

Economic analysis of brackish-water desalination used for irrigation in the Jordan Valley

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ABSTRACT

The financial profitability is one of the main factors that play a role in the decision to adopt this technology. More than 50 brackish water desalination plants have been installed by farmers in the Jordan Valley for irrigation purposes. In all plants, reverse-osmosis technology is applied. The plants' capacities are 360 to 2400 m³/d. The total water abstracted is about 11.7 MCM, whereas the total desalinated amount reaches 7.7 MCM while the brine discharge is about 4.1 MCM. Brackish water, having salinity between 1300 and 7000 ppm with an average of 3150 ppm. Desalinated waters have a salinity between 50 and 800 ppm, averaging 195 ppm. The facilities are generally in operation 24 h/d in the summer and 12 h/d in the winter. The only energy source used to run these plants is the electric power grid. Desalinated water is then diluted to a salinity of about 700 ppm (400–1000 ppm). Irrigation water is applied, in particular, for bananas, strawberries, and dates. Those crops have a high market value. The average investment cost per cubic meter for the installed capacity of the desalination plants ranges between \$124/(m³/h) for small plants and \$63.5/(m³/h) for large plants; the average is \$89/(m³/h). The average desalination cost is \$0.38 per cubic meter. The results show that large desalination plants have a lower desalination cost (\$0.33/m³) compared with small ones that have an average desalination cost of \$0.48/m³.

Keywords: Cost-effectiveness analysis; Desalination cost; Irrigation; Jordan Valley

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