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Economic evaluation of a small RO unit powered by PV installed in the village of Hartha, Jordan

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ABSTRACT

A PV-powered desalination system has been successfully designed, installed and tested at the Hartha Charitable Society in northern Jordan as part of Autonomous Desalination In Rural Areas (ADIRA) with renewable energies—Potentials, technologies, field experience, socio-technical and socioeconomic impact) project installations, partially supported by the European Commission. The system is composed of photovoltaic (PV) panels (433 Wp), a commercially available small RO compact unit with a typical daily production of 428 L, and a softener. The system produced clean drinking water from a variety of feed waters, including brackish water (1700 mg/L). The amount of energy required to produce 1 m^3 of high quality water (30 mg/L) is about 13 kWh, depending on the salinity of feed water and the system operating conditions. The cost per cubic meter of water produced is US$ 15.6. The price is not competitive with the price of water produced by conventional desalination processes, but in some cases, for instance small rural sites or during catastrophes where drinkable water is not available, such systems are indispensable. This paper presents the cost calculations of the PV–RO system and the possible scenarios to reduce the production cost.

Keywords: PV; RO; Solar; Clean energy; Cost; Brackish water; Desalination; Jordan

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