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Overview of systems engineering approaches for a large-scale seawater desalination plant with a reverse osmosis network

Young M. Kim[a,b], Seung J. Kim[a,b], Yong S. Kim[a,b], Sangho Lee[c], In S. Kim[a,b], Joon Ha Kim[a,b*]

[a]*Department of Environmental Science and Engineering, Gwangju Institute of Science and Technology (GIST), Gwangju 500-712, Korea*
Tel. +82 (62) 970-3277; Fax: +82 (62) 970-3434; email: joonkim@gist.ac.kr
[b]*Center for Seawater Engineering and Architecture of High Efficiency Reverse Osmosis (SeaHero), GIST, Gwangju 500-712, Korea*
[c]*Environmental Research Division, Water Recourse Research Department, Korea Institute of Construction Technology, Goyang-Si, Gyeonggi-Do, 411-412, Korea*

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Abstract

Over 100 papers were reviewed to elucidate factors influencing large-scale seawater desalination plants with reverse osmosis networks (SWRO). This paper consists of subjects such as SWRO systems investigation, system models of pretreatment and RO networks, systems optimization to minimize the total cost of SWRO plant design, and the future direction of SWRO technology. In order to design a large-scale seawater desalination plant, a systematic understanding of SWRO processes should be followed. After investigating all the processes, including site-specific features, seawater intakes, pretreatment systems, RO networks, energy recovery systems, post-treatment systems, brine disposal, and the environmental impact of SWRO desalination, system models are discussed for predicting the performance of each system. Based on the minimal principle of total cost required for a full-scale SWRO plant, optimized results are discussed. Studies needed for developing future SWRO technologies are suggested.

Keywords: Desalination; Reverse osmosis membrane; Seawater; SWRO; Optimization; Systems engineering approach

*Corresponding author.

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