
INTISARI

Sebagai salah satu komoditas terbesar, kebutuhan garam industri setiap tahunnya masih belum dapat dipenuhi produksi lokal, padahal Indonesia merupakan negara maritim dengan kualitas air laut yang baik. Pembangunan pabrik garam industri di provinsi D.I. Yogyakarta dinilai dapat memberikan kontribusi signifikan terhadap produksi lokal, dimana perairannya memiliki salinitas sekitar 32-34%.

Pabrik garam industri dirancang dengan kapasitas 250.000 ton/tahun dan beroperasi secara berkelanjutan selama 330 hari/tahun serta 24 jam/hari. Bahan baku berasal dari perairan Samudera Hindia di Pantai Siung, Wonosari, sebanyak 1.500.000,00 kg/jam dengan bahan pendukung untuk tahapan persiapan, berupa: senyawa $\text{Al}_2(\text{SO}_4)_3 \cdot 18\text{-H}_2\text{O}$ sebanyak 57,58 kg/jam, senyawa Na_2CO_3 sebanyak 1.534,51 kg/jam, senyawa BaCl_2 sebanyak 9.086,52 kg/jam, serta NaOH sebanyak 6.371,53 kg/jam. Proses produksi menggunakan metode integrasi membran yang mengombinasikan membran mikrofiltrasi, membran nanofiltrasi, membran reverse osmosis, serta membran distilasi, dimana umpan air laut yang sudah dihilangkan sebagian besar pengotornya dinetralkan terlebih dahulu dengan larutan HCl sebanyak 1,42 kg/jam sebelum dialirkan ke segmen integrasi membran. Umpan air laut dari segmen membran dikristalkan melalui membran *crystallizer*, lalu dikeringkan hingga menghasilkan garam kemurnian masing-masing sebesar 99%.

Pabrik ini direncanakan berdiri di Kabupaten Gunung Kidul, D.I. Yogyakarta, dengan jumlah pekerja sebanyak 196 orang. Kebutuhan energi dalam pengoperasian pabrik, meliputi kebutuhan listrik sebesar 16.080,28 kW, kebutuhan air dari hasil samping proses untuk utilitas sebesar 651.689,13 Kg/jam, serta kebutuhan udara instrumen sebesar 4.203.191,28 Kg/jam.

Modal tetap, modal kerja, modal produksi, dan total penjualan pabrik masing-masing sebesar Rp2.732.334.557.056,75 ; Rp1.470.359.869.112,66 ; Rp4.887.063.813.770,02 ; dan Rp6.579.395.055.439,25. Pabrik garam industri ini tergolong low risk dengan ROI before tax 26,57% dan after tax 17,27%, POT before tax 2,7 tahun dan after tax 3,7 tahun, BEP 33,03%, SDP 16,78%, serta DCFRR 29,70% Berdasarkan evaluasi ekonomi tersebut, pabrik ini layak didirikan serta dikaji lebih lanjut.

Kata kunci : garam industri, integrasi membran, mikrofiltrasi, nanofiltrasi, *reverse osmosis*

ABSTRACT

As one of the largest commodities, the needs for industrial salt cannot be met by local production, even though Indonesia is a maritime country with good seawater quality. Construction of an industrial salt plant in the province of D.I. Yogyakarta is considered to be able to make a significant contribution to local production, where its waters have a salinity of around 32-34%.

The industrial salt plant is designed with a capacity of 250,000 tons/year and operates continuously for 330 days/year and 24 hours/day. Raw materials come from the waters of the Indian Ocean at Siung Beach, Wonosari, as much as 1,500,000.00 kg/hour with supporting materials for the preparation stage, in the form of: $Al_2SO_4 \cdot 18-H_2O$ compounds of 57.58 kg/hour, Na_2CO_3 compounds of 1,534.51 kg/hour, 9,086.52 kg/hour of $BaCl_2$ compounds, and 6,371.53 kg/hour of NaOH. The production process uses a membrane integration method that combines microfiltration membranes, nanofiltration membranes, reverse osmosis membranes, and distillation membranes, in which the feed seawater, which has removed most of the impurities, is first neutralized with as much HCl solution as 1.42 Kg/jam before flowing to the integration membrane segment. The seawater feed from the membrane segments is crystallized through a distillation membrane, then dried to produce a salt of purity of 99% respectively.

This plant is planned to be established in Gunung Kidul Regency, D.I. Yogyakarta, with a total of 196 workers. The energy requirements for factory operations include the electricity requirement of 16.080,28 kW, the need for utility water unit from process by-products of 651,689.13 Kg/jam, and the requirement for instrument air of 4,203,191.28 kg/jam.

Fixed capital, working capital, production capital, and total factory sales respectively Rp. 2,732,334,557,056.75; IDR 1,470,359,869,112.66; IDR 4,887,063,813,770.02; and IDR 6,579,395,055,439.25. This industrial salt plant is classified as low risk with ROI before tax of 26.57% and after tax of 17.27%, POT before tax of 2.7 years and after tax of 3.7 years, BEP of 33.03%, SDP of 16.78%, and DCFRR of 29.70% Based on the economic evaluation, this plant is considered feasible and worthy of further study.

Key words: industrial salt, membrane integration, microfiltration, nanofiltration, reverse osmosis