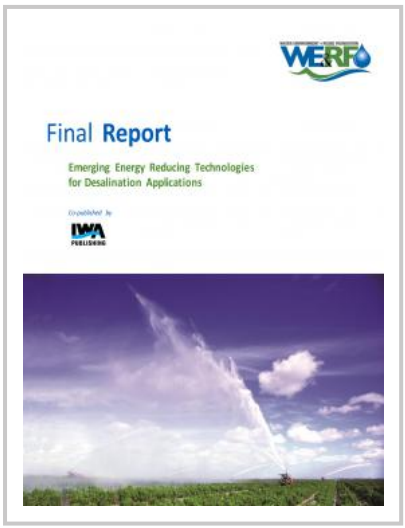
Emerging Energy Reducing Technologies for Desalination Applications



The purpose of this project was to independently evaluate two emerging desalination technologies that showed promise for at least 10 to 15% savings in specific energy consumption (SEC) during seawater desalination. Thin film nanocomposite (TFN) reverse osmosis (RO) membranes from LG-NanoH2O, LLC and semi-batch RO from Desalitech, LLC were selected for evaluation at the pilot scale. The significance of performing such a study was to independently test innovative technologies and ultimately to accelerate industry adaptation of recently developed commercial products by minimizing the time to widespread testing and application.

The project consisted of two major phases: (1) literature review and (2) pilot-scale evaluation of TFN RO membranes and the semi-batch RO process. A comprehensive literature review was conducted to identify emerging desalination technologies with particular focus on energy minimization during seawater desalination. Pilot-scale evaluations of TFN RO membranes, Qfx400ES, Qfx365ES, and Qfx400R, were conducted at West Basin Municipal Water District's Ocean Water Demonstration Facility using seawater from the Pacific Ocean. Thin film composite (TFC) RO membranes from DowFilmtec, SW30ULE, and SW30XLE were used for baseline data collection and comparison with TFN RO membranes. The SEC at various flux and feed water recoveries were evaluated for the model membranes. A pilot scale evaluation of the semi-batch RO process was conducted at Israel Aerospace Industries (IAI) facility in Tel Aviv, Israel. Pretreated water from the Ashkelon Desalination Plant was used as the feed water for the pilot-scale evaluation. TFC RO membranes (SW30HRLE) were harvested from the full-scale plant and utilized in the semi-batch RO system. In addition, TFN RO membranes (Qfx400ES) also were utilized in the semi-batch RO system and SEC was evaluated at various flux and recovery conditions.

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