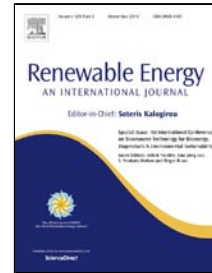


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# Field study of a novel solar-assisted dual-source multifunctional heat pump

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## Abstract

The coupling between heat pumps and renewable energy sources is a recognized strategy to reduce primary energy consumption. This paper contributes to the present-day discussion concerning solar-assisted heat pumps for heating/cooling and to produce domestic hot water. In particular, this study presents the results of a field study concerning a novel solar-assisted dual-source multifunctional heat pump, installed in a detached house in Milan. The proposed system couples hybrid photovoltaic/thermal (*PVT*) panels with a multifunctional and reversible heat pump. The heat pump is equipped with “*air-source*” and “*water-source*” evaporators, connected in series and operated alternatively, based on the ambient conditions, system parameters and operating modes. In addition, the *PVT* panels are used, by employing two storage tanks, to produce domestic hot water and to provide a heat source to the “*water-source*” evaporator. The proposed system has been tested experimentally, showing interesting and promising results: the system has been able to maintain high efficiencies in the different seasons and has been able to use the solar energy to support the production of domestic hot water. It was found that the use of the “*water-source*” evaporator allowed to significantly increase the performance of the system and to avoid the defrost cycles.

**Keywords:** Solar-assisted heat pump, Hybrid photovoltaic/thermal panels, Dual Source heat pumps, Heat Pump, Field trial, Energy efficiency

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