Proceedings of the International Conference on Industrial Engineering and Operations Management
Paris, France, July 26-27, 2018

Peformance Analysis of Dry Steam Geothermal Power Plant by Modeling and Optimization of Noncondensable Gas Removal System

Fano Alfian Ardyansyah
Department of Mechanical and Industrial Engineering
Universitas Gadjah Mada
Yogyakarta, Indonesia
fano.alfian@gmail.com

Abstract

Geothermal energy was a renewable energy source that uses geothermal fluids to generate electricity. Besides, geothermal fluids contain noncondensable gases (NCGs) which can be an negative impact for power plant and environment. NCGs can decrease power output and work in Geothermal Power Plant (GPP). In addition, the higher concentration of NCGs, Carbondioxide, contribute to Global warming potential in the world. Therefore, selection of NCG Removal system (GRS) becomes a major concen at planning and basic design stage which aims to maximize power output and minimize cost of GPP in a long-term perspective by modeling to simulate dry steam of GPPs to examine the thermodynamic and economical performance of GRS. This model is validated against actual data in Kamojang unit-1 with low disprecancy level (<5% error). To Optimize the model, 3 GRS configuration was investigated, Steam Jet Ejector with low of motive steam, Steam Jet Ejector with high of motive steam, and Compressor System. The allowable condenser and separator pressure was defined to set constraints. Under the best configuration (Compressor system), the gross power output and overall exergetic efficiency are 53.6 MW and 26%, respectively. Furthermore, by 1.5% of Interest rate, Net Present Value of the proposed plant was 3,467.

Keywords: GRS, NCGs, Modeling, Power output, Cost

Acknowledgements

Foremost, I would like to express my sincere gratitude to Mrs. Bertha as my advisor, then PT Indonesia Power for giving me an opportunity to be intern.

Biographies

Fano Alfian Ardyansyah is an undergraduate student of Industrial Engineering at Universitas Gadjah Mada, Yogyakarta, Indonesia. His research interests include manufacturing, simulation, optimization, energy analysis, and environment management.