

## Chapter 7

# Concluding remarks and epilogue

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SWRO has extended the possibility of low-energy seawater desalination to a higher level of implementation. The RO technology development in recent decades has led to a tremendous increase in desalination capacity worldwide. The development of RO technology was conducted in various fields of engineering, such as RO membrane development, system configuration optimization, high-efficient equipment design, operation optimization, and improvements of pre- and post-treatment. In this book, we tried to summarize most of the RO developments, especially in terms of energy efficiency. The detailed configuration of conventional SWRO plants and the equipment correlating with energy consumption were introduced. The basic theoretical background of energy consumption in the SWRO system was provided, and the recent trend in the SEC of SWRO plants have been investigated by analyzing the current data on SWRO plants. The main factors affecting the SEC of SWRO plants have been investigated and summarized. To reduce the SEC of SWRO plants further, future directions for low-energy SWRO systems were characterized. The advanced technologies of RO systems which were designed to achieve low-energy desalination have been introduced. Finally, the recent development of RO membranes was summarized.

Currently, desalination communities face great challenges to resolve carbon neutralization and provide a sustainable water supply. SWRO has proposed a valuable solution to these problems by reducing energy consumption and expanding the desalination plant capacity. However, the regulations to achieve carbon neutralization and provide sustainable water supply are getting stronger, the desalination system using SWRO should be developed further to provide a higher level of solutions, such as higher recovery for sustainable water supply and lower SEC for carbon neutralization. Through this book, we

provide comprehensive information, knowledge, and analyses about SWRO systems from a basic understanding of RO systems to future directions for the realization of low-energy SWRO systems. In addition, the SWRO plant data included in the graphs show a clear trend of SEC improvement. We believe that the information in this book is helpful for students who want to study desalination systems using RO from basic knowledge, and for engineers who want to overview the current trends of SWRO systems. We hope that this book will serve as a small stepping stone for the SWRO system to improve its current level of technology.

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