



## Design and analysis of a solar photovoltaic powered seawater reverse osmosis plant in the southern region of the Gaza Strip

Loay T.A. Salama<sup>a,\*</sup>, Khaled Z. Abdalla<sup>b</sup>

<sup>a</sup>Faculty of Engineering, Cairo University, Cairo, Egypt, email: Loay4321@hotmail.com

<sup>b</sup>Department of Civil Engineering, Cairo University, Cairo, Egypt, email: civil3e@civil3e.com

Received 2 August 2018; Accepted 12 December 2018

---

### ABSTRACT

Energy and water are essential components to any civilization. Both are important for industrial, agricultural and societal development. Desalination seems to be one of the most suitable solutions to the water problem. The integration of renewable energy into water desalination systems has become increasingly attractive due to the growing demand for water and energy. In this paper, a proposed model consists of a solar photovoltaic (PV) powered seawater reverse osmosis desalination plant for the southern region of the Gaza Strip. The proposed system of reverse osmosis plant with a capacity of 2,400 m<sup>3</sup>/h is designed using ROSA software. As the solar PV plant is designed using System Advisor Model software that does not rely on expensive batteries, the water production cost is nearly the same as the current expenses (0.56 USD/m<sup>3</sup>). The simple payback period for PV plant was found to be 5.9 years, the nominal levelized cost of energy was 9.3 cents/kWh, the net present value was around \$800,000 and the investor internal rate of return was 10.6% (which is greater than the interest rate 6%). The system reduces the emission of greenhouse gases. Comparing the results obtained with the conventional values, this model would provide a much needed efficient compensator of the shortage of water and energy, making it more sustainable and economically feasible.

*Keywords:* Desalination; Reverse osmosis (RO); Solar photovoltaic (PV); Cost analysis; Renewable energy; Gaza Strip

---

\* Corresponding author.