

Design of a Small Mobile PV Driven RO Water Desalination Plant to be Deployed at the North West Coast of Egypt

Authors : Hosam A. Shawky, Amr A. Abdel Fatah, Moustafa M. S. Abo ElFad, Abdel Hameed M. El-Aassar

Abstract : Water desalination projects based on reverse osmosis technology are being introduced in Egypt to combat drinking water shortage in remote areas. Reverse osmosis (RO) desalination is a pressure driven process. This paper focuses on the design of an integrated brackish water and seawater RO desalination and solar Photovoltaic (PV) technology. A small Mobile PV driven RO desalination plant prototype without batteries is designed and tested. Solar-driven reverse osmosis desalination can potentially break the dependence of conventional desalination on fossil fuels, reduce operational costs, and improve environmental sustainability. Moreover, the innovative features incorporated in the newly designed PV-RO plant prototype are focusing on improving the cost effectiveness of producing drinkable water in remote areas. This is achieved by maximizing energy yield through an integrated automatic single axis PV tracking system with programmed tilting angle adjustment. An autonomous cleaning system for PV modules is adopted for maximizing energy generation efficiency. RO plant components are selected so as to produce 4-5 m³/day of potable water. A basic criterion in the design of this PV-RO prototype is to produce a minimum amount of fresh water by running the plant during peak sun hours. Mobility of the system will provide potable water to isolated villages and population as well as ability to provide good drinking water to different number of people from any source that is not drinkable.

Keywords : design, reverse osmosis, photovoltaic, energy, desalination, Egypt

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