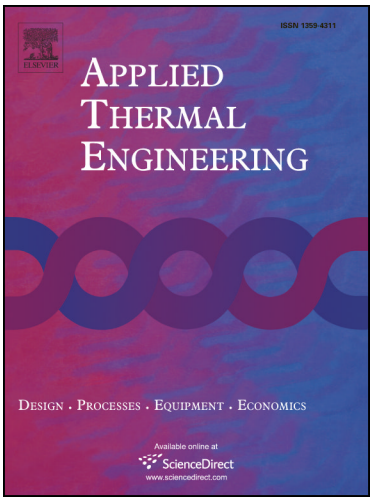

Research Paper

Modeling, Simulation and Dynamic Control of Solar Assisted Ground Source Heat Pump to Provide Heating Load and DHW

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Modeling, Simulation and Dynamic Control of Solar Assisted Ground Source Heat Pump to Provide Heating Load and DHW

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Abstract

Having great resources of fossil fuels in Iran and ease of access to them inhibits utilization of renewable energies, especially in large scales. In spite of great sources of fossil fuels, Sistan province in the southeast of Iran has no gas pipelines yet and people sometimes use gas cylinders or oil products for heating of their houses. This paper aims to propose a sustainable renewable energy system to provide heating systems for residential buildings as well as domestic hot water (DHW). Five different combinations of solar assisted ground source heat pump (SAGSHP) are simulated for a residential building in the city of Zahedan, Iran. Modeling, simulation, and operation controlling have been performed in TRNSYS software and the coefficient of performance (COP), electrical power consumption of the GSHP, soil temperature, as well as building and domestic hot water temperatures for 10 years of operation have been obtained and compared. It is obtained that a 12kW GSHP with the assisted flat solar collectors can supply space heating demand and DHW for the building throughout the winter. The maximum and minimum annual mean COP value are 3.75 and