

Studi Analisis Risiko Tekno-Ekonomi Utilisasi CO₂ dari Kilang sebagai Bahan Baku Produksi Dimetil Eter = Techno-Economic Risk Analysis Study of CO₂ Utilization from Refinery As Raw Material For Production of Dimethyl Ether

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Abstrak

Adanya regulasi carbon footprint trade serta kemajuan teknologi carbon capture, utilization, and storage (CCUS) menimbulkan urgensi instalasi CCUS pada seluruh kilang secara global. CO₂ yang tertangkap dapat dijadikan peluang ekonomi baru dengan diolah kembali sebagai bahan baku proses produksi. CO₂ dapat diolah menjadi DME lewat proses dry methane reforming, methanol synthesis, dan methanol dehydration. Pemerintah Indonesia berencana untuk mengganti LPG dengan DME. Dengan demikian, dilakukan simulasi proses menggunakan Aspen Plus untuk melihat efektivitas produksi beserta analisis kelayakan investasi ditinjau dari nilai NPV, IRR, PBP, dan PI serta peninjauan probabilitas menggunakan simulasi Monte Carlo. Dari simulasi pada aspen plus, DME terproduksi sebanyak 868,04 ton / hari. Selanjutnya parameter keekonomian dihitung dengan harga jual DME \$1.300/ton dan didapatkan nilai didapatkan NPV sebesar \$1.783.715.566,19, IRR 58,44%, PBP 2,041 Tahun, dan PI 3,675 sehingga pabrik dapat dikatakan layak. Dari 1000 iterasi yang dilakukan pada simulasi, keempat parameter keekonomian menunjukkan nilai positif sehingga risiko finansial pabrik relatif aman.

.....The existence of carbon footprint trade regulations and advances in carbon capture, utilization, and storage (CCUS) technology have led to the urgency of CCUS installations at all refineries globally. Captured CO₂ can be used as a new economic opportunity by being reprocessed as a raw material for the production process. CO₂ can be processed into DME through dry methane reforming, methanol synthesis, and methanol dehydration processes. The Indonesian government plans to replace LPG with DME. Thus, a process simulation using Aspen Plus was carried out to see the effectiveness of production along with an investment feasibility analysis in terms of NPV, IRR, PBP, and PI values and a probability review using Monte Carlo simulation. From the simulation on Aspen Plus, DME was produced as much as 868.04 tons/day. Furthermore, the economic parameters were calculated with a DME selling price of \$1,300/ton and obtained an NPV value of \$1,783,715,566.19, IRR 58.44%, PBP 2.041 years, and PI 3.675 so that the plant can be said to be feasible. From 1000 iterations carried out in the simulation, the four economic parameters show positive values so that the financial risk of the plant is relatively safe.