Evaluation of the recovery of osmotic energy in desalination plants by using pressure retarded osmosis

Luis G. Palacin, Fernando Tadeo*, Cesar de Prada, Khaled Touati

Department of Systems Engineering and Automatic Control, University of Valladolid, Valladolid 47011, Spain
Email: fernando@autom.uva.es

Received 1 March 2012; Accepted 18 July 2012

ABSTRACT

The current paper explores the possibility of using pressure retarded osmosis (PRO) as part of the post-treatment of existing desalination plants: a membrane-based PRO system would be used to transform osmotic energy of the retentate into hydraulic pressure; this pressure is then used to generate electricity in a turbine. For this, a source of water with lower osmotic pressure would be needed: municipal or industrial wastewater, brackish water, etc. From the point of view of implementation, except for the PRO membranes, this additional PRO post-treatment uses a small number of additional components, which are similar to those already standards in desalination industry. A model of the process is developed, and some feasibility studies will be discussed, to evaluate the potential for varying mixing rates.

Keywords: Energy recovery; Desalination; Pressure retarded osmosis

*Corresponding author.

Presented at the International Conference on Desalination for the Environment, Clean Water and Energy, European Desalination Society, 23–26 April 2012, Barcelona, Spain