



## Performance analysis of combined two stage desalination and cooling plant with different solar collectors

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### ABSTRACT

An experimental investigation of a two stage desalination-cooling (TSDC) plant assisted by solar flat plate collectors (SFPC) is reported. From the experimental study the total power consumption, desalination yield, and cooling output were estimated. The potential of a concentrating photovoltaic thermal (CPVT) collector to achieve possible reduction in power consumption of the TSDC plant was explored for the same desalination and cooling output. A mathematical model of CPVT collector assisted TSDC plant was developed and validated. Both configurations are compared in terms of specific water production and plant energy utilisation factor (EUF). This study reveals that the highest specific water production and EUF of CPVT assisted plant are 0.12 kg/m<sup>2</sup>-h and 0.23. For SFPC assisted plant the highest specific water production and EUF are 0.11 kg/m<sup>2</sup>-h and 0.11 respectively. The use of CPVT collector in lieu of SFPC to operate the TSDC plant results in higher specific water production and energy utilisation factor. A lesser amount of electrical energy and collector area is sufficient to operate the TSDC plant assisted by CPVT collector compared to SFPC assisted plant for same output.

*Keywords:* Concentrated photovoltaic/thermal; Cooling; Desalination; Humidification; Power

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