

INTISARI

Carbon Capture Storage Storage (CCS) merupakan salah satu solusi dalam mengurangi kandungan karbondioksida di udara dengan cara menangkap CO₂ di udara kemudian diinjeksikan ke dalam perut bumi. *Reservoir* yang dapat digunakan sebagai CCS dapat berupa lapangan minyak tua, area bekas tambang Batubara, dan *reservoir saline aquifer*. Agar injeksi CO₂ ke dalam perut bumi berhasil dilakukan maka diperlukan pengetahuan terhadap karakteristik lapisan bumi dan analisis aliran fluida di media berpori. Terdapat parameter seperti permeabilitas dan porositas yang memengaruhi pola aliran CO₂ di lapisan bumi. Tugas akhir ini ditujukan untuk mengetahui pengaruh laju aliran massa injeksi CO₂, tekanan *reservoir*, temperature *reservoir*, serta kandungan CO₂ *reservoir* terhadap usia *Carbon Capture Storage reservoir* dan kapasitas penyimpanan CO₂. Simulasi numeris perangkat lunak menggunakan PETRASIM dengan *solver* TOUGHREACT dan *Equation of State (EOS) ECO2N* yang seringkali digunakan pada fluida yang mengandung air, garam, dan CO₂ yang cocok untuk studi penyimpanan CO₂ di *saline aquifer*. Hasil penelitian didapatkan bahwa parameter yang sangat memengaruhi *Carbon Capture Storage* ialah *mass flow rate*. Penambahan *mass flow rate* 3 kg/s menurunkan usia *reservoir* 55,36% dan menurunkan kapasitas penyimpanan sebesar 57%. Persentase penambahan kandungan CO₂ sebanyak 5% meningkatkan usia *reservoir* sebesar 23,23% dan meningkatkan kapasitas penyimpanan sebesar 36,1%. Peningkatan temperature *reservoir* 10 Fahrenheit meningkatkan usia *reservoir* sebesar 18,64% dan menurunkan kapasitas penyimpanan sebesar 130%. Peningkatan tekanan 500 psi meningkatkan usia *reservoir* sebesar 12,8% dan meningkatkan kapasitas penyimpanan sebesar 14%.

Kata kunci: CCUS, Petrasim, *Carbon Capture Storage Reservoir*, Storage Capacity, *Saline Aquifer*

ABSTRACT

Carbon Capture Storage (CCS) is one of the solutions in reducing carbon dioxide content in the air by capturing CO₂ in the air then injected into the bowels of the earth. Reservoirs that can be used as CCS can be old oil fields, ex-coal mine areas, and saline aquifer reservoirs. In order to successfully inject CO₂ into the bowels of the earth, it is necessary to know the characteristics of the earth's layers and analyze fluid flow in porous media. There are parameters such as permeability and porosity that affect the flow pattern of CO₂ in the earth's layers. This final project aims to determine the effect of CO₂ injection mass flow rate, reservoir pressure, reservoir temperature, and reservoir CO₂ content on reservoir Carbon Capture Storage and CO₂ storage capacity. Software numerical simulation using PETRASIM with TOUGHREACT solver and Equation of State (EOS) ECO2N which is often used in fluids containing water, salt, and CO₂ suitable for CO₂ storage studies in saline aquifers. The results showed that the parameter that greatly affects the Carbon Capture Storage is the mass flow rate. The addition of mass flow rate of 3 kg/s decreased the reservoir life by 55,36% and decreased the storage capacity by 57%. The addition of 5% CO₂ content increases the reservoir life by 23,23% and increases the storage capacity by 36,1%. A 10 Fahrenheit increase in reservoir temperature increased reservoir life by 18,64% and decreased storage capacity by 130%. An increase in pressure of 500 psi increased reservoir life by 12,8% and increased storage capacity by 14%.

Keywords: CCUS, Petrasim, Carbon Capture Storage Reservoir, Storage Capacity, Saline Aquifer