

Abstract

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Exergy analysis of Garri “2” 180MW combined cycle power plant

Recently, one of the major and serious worldly concerns is the limitation of energy resources. Sudan, in specific, confronts a critical crises relating to fossil fuel resources, and mostly concerning the production of electricity energy from fired thermal power plants. One of these Garri “2” combined cycle power plants produce about 180 MW. In the light of the second law of thermodynamics, exergy analysis is considered a powerful and effective tool to investigate the optimization of engineering devices. In order to evaluate exergetic efficiency and exergy destruction of each part, exergy analysis has been carried out for Garri “2 ” while in order to achieve it, exergy balance and entropy generation were analyzed. Conclusively, the results proved that combustion chambers are the main sources of exergy destruction due to their high irreversibility. These results in detail illustrate the following percentages: 63% from the total exergy destruction, followed by 13.6% of gas turbines, 6.4% steam turbines, 6.3% heat recovery steam generators (HRSGs), 4.7% stacks (exhaust gases), 3.8% compressors and 2.3% cooling systems. Moreover, the results affirmed that thermal and exergetic efficiencies for the entire plant are (38%, 49%) respectively.