

ABSTRACT

The preliminary design of dimethyl ether for 30,000 ton/year capacities utilizes methanol of raw material to result dimethyl ether with purity 99.5%. The process is dehydration of methanol with silica-alumina catalyst to produce dimethyl ether in fixed bed reactor at 250 K and 13 atmosphere. This plant is included high risk plant because processes at high operation condition (temperature and pressure), another raw material and product are flammable.

This plant is planned to be built in Bontang, East Kalimantan. It covers 10979 m² of land and needs 145 employees. It works continually for 24 hours/day and 330 days/year. Process unit requires 41652,7 ton/year of methanol, whereas utility unit needs 213508,71 kg/hour water for cooling, 1750 kg/hour water for domestic, 7312,49 kg/hour of steam, 296.86 kW of electricity, 940.33 kg/hour of fuel oil and 500 kg/hour of pressured air.

The economic evaluation shows Fixed Capital of Rp. 8.073.867.824 + US\$ 2,614,658, Working Capital of Rp. 67.389.796.096 + US\$ 51,551, Profit before taxes Rp. 25.371.971.106, Profit after taxes Rp. 12.685.985.553. Feasibility studies results in Break Even Point (BEP) of 42.80% (BEP requisite in Indonesia 40% - 60 %), Shut Down Point (SDP) of 32.85%, and Discounted Cash Flow Rate of Return (DCFR) of 20.07%. Meanwhile Return On Investment Before Taxes (ROI_b) of 69% (ROI_b requisite for high risk plant > 44%) and Return On Investment After Taxes (ROI_a) of 35%. along with Pay Out Time Before Taxes (POT_b) of 1.27 years (POT_b requisite for high risk plant < 2 years) and Pay Out Time After Taxes (POT_a) of 2.25 years in a row. Based on this economic evaluation, it can be concluded that dimethyl ether Plant of 30,000 ton/year is economically feasible.