

Hybridization — a new trend in desalination

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Received 28 July 2008; Accepted 6 January 2009

ABSTRACT

A challenging problem that faces planners, designers and operators of power–desalination projects is the optimum selection of power and desalting technology in order to optimize the joint production of water and power by the utility. Previously the basis of selection was minimal costs for standalone, baseload production of water and power. Currently, the optimal design of a dual-purpose plant should take into account the individual site demands for electricity and water expressed in terms of the power to water ratio (PWR), the total network situation, the cost of energy, capital costs of plants and then the design is optimized for the lowest cost alternative, depending upon the ratios of water to baseload power and peak to baseload electricity demand. Due to the high cost of power–desalination plants, the Gulf countries are considering feasible alternatives with minimum investment and operating costs and optimal supply of water and power. However, the optimization problem is complicated by the significant seasonal mismatch between water and power demands and the increasing future demand of water over power due to the fast rate of industrial and social development and continuous population growth. Furthermore, choice of the optimal technology in co-generation plants is made more difficult due to the large number of the combinations of desalination technologies and power facilities that could be coupled together. Hybridization of power systems with electrically driven desalination technologies presents promising design alternatives capable of minimizing PWR while satisfying the other constraints of an optimal selection of the power-desalting plant. This paper briefly reviews different desalination technologies, summarizes the main components of power plants utilizing fossil fuels and presents a variety of hybrid configurations for dual-purpose plants emphasizing their advantages and limitations.

Keywords: Desalination; Hybridization; Power to water ratio; Co-generation; Optimization

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