greenhouse gas emissions. Studies show that coal seams located in South Sumatera Basin, Indonesia are suitable for the application of CO_2-ECBM based on economic, regulatory, and reservoir engineering criteria. From reservoir-geology assessment, there are very limited study undertaken in this area, especially for linking the effects of geological parameter on the CBM reservoir performance due to CO_2 sequestration. This study has therefore aimed to investigate the effect of coal seams thickness on CO_2 storage and CH_4 recovery factor during the CO_2-ECBM process in South Sumatera Basin's coal seams.

In this study, adsorption trapping was considered as the main sequestration mechanism in coal seams and coal matrix was fully saturated by CH_4. Using sensitivity analysis, ranges of coal seams thickness values in South Sumatera Basin were examined on its effects to CO_2-ECBM performance. Compositional simulation results show that CO_2 storage increases proportionally to increasing coal seams thickness. However, a parabolic relationship exists between coal seams thickness and additional CH_4 recovery factor due to CO_2-ECBM. Therefore, the optimum range of coal seams thickness is essential for the successful application of CO_2-ECBM.

From this study, the ideal coal seams thickness for CO_2 storage and enhance CH_4 recovery purposes will be proposed. Optimizations in order to maximize CO_2 storage efficiency and additional CH_4 recovery factor due to CO_2-ECBM will be also recommended. Thus, geoscientists and engineers can screen specific prospects and design appropriate operations for the optimum CO_2-ECBM process.

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