The Riyadh project presented some particular challenges for the firm.

The client had a final yield of 7,200m³/day.

KEY STATS

7,200m³
Final yield

75%
Waste stream recovery

7,950m³
Total inlet

then passed to a set of low-pressure RO plants, recovering 75% of the feed solution.

"The brine from the LP-RO units was then sent to the real workhorse of the plant - a 3,000m³ equalisation tank constructed to receive other sources of wastewater alongside the brine - for example, from floor drains and chemical cleaning.

"The filtered water downstream of the media filters contained low levels of calcium and magnesium hardness, low silica content and virtually composed of Sodium, chloride, and sulfate salts. Alkalinity was carefully controlled so no scaling will form in the high pressure RO (HPRO). The HPRO was designed with special high rejection membranes running at high pressure. The chemical composition of the feed water allowed for 75% recovery of the waste stream."

Khan explains that two waste streams coming from the plant were sent to different locations, with the brine sent to evaporation ponds where circulation pumps and vaporising nozzles were utilised to assist evaporation rates and minimise space requirements. The lime slurry was sent to sludge drying beds, where decanted water was reclaimed and put back into the system for further recovery.

"The plant was successfully commissioned and put in service. Fine-tuning was done to reduce the lime slurry by up to 20% through reducing the lime and adding caustic instead. Part of the slurry was recycled back to the inlet of the clarifiers, providing seeds for precipitate particles to form, improving the solids capacity and minimising solids carryover."

By the end of the project, Khan says that the client recorded a yield of 7,200m³/day from a total inlet of 7,950m³/day.

"The scarcity of water has pushed the envelope for water engineering to the limits, and in countries as dry as Saudi Arabia, this poses the maximum challenge for engineers to keep coming up with innovative and effective solutions." Utilities

Asad Khan, AES Arabia.