



Desalitech helped Southern California Edison improve its water treatment, in a power-industry first, saving tens of millions of gallons of water per year and reducing operating costs by 85% versus mobile demineralizers.

Industry

Power Generation

Client Profile



One of the largest electric utilities in the U.S., Southern California Edison (SCE) has been delivering power to over 14 million people in southern and central California for more than 125 years.

Client Challenges

- Ultrapure water required for emissions control and cooling
- Mobile demineralizers were extremely cost intensive
- Reliability was essential

Key Benefits

- Est. 44 million gallons/year total water savings
- 91% water recovery
- Guaranteed 10 μ S/cm quality permeate
- 85% reduction in annual water-related costs

The Problem

In California, a once-in-a-century drought has cost consumers an estimated \$2.5 billion as increased power costs due to reduced hydropower operation. Responsible water use is more important than ever, and California's State Water Resources Control Board is cracking down on water usage at power plants to date, 17 plants have been shut down.

Southern California Edison (SCE) depends on ultrapure water for emission control and cooling in five of its peaking power plants. In most of these applications, this water comes from municipal sources, and must be made "ultrapure" before use to prevent damage to the turbines in use to generate power. Until recently, SCE had been relying solely on rented, mobile demineralization trailers to purify water for use in these peaking power plants. However, these systems were costly, consumed a lot of water in SCE's supply chain and presented a singular point of failure in the plant.

Any potential replacement needed to be extremely reliable, with exemplary water recovery rates. "If the demineralized water is not available, we cannot run the turbines which can impact grid reliability," explains Kishore Billapati, with SCE Generation Plant Engineering. Given that many of these peaking power plants are not manned on a daily basis, it was vital that any alternative to the mobile demineralizers be largely autonomous and reliable.

SCE identified five gas-fired peaking plants that were looking for reliable and cheaper ways to manage their water needs. Stanton, Norwalk, Ontario, and Rancho Cucamonga in the Los Angeles Basin, with the fifth in Ventura County, at Oxnard, on the Pacific coast. Each plant uses GE LM6000 gas combustion turbines rated at 50 MW.



The company needed an alternative to mobile demineralizers that would allow them to simultaneously reduce their operational expenses and improve operational reliability without sacrificing water quality.

The Solution

A reverse osmosis (RO) system made the most sense to replace the temporary, expensive demineralization trailers; but traditional RO systems have limited water recovery rates. This can be overcome, in part, by setting up multi-stage RO systems, but the trade off is an increase in operational complexity.

Multi-stage RO systems are also more difficult to maintain with each subsequent stage and require significant downtime for cleaning and maintenance. The end result is that any more than two or three stages will suffer from reduced reliability.

Desalitech's Closed Circuit Reverse Osmosis™ (CCRO) systems address these weaknesses. The patented CCRO process is able to achieve recovery rates as high as 98% with an elegant single-stage design, providing customers with complete flexibility and reliability.

SCE adopted CCRO along with mixed-bed polishers to address all of their concerns at the five peaking power plants.



The Results

SCE estimates a savings of 44 million gallons of water per year through the CCRO systems — which was first use of CCRO process in the power generation industry. The systems operate at 91% recovery in an elegant and flexible single-stage design, producing a guaranteed water purity of <math><10\text{ uS/cm}</math>. When compared to a traditional multi-stage reverse osmosis system, the CCRO systems provide an additional 18% savings in feedwater consumption and a 64% savings in brine disposal costs.

In addition, SCE will greatly improve reliability due to the high quality CCRO permeate and by operating the mixed-bed polishers in series. This novel approach has enabled SCE to reduce its annual water operating costs by 85%, from about \$1.5 million to \$0.225 million per plant.

The CCRO systems have been successfully commissioned at all five plants. For adopting new technology in the pursuit of sustainability, this project earned SCE the prestigious 2017 Power Magazine Water Award, which is given to innovative leaders in the power industry.