

INTEGRATED SOLAR WATER-HEATER AND SOLAR WATER COOLER PERFORMANCE DURING WINTER TIME

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Abstract:

Solar powered water heater and water cooler is an important contribution for the reduction of fossil fuel consumptions and harmful emissions to the environment. This study aims to harness the available solar potential of Pakistan and provide an option fulfilling the domestic hot and cold water demands during winter and summer seasons respectively. The system was designed for the tap-water temperature of 65°C (149°F) and the chilled drinking-water temperature of 14°C (57°F) that are the recommended temperatures by World Health Organization (WHO). The solar water heater serves one of the facilities of the Department of Mechanical Engineering at NED University of Engineering and Technology whereas, the solar water cooler will provide drinking water to approximately 50 people including both faculty and students. A pair of single glazed flat plate solar collector was installed to convert solar radiations to heat. Hot water storage and supply system was carefully designed and fabricated to obtain the designed tap-water temperature. Vapour-absorption refrigeration system was designed to chill drinking water. Intensity of solar radiations falling on the solar collector, water temperatures at the inlet and outlet of the solar collectors and the tap water temperature were measured and analyzed at different hours of the day and at different days of the month. The results show that the installed solar collector system has potential to feed hot water of temperatures ranging from 65°C (149 °F) to 70°C (158°F), that is the required hot water temperature to operate a vapour absorption chilled water production system.

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