

Techno-economic feasibility of a solar-powered reverse osmosis desalination system integrated with lithium battery energy storage

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Received 5 December 2018; Accepted 12 June 2019

ABSTRACT

Today, energy and fresh water play a vital role in human life and the development of economics and also in industry. The energy density in water desalination process is remarkable, so using the renewable energy sources for this purpose can be interesting especially in the high potential renewable energy sources (solar energy) like Middle East. The simulation and feasibility study of solar water desalination system coupled with lithium battery energy storage is considered in the case study of Iran. For these purposes, a complete simulation of the considered system is done. Then, using simulation results, the economic study is carried out using tem economic method. Also, the parametric study is considered to find out the effect of climate change, temperature, solar panel type, size of system and the salinity of inlet water on the economic feasibility. Results show that the suggested system is economically feasible in the considered place (period of return is under 5 years). The minimum cost of market for desalinated water which causes the considered system economic is 0.045 US\$/L in (Tehran and Jask), 0.04 US\$/L for Semnan, 0.065 US\$/L in Rasht and 0.035 US\$/L in Yazd.

Keywords: Annualized cost of system; Solar radiation modeling; Solar water desalination; Lithium battery energy storage; Reverse osmosis

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