



ABSTRACT

Mono ethylene glycol (MEG) is a common raw material for paints, resins, solvent, and 60% of it is for polyester in textile industry. The production flow of MEG involves utilization of syngas from natural gas reforming, through oxidative coupling and hydrogenation reaction, operating at 190 - 220°C with 25 bar of pressure. Besides from natural gas, methanol and methyl nitrite is required as its additional raw material and dimethyl oxalate will be obtained as a side product with selling price of US\$ 1,500/ton.

MEG plant is designed to be built in Balikpapan, East Kalimantan with capacity of 400,000 ton/year. It will require land area of 50,000 m² and 476 of total employees. The plant is designed to operate for 24 hours a day with 330 yearly operating days. To produce designed MEG capacity, natural gas and water as much as 40,188.32 kg/hour and 347,468.78 kg/hour is required. Meanwhile, to be fully operated, fuel of 28,244.85 tons/year, river water of 347,468.78 kg/hour, electrical as much as 9,309.125 kW, and total steam as much as 35,498.62 kg/hour are needed.

In term of investment, fixed capital costs \$ 249,493,039.12 + Rp882,852,904,444.75, whereas working capital costs \$ 58,414,590.41 + Rp733,502,415,544.54. This plant would attain profit before tax of Rp2,617,877,274,287.83 and profit after tax of Rp1,308,938,637,143.91. Based on its processes, MEG plant from natural gas is considered as high risk chemical plant with return on investment (ROI) 59.54%, pay out time (POT) 1.44 years, breakeven point (BEP) 40.27% capacity, shut down point (SDP) 20.87% capacity, and discounted cash flow rate of return (DCFRR) 38.50%. Based on the aforementioned value, preliminary design of this innovative MEG plant is worth for further consideration, while able to become a promising alternative for Indonesia's textile industry.

Keywords: MEG, textile industry, natural gas, DMO





INTISARI

Monoetilen glikol (MEG) merupakan produk petrokimia yang biasa digunakan sebagai bahan baku cat, resin, solven, dan 60% di antaranya digunakan sebagai bahan baku poliester di industri tekstil. Produksi MEG meliputi utilisasi *syngas*, yang berasal dari gas alam, dengan *oxidative coupling* dan reaksi hidrogenasi yang beroperasi pada suhu 190 – 220°C dengan tekanan 25 bar. Selain menggunakan gas alam, metanol dan metil nitrit dibutuhkan sebagai bahan baku dan menghasilkan dimetil oksalat (DMO) sebagai produk tengahan dengan harga jual US\$1500/ton.

Pabrik MEG dirancang untuk dibangun di Balikpapan, Kalimantan Timur dengan kapasitas produksi 400.000 ton/tahun. Pabrik ini membutuhkan luas tanah 50.000 m², total pegawai 476 orang, dan beroperasi selama 24 jam per hari dengan 330 hari operasi setiap tahunnya. Untuk memproduksi MEG dengan kapasitas tersebut, dibutuhkan gas alam dan air sebanyak 40.188,32 kg/jam dan 347.468,78 kg/jam. Agar pabrik dapat beroperasi, dibutuhkan bahan bakar 28.244,85 ton/tahun, air sungai sebesar 347.468,78 kg/jam, listrik 9.309,125 kW, dan *steam* sebanyak 35.498,62 kg/jam.

Pabrik ini membutuhkan \$249.493.039,12 + Rp882.852.904.444,75 untuk biaya modal tetap (*fixed capital*), sedangkan modal kerja (*working capital*) yang diperlukan adalah \$59.414.590,41 + Rp733.502.415.544,54. Keuntungan sebelum pajak diperoleh Rp2.617.877.274.287,83 dan keuntungan setelah pajak Rp1.308.938.637.143,91. Berdasarkan prosesnya, pabrik MEG dari gas alam ini tergolong sebagai pabrik kimia yang beresiko tinggi, dengan *return on investment* (ROI) 59,54%, *pay out time* (POT) 1,44 tahun, *breakeven point* (BEP) 40,27%, *shut down point* (SDP) 20,87%, dan *discounted cash flow rate of return* (DCFRR) 38,50%. Berdasarkan nilai tersebut, prarancangan pabrik MEG tergolong layak untuk dibangun dan diharapkan dapat menjadi alternatif inovatif untuk industri tekstil di Indonesia.

Kata kunci: MEG, industri tekstil, gas alam, DMO