

Cost savings by novel seawater reverse osmosis elements and design concepts

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ABSTRACT

Desalination market growth has triggered significant development in SWRO membrane and process development and the new extra high rejection and ultra low energy membranes from Dow, FILMTEC™ SW30XHR-400i and SW30ULE-400i, as well as the internally staged design concept, have been validated in extensive field testing and various commercial plants over the recent years and are now commercially available. These solutions from Dow can be used to increase membrane flux and system recovery and / or to reduce feed pressure. This yields capital cost and /or energy savings. These savings have been assessed in 4 different situations / geographies, using a thorough and validated cost model. These geographies are South Pacific (Australia), Persian Gulf (Saudi Arabia), with very different feed water qualities (in terms of feed salinity and temperature range) and product quality requirements (in terms of bromide, boron and salinity). Depending on the cost savings route chosen, there are strong differences in the consequences with regards to size of the RO stage (17–26% smaller), size of the pretreatment (9–12% smaller), and/or the feed pressure (2–6 bar lower). These cost savings are in the range of US cent 0.4–4.1/m³ water produced. This is equivalent to 0.7–6.5% water cost saving. Considering that these considerable cost savings are readily available since 2008 from Dow Water Solutions, the industry should start to significantly benefit from these in the coming years.

Keywords: Desalination; Reverse osmosis; FilmTec membranes; Design; Economics

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