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Desalination of seawater using solar, ambient energy and waste heat from air conditioning

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ABSTRACT

Desalination is considered one of the most suitable areas for the utilization of solar energy, as there are many places in the world where abundant supply of solar energy is available and also there is a great demand for fresh water. An integrated solar heat pump desalination system has been developed at the National University of Singapore. The system also offers the opportunity of water heating and drying utilizing solar, ambient energy and waste heat from air conditioning system, which is conventionally dumped into the environment causing global warming. Desalination is carried out by making use of a single effect of Multi-Effect Distillation (MED) system. Within the desalination chamber, both flashing and evaporation of saline water take place. The maximum Coefficient of Performance (COP) of the heat pump system was around 5.8. In the integrated system, the maximum fresh water production rate was 9.6 l h^{-1} and a Performance Ratio (PR) of 1.2. For only desalination, the system has the potential to produce a maximum of 30 l h^{-1} of fresh water.

Keywords: Solar energy; Ambient energy; Waste heat; Heat pump; Desalination

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