ABSTRACT

This plant is planned to utilize 100,000 dry palm fruit empty bunch/year to produce 28,209 ton gasoline/year as main product and 16,452 ton LPG/year as side product. Plant is designed to operate continuously for 330 days/year and 24 hours/day. In this plant 432,741 ton of wet palm fruit empty bunch/year, 34,589 ton of water/year, and 61,941 ton of air/year are required as raw materials.

This process consists of 3 main steps which are biomass gasification, synthesis of methanol from syngas, and synthesis of gasoline from gasoline. Gasification is carried out in dual bed gasifier at 1.62 bar and 928ºC. Syngas is reacted to synthesis methanol in trickle bed reactor at 50 bar and 240ºC using TEGDME as absorbent that keep reactor near isothermal. Methanol is reacted to synthesis hydrocarbon fraction at 2.75 bar and 512ºC in fludized bed reactor. Hydrocarbon fraction is separated into light gas which is utilised in utility to generate heat, LPG as side product, and gasoline as main product.

This plant is planned to be built in Pulau Muda, Teluk Meranti, Palawan Regency, Riau on a 2 ha land and employs 287 employees. The energy required to operate this plant in state of steam equals to 5,921,813 kJ/hr, electricity is 4,779 kWatt, water required for the utility is 52,818.76 kg/hour, and the air instrument required is 500 m^3/hour.

Fixed capital for this plant costs $27,482,667+Rp4,734,865,262 and the working capital costs $ 4,269,484 + Rp 17,677,325,764. Based on the processes, this petroleum plant is considered as high risk chemical plant with ROI before tax 32.5%, POT before tax 2.41 years, BEP 47.89%, SDP 29.2% and DCFRR 37.11%. In accordance with those values, it can be concluded that this preliminary design of Palm Fruit Empty Bunch into Gasoline Plant is attractive economically.