



Design of a Photovoltaic System for Preheating in Solar Desalination

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Abstract

Demand for water is substantially on the rise fueled by the unbridled population growth worldwide. Solar stills can be a proper solution to this demand in less densely populated areas with enough solar irradiation. The main drawback of these desalination systems is their low efficiency, which can be addressed by preheating. Microwave preheating was used in this study. Sunlight is a clean energy source that can be harnessed through solar cells. The study aimed at designing a photovoltaic system to supply power for an automated stepped solar desalination system with preheating. The system included a water pump, a microwave stirrer, electric valves and a microwave device. The photovoltaic system was designed for conditions of Tehran, Iran located at 35° latitude to store energy in a battery for three days and was implemented at TarbiatModares University.

Key words: Solar desalination, Preheating, Microwave, Photovoltaic system

1. Introduction

In this era, due to the energy crisis and environmental problems, the human race is searching for a solution to save energy and make use of renewable energies in a bid to address water and power shortages. The increasing population has exacerbated demand for fresh water, while the direct sources of this vital substances are dwindling. It is predicted that, by 2025, more than half the planet's population will face fresh water shortage. The water desalination industry can be a viable dependable solution considering the vast global saline water sources (e.g. oceans, seas) or other local sources in desert regions. In most parts of the world, solar energy is highly essential for producing fresh potable water from saline waters (Koschikowski J., 2011). The need for small-scale production of potable water for less densely populated and remote areas of Iran, due to their climatic conditions, is not a broadly researched topic. This is while the vast central hot and arid areas of Iran are both plagued with fresh water crisis and blessed with sufficient solar irradiation