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Influence of the steam generator on the exergetic and exergoeconomic analysis of solar tower plants

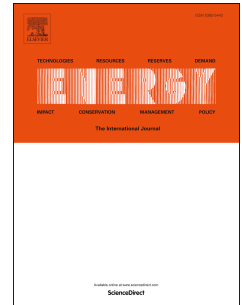
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1 **Influence of the steam generator on the exergetic and exergoeconomic analysis**
2 **of solar tower plants**

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9 **Abstract**

10 Solar power tower plants differ from conventional power plants in the steam generator
11 design due to the higher heat duty. In this work, the influence of the steam generator
12 heat exchangers (preheater, evaporator, superheater and reheater) on a solar power
13 plant with molten salt receiver and thermal storage is studied for the first time. Energy,
14 exergy and exergoeconomic analyses give a complete view of the cost flows within the
15 system. The pinch point temperature difference in the evaporator is used as the main
16 variable as it changes the steam generator design and the operating conditions of the
17 plant, such as the inlet temperature of the receiver and the salt mass flow. All heat
18 exchangers are designed and optimized at minimum cost for each pinch point to fulfill
19 the thermomechanical limitations of TEMA standards and Pressure Vessel code. The
20 field of heliostats, molten-salt receiver and the power-block (110 MWe) designs are
21 kept constant throughout the paper. A low pinch point should be used to minimize the
22 plant exergy destruction while the exergoeconomic approach obtains an optimum pinch
23 point around 2-3°C. Furthermore, the low exergoeconomic factor values show that the
24 heat exchangers of the SG are crucial for the plant operation.

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