

## Design, Construction, Technical and Economic Evaluation of a Solar Water Desalination Device with Two Heat Exchangers and a Photovoltaic System

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**Abstract :** Due to the limited resources of fossil fuels and their harmful effects on the environment and human health, research on renewable energy applications in industrial and scientific communities has become particularly important. Only one percent of freshwater resources are available for use in the domestic, agricultural, and industrial sectors. On the other hand, the rapid growth of industry and the increase of population in most countries of the world, including Iran, have led to an increase in demand for freshwater. Among renewable energies, there is the potential of solar energy in Iran. As a result, solar distillation systems can be used as a solution to supply fresh water in remote rural areas. Therefore, in the present study, a solar water desalination device was designed and manufactured using two heat exchangers and a photovoltaic system. Its evaluation was done during September and October of 2020. During the evaluation of the device, environmental variables such as total solar radiation, ambient temperature and cooling tower temperature were recorded at intervals of one hour from 9 am to 5 pm. The effect of these variables on solar concentrator performance, heat exchanger, and daily freshwater production was evaluated. The results showed that using two heat exchangers and a photovoltaic system has led to the daily production of 5 liters of fresh water and 46% economic efficiency.

**Keywords :** solar water desalination, heat exchanger, photovoltaic system, technical and economic evaluation

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