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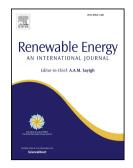
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# Title: A comprehensive investigation of using mutual air and water heating in multi-functional *DX-SAMHP* for moderate cold climate.

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#### 9 Abstract

Solar energy assisted heat pump systems (SAHP) have been used in this application. SAHP 10 system with solar collectors and the heat pump are combined into one unit so as to convey the 11 solar energy to the refrigerant. The solar collector is used as the evaporator, where the 12 refrigerant is directly vaporized by solar energy input. Due to the complicated technical 13 issues associated with a combined system that provides air for space heating and domestic hot 14 water, most of the previous studies have concentrated on water heater heat pump mechanism. 15 The current work is aimed at examining the use of a new multi-functional heat pump (DX-16 SAMHP), air for space heating mutually with solar for domestic hot water without employing 17 18 an auxiliary heater. Comprehensive experimental and analytical studies in the first of its kind have been performed on the new system. The novel system with ternary panels and the 19 20 thermal performance of the collector has been examined in this study. Results indicate that 21 the DX-SAMHP using solar inner and outer panels for space and water heating is a promising 22 substitute for the existing DX-SAHP water heater. Compared to the conventional solarassisted SAHP heat pump systems, the coefficient performance of the new design doubles 23 that of the conventional DX-SAHP systems. 24

#### 25 Keywords

26 Heat pump in low temperature, Solar energy system, Refrigeration cycle, Heating system

27 application.

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