

Abstract

Among all the hybrid solar thermal technologies available up to now, the Integrated Solar Combined Cycle (ISCC) is nowadays the most efficient system for converting solar energy into electricity. This power plant is a combination of a parabolic trough solar field with a conventional combined cycle. In the present article, the performance of an ISCC plant under southern Algerian climate has been investigated. To do so, a thermodynamic model has been developed to evaluate solar radiation intensity as well as the overall performance of the hybrid solar power plant.

The analysis has shown that solar to electricity efficiency could reach up to 14.4% during sunny periods. Furthermore, an overall thermal efficiency of about 60% is feasible. It has also been found that the amount of electricity produced increases with several operation parameters such as the time of the day, the mass flow rate of the heat transfer fluid and the angle of incidence on the collector surface.