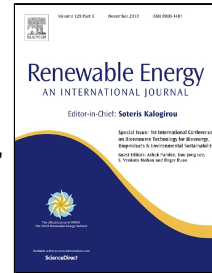


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Al- Abdaliya Integrated Solar Combined Cycle Power Plant: Case Study of Kuwait, Part I

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11 Abstract

12
13 Kuwait is planning to develop a solar project using a 60 MW_e parabolic trough collector in Al-
14 Abdaliya. This will be part of a 280 MW_e Integrated Solar Combined Cycle (ISCC) System, which
15 will be the first of its kind and size in Kuwait.

16 The objective of this paper is to develop a mathematical model of a typical ISCC system using
17 Engineering Equations Solver (EES), to evaluate the performance of such commercial ISCC power
18 plants. A sensitivity analysis has been carried out to investigate the effect of selected parameters
19 on the performance of the planned ISCC power plant.

20 Results show that the efficiency of Abdaliya ISCC power plant could reach more than 66% which
21 is 20 to 100% higher than that of the current conventional power plants in Kuwait. The plant output
22 power is also a strong function of solar heat input, it could reach 290 MW_e at solar heat input of 75
23 GJ/s. The annual fuel saving and emissions reduction are more pronounced in case of adding
24 thermal energy storage than that of increasing its solar fraction from 0.2 to 0.3. The expected
25 annual benefits could support the decision-makers to accelerate the adoption of ISCC power plants
26 in Kuwait.

27
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29 **Keywords:** Solar energy, Integrated solar combined cycle, Thermal analysis, Power plants, Renewable.
30

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