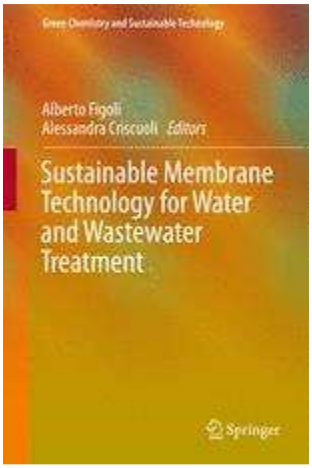

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Desalination by Reverse Osmosis

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Abstract

This chapter deals with the main techno-economic and environmental issues involved in assessing the sustainability of RO membrane technology for water desalination. The technical and economic aspects of desalination plant design and operation are reviewed, focusing on the key parameters of specific energy consumption (SEC) and product water unit cost, which are significantly affected by the main RO process part of the plant. Analysis of factors affecting these parameters helps to identify technical areas for improvements, particularly for seawater desalination. Improving the efficiency of high pressure pumps and of energy recovery devices as well as the permeability and antifouling characteristics of RO membranes appear to be high priority R&D targets, combined with efforts to improve membrane module design. Regarding environmental impact, in addition to SEC, the raw water intake facility and the effluent-brine handling practices tend to get increasing attention and are expected to dominate in the overall sustainability assessment in the coming years, despite their modest direct contribution to the product water unit cost at present. Consequently, there is also a clear priority for R&D work related to the intake facility and the brine handling and/or utilization methods. Difficulties encountered in implementing a comprehensive sustainability assessment of RO membrane desalination are outlined.