

An approach to optimize the production of solar desalination unit using the SMCEC principle

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ABSTRACT

This paper tackles an optimization approach in order to boost the fresh water production of the SMCEC (solar multiple condensation evaporation cycle) unit which is located at Sfax's Engineering National School in Tunisia. This optimization approach is based upon the above mentioned design's improvement through adding into it a flat plate solar air collector and a humidifier. Then, the humidification dehumidification (HD) developed process is essentially composed of five components: a flat plate solar air collector, a flat plate solar water collector, a humidifier, an evaporation tower and a condensation tower. A global mathematical model based on heat and mass transfers is developed to investigate both the effect of different operating modes and that of the variation of functioning parameters and weather conditions on the fresh water production. The fresh water production of the most effective operating mode is compared to the SMCEC unit and as a result, it transpires that the fresh water production of the most effective operating mode has increased with comparison to the SMCEC production.

Keywords: Solar energy; Water desalination; Humidification-dehumidification; Operating modes; Mathematical model and optimization

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