Desalination and Water Treatment
www.deswater.com
doi: 10.5004/dwt.2021.27766

238 (2021) 125–134
October

The implementation of the preference selection index approach in ranking water desalination technologies

Mohammed Said Obeidat*, Tarek Qasim, Haneen Traini

Department of Industrial Engineering, Jordan University of Science and Technology, P.O. Box: 3030, Irbid 22110, Jordan, emails: msobeidat1@just.edu.jo (M.S. Obeidat), tqqasim@just.edu.jo (T. Qasim), haneentraini@gmail.com (H. Traini)

Received 30 April 2021; Accepted 3 September 2021

ABSTRACT

A huge variation exists among countries in terms of freshwater availability. Water scarcity is considered a global problem that continues to grow with the fast increase in population and depleting sources of freshwater. Water desalination can be a professional solution for addressing such scarcity of water supply, but the selection of the suitable desalination method can be hard in some cases and depends on several criteria. Multi-criteria decision-making methods could be used to simplify the decision-making problem. In this paper, the preference selection index (PSI) will be used to rank seven desalination technologies; these include reverse osmosis, electrodialysis, multi-flash desalination, multi-effect desalination, mechanical vapor compression, nanofiltration and ion exchange. Twelve criteria were used in evaluating the desalination methods, including the capital cost, operating cost, the energy required, recovery ratio, product water quality, adaptability, lifetime, environmental impact, simplicity, reliability, maturity and applicability. The results of the PSI model showed that the ion exchange technology is the optimal desalination technology, followed by nanofiltration technology.

Keywords: Multi-criteria decision making; Desalination; Preference selection index; Water shortage; Secondary data

* Corresponding author.