INTISARI

Pra rancangan pabrik etilen oksida direncanakan akan berdiri tahun 2024 di Cilegon, Banten dengan kapasitas 22.000 ton/tahun menggunakan bahan baku etilen menghasilkan etilen oksida dengan kemurnian 99,99%. Etilen oksida memberikan berbagai manfaat seperti di bidang pertanain sebagai insektisida, bidang industri sebagai bahan intermediet pembuatan etilen glikol, bidang kesehatan sebagai desinfektan. Proses pembuatan etilen oksida dilakukan dengan sintesis etilen menggunakan katalis perak dalam reaktor *fixed bed*, reaksi berlangsung pada fase gas dengan suhu 250 ^{o}C dan tekanan 15,7 atm. Pabrik ini termasuk pabrik beresiko tinggi karena prosesnya berlangsung pada kondisi operasi (suhu dan tekanan) tinggi.

Pabrik ini berdiri dengan area seluas 12.603,5 m^2 dan membutuhkan 149 karyawan. Pabrik beroperasi secara kotinyu selama 24 jam/hari dan 330 hari/tahun. Proses membutuhkan etilen sebesar 3.123,6202 kg/jam sebagai bahan baku. Bahan baku dipasok dari PT Chandra Asri Petrochemical. Utilitas pendukung meliputi penyediaan dowtherm sebesar 105.380,3533 kg/jam, air untuk keperluan domestik 1.635,1259 kg/jam, air untuk kebutuhan steam 35.436,1878 kg/jam, kebutuhan listrik sebesar 1.468,9170 kW, kebutuhan bahan bakar sebesar 188,0430 liter/jam dan 74,7648 m^3/jam udara tekan.

Hasil evaluasi ekonomi menunjukkan modal tetap sebesar Rp 787.870.971.648, modal kerja sebesar Rp 137.279.180.464, keuntungan sebelum pajak sebesar Rp 229.202.533.251 keuntungan setelah pajak Rp 160.441.773.276. Berdasarkan hasil studi analisa kelayakan diperoleh Break Even Point (BEP) sebesar 44,80% (syarat BEP 40-60%), Shut Down Point (SDP) sebesar 21,58% dan Discounted Cash Flow Rate (DCFR) sebesar 25,50%. Sementara itu, Return on Investment sebelum pajak (ROI_b) sebesar 29,09% (syarat ROI_b pabrik beresiko tinggi > 44%) dan Return on Investment sesudah pajak (ROI_a) sebesar 20,36%, Pay Out Time sebelum pajak (POT_b) sebesar 2,56 tahun (syarat POT_b untuk pabrik beresiko tinggi < 2 tahun) dan Pay Out Time sesudah pajak (POT_a) sebesar 3,29 tahun. Dari tinjauan ekonomi tersebut, maka dapat disimpulkan pabrik etilen oksida dengan kapasitas 22.000 ton/tahun layak untuk didirikan.

Kata kunci : etilen oksida, sintesis etilen, dowtherm.

ABSTRACT

The pre-designed ethylene oxide plant was planned to be established in 2024 with a capacity of 22,000 tons / year using ethylene raw material to produce ethylene oxide with a purity of 99.97%. Ethylene oxide provides various benefits such as in the field of agriculture as an insecticide, the industrial field as an intermediate for the manufacture of ethylene glycol, the health sector as a disinfectant. The process of making ethylene oxide was carried out by ethylene synthesis using a silver catalyst in a fixed bed reactor, the reaction takes place in the gas phase with a temperature of 250 ^oC and a pressure of 15.7 atm. This plant was a high risk plant because the process takes place in high operating conditions (temperature and pressure).

The plant was planned to be established in Cilegon, Banten in an area of 12,603.5 m^2 and requires 149 employees. The factory operated continuously for 24 hours/day and 330 days/year. The process was required ethylene as big as 3,123,6202 kg/hour as raw material. Raw materials were supplied from PT Chandra Asri Petrochemical. Supporting utilities include the supply of dowtherm in the amount of 105,380.3533 kg/hour, water for domestic used 1,635,1259 kg/hour, water for steam needed 35,436,1878 kg/hour, electricity demand for 1,468,9170 kW, fuel requiremented for 188,0430 liters/hour and 74.7648 m^3/hour of compressed air.

The results of the economic evaluation showed that fixed capital was Rp 787,870,971,648, working capital was Rp 137,279,180,464, profit before tax was Rp 229,202,533,251 profit after tax Rp 160,441,773,276. Based on the results of a feasibility analysis study obtained a Break Even Point (BEP) 44.80% (BEP requirement of 40-60%), Shut Down Point (SDP) 21.58% and Discounted Cash Flow Rate (DCFR) 25.50% . Meanwhile, Return on Investment before tax (ROIb) of 29.09% (the high risk factory ROIb > 44%) and Return on Investment after tax (ROIa) 20.36%, Pay Out Time before tax (POTb) 2.56 years (POTb for high risk factories <2 years) and Pay Out Time after tax (POTa) 3.29 years. From this economic review, it can be concluded that the ethylene oxide plant with a capacity of 22,000 tons / year is suitable to be established

Keywords: ethylene oxide, ethylene synthesis, dowtherm.