Summary of Issues | Strategies | Benefits & Costs | Key Uncertainties | Additional Resources

**KEY POINT:** Using power plant cooling water as feedwater can result in energy savings compared to stand-alone facilities because of warmer feedwater temperature

**SUMMARY OF ISSUES**

- When feasible, seawater desal plants co-located with power plants typically use the power plant cooling water discharge as feedwater (CDWR 2003).

- Power plant cooling water provides a warmer source of feedwater compared to the direct use of ocean water. The warmer feedwater can decrease RO system feed pressure requirements (and associated energy demand) and yield power cost savings.

- As a result of co-location, the unit power costs of desal can be further decreased if the need for power grid transmission and associated fees is avoided (Voutchkov 2004).

- Warmer feedwater may accelerate membrane fouling if there are no effective fouling control strategies. Membrane fouling will raise energy demand and treatment costs due to increased feed pressure requirements and chemical cleaning frequencies.

**STRATEGIES**

- Experience has shown that problems associated with corrosion and biofouling are enhanced by the higher temperature feedwater used at co-located facilities (van Agtmaal et al. 2007). This can be compounded by operations and maintenance problems caused by a lack of understanding of variation in feed water quality. These problems will increase energy demand and associated costs at co-located facilities. A thorough understanding of variability of source water quality, long-term pilot testing, adequate and robust pretreatment, flexible process design, and sufficient pretreatment capacity are critical to ensure adequate design and maintain sustainable operation of a desal facility.

- The maximum operating temperature of most RO membranes is 113°F (45°C). Co-located desal plants should have a temperature control system (e.g. blending with cold water) to control feedwater temperatures when the temperature of the cooling water is too high for the membranes.
BENEFITS & COSTS

Benefits

Power plant cooling water is typically 5 °C to 15 °C warmer than the temperature of ambient ocean water. Feed pressure requirements for the RO membrane separation of seawater are approximately 5-8% lower if feed water temperature is 10 °C warmer. Since power costs account for 20 to 40% of the total cost of producing desalinated water, the use of warmer source water could have a measurable beneficial effect on the overall water production costs (Vouchkov 2004).

Co-location with a power plant can result in the reduction of unit power costs if the desal facility can connect directly to the power plant generation facilities. Potential cost reductions may also result from reduced power transmission charges.

Costs

Installation of a cooling system to reduce feedwater temperature and protect RO membrane integrity may be necessary.

Membrane operation and performance may deteriorate due to biofouling, high temperature, and additional contaminants (such as metals resulting from corrosion) in the power plant cooling water.

The use of warmer water as a feedwater source may result in lower salt and boron rejection and post-treatment or feedwater pH adjustment may be required to meet stringent water quality standards.

KEY UNCERTAINTIES

Potential phasing out of OTC systems may eliminate energy saving benefits associated with using the power plant’s warmer cooling water as RO feedwater.

ADDITIONAL RESOURCES


[Click here to return to top of page]