



PARAMETRIC STUDY OF THE SOLAR ASSISTED HEAT PUMP PERFORMANCE

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ABSTRACT

The rising interest in near zero energy buildings (NZEB) as an energy policy tool to reduce the consumption of primary energy, has increased attention to the renewable energy systems for buildings. Heat pump systems are wide spread solution to reduce energy use. In cold climate due to intense energy use for space heating and domestic hot water preparation, it is difficult to reach seasonal performance factor values suggested in the EN 15450 standard. A combination of heat pump and solar thermal collectors helps to meet standard requirements and increases the fraction of the renewable energy use.

In order to improve the performance of the system we need to know parameters that have the greatest impact on it. Thus we create a simulation model of the system in TRNSYS and carry out a parametric study to investigate how different values of the parameters will affect the seasonal performance factor (SPF) of the solar assisted ground source heat pump system. The main parameters considered are borehole size, efficiency of solar collectors and required capacity of circulation pumps. All these parameters can be influenced at the design stage of the system, while the heat demand profile is considered to be predetermined. Different solar assisted heat pump design solutions with serial and parallel solar thermal connections to heat pump loop are modelled. The findings could help directing future research to increase the performance of near zero energy building energy supply for heating systems and decrease of systems efficiency

Keywords: solar assisted heat pump, near zero energy buildings, parametric study, TRNSYS