Analisis energy dan optimasi thermoeconomic penerapan double stage absorption system untuk meningkatkan kinerja pembangkit listrik tenaga panas bumi Kamojang = Exergy analysis thermoeconomic optimization implementtaion of double stage absorption system to improve Lamojang 5 GPP's performance

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Abstrak

Penelitian berfokus pada analisis penerapan double stage absorption system untuk meningkatkan kinerja Pembangkit Listrik Tenaga Panas Bumi Kamojang Unit V. Panas yang diambil berasal dari abandoned well sekitar Kamojang yang masih memiliki tekanan 400 kPa. Terdapat beberapa analisis yang dilakukan yaitu analisis exergy pada kondisi operasi, optimasi efisiensi exergy, optimasi biaya dan optimasi multi objektif. Perhitungan dilakukan dengan program Matlab, dan optimasi optimtool. Tekanan operasi saat ini menghasilkan efisiensi exergy 44.93. Optimasi single objektif sistem gabungan menghasilkan efisiensi exergy sebesar 52.66 , biaya 3558400. Optimasi single objektif biaya menghasilkan exergy 51.55 dengan biaya 2514000 dan Optimasi objektif menghasilkan efisiensi 48.64 dengan biaya 2913700 dengan parameter optimum tekanan scrubber 782.64 kPa, beda temperatur air pendingin 3.12°C, temperatur evaporator 7.6°C, temperatur desorber 120.08°C, temperatur condenser 44.9°C, temperatur absorber 43.79°C.
.....This study focusses on implementation of double stage absorption to improve performance of Kamojang 5 GPP rsquo s. Heat recovery used for optimization, utilized from abandoned well that still have 400 kPa saturation pressure. There are several optimization conducted in this study, there are exergetic efficiency, annual cost, and multi objective optimization. Calculations are conducted by using MATLAB, and optimtool function. The wellhead pressure operational condition has exergetic efficiency 42.4. Exergetic optimization of integrated system has 54.7 exergetic efficiency and system cost 3558400. Economic optimization has exergetic efficiency 44.3 and system cost 2598100. While, multiobjective optimization has exergetic efficiency 51.9 and system cost 2861900 with optimum parameters scrubber pressure 782.64 kPa, temperatur delta of cooling water 3.12°C, evaporator temperature 7.6°C, desorber temperature 120.08°C, condenser temperature 44.9°C, and absorber temperature 43.79°C.