Desalination and Water Treatment
www.deswater.com

36 (2011) 239–260
December

1944-3994/1944-3986
doi: 10.5004/dwt.2011.2534

Energy consumption and recovery in reverse osmosis

Veera Gnaneswar Gude*

Civil Engineering Department, Oregon Institute of Technology, 3201 Campus Drive, Klamath Falls, OR 97601, USA
Tel.: +15418851903; Fax: +15418851654; email: gudevg@gmail.com

Received 16 December 2010; accepted 21 March 2011

A B S T R A C T

Energy consumption is a key factor which influences the freshwater production cost in reverse osmosis (RO) process. Energy recovery and reuse options have already been very well explored in the current desalination industry. Achieving minimum theoretical specific energy consumption for water recovery is not feasible due to effects of concentration polarization, membrane fouling and hydraulic resistance to permeate flow. Due to these limitations, energy recovery along with water recovery can be a better alternative to improve energy consumption and economics of the RO process both in small and large scale applications. This paper reviews currently available process configurations, operating strategies, and discusses potential pathways to recover and recycle energy and water to improve the performance of the RO process.

Keywords: Desalination; Reverse osmosis; Energy consumption; Energy recovery; Specific energy and water recovery