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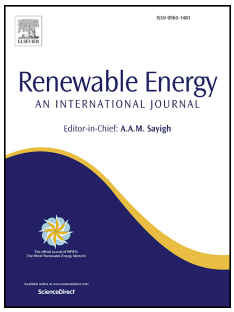

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Techno-economic analysis of a solar thermal retrofit for an air-cooled geothermal Organic Rankine Cycle power plant

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Abstract

High ambient temperatures are often coupled with high levels of solar irradiation and lead to a significant reduction of the power output of air-cooled geothermal Organic Rankine Cycle (ORC) power plants. Consequently, hybridisation based on solar thermal power is promising. In this work, a solar thermal retrofit based on superheating of the ORC working fluid is analysed under technical and economic criteria considering typical conditions in Turkey. The conducted off-design simulations prove that the isentropic efficiency of the turbine has a major impact on the performance of the entire system. The solar field size and the corresponding degree of superheating is limited in the respect to the built-in components. Therefore, the thermal stability of the examined ORC working fluid is sufficient and a low-temperature parabolic trough field with water as heat transfer fluid can be realised. For the retro-

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