Thermodynamic Analysis and Optimization of Single-Flash Steam Cycle Geothermal Power Plant in PT. Geo Dipa Energi (Persero) Unit Dieng
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ABSTRACT

Thermodynamic analysis and optimization of single-flash steam cycle geothermal power plant in PT. Geo Dipa Energi (Persero) Unit Dieng was done based on energy and exergy analysis. Energy and exergy stream calculated on each state and main component such as separator, scrubber, demister, turbine, main condenser, intercondenser, aftercooler, cooling tower, and flasher. Energy analysis gave an information about the amount of energy stream on each component. Afterwards, exergy analysis gave an information about exergetic efficiency and irreversibility of each component. Besides, the exergy analysis was done with environmental temperature variation or dead state. Optimization was done on each component which has the biggest irreversibility. The exergy analysis result showed that exergy stream from production well is about 106515 kW which is used for electricity production for about 40680 kW with 38,19% exergy efficiency system. The biggest irreversibility happened in turbine on 11217 kW. Exergy optimization was done on turbine as a component that have the biggest irreversibility in geothermal power plant system. Optimization was done with variation of inlet turbine pressure. The optimization result showed that the higher the inlet turbine pressure caused the turbine irreversibility increased and exergetic turbine efficiency decreased. Inlet turbine optimum pressure reached on 5,5 bar pressure with the maximum pressure changing depend on environmental temperature.

Keywords: *Energy, Exergy, Irreversibility, and Optimization*