

CASE STUDY



SOLAR POWER PLANT

Cooling Tower Blowdown Wastewater Treatment for Reuse

- **Location:** Ashalim, Israel
- **Client:** Alstom - GE
- **Solution:** containerized systems for cooling tower wastewater treatment and reuse
- **Capacity:**
 - 20 m³/hr - cooling system makeup water
 - 10 m³/hr - demineralized water for boiler feed

Background

Megalim Solar Power Ltd's Power Station, located in Israel's northern Negev desert, will be the first utility-scale solar thermal or concentrated solar power (CSP) plant in operation in Israel when completed at the end of 2017. The plant, one of the largest projects of its type in the world, includes 50,600 computer-controlled heliostats

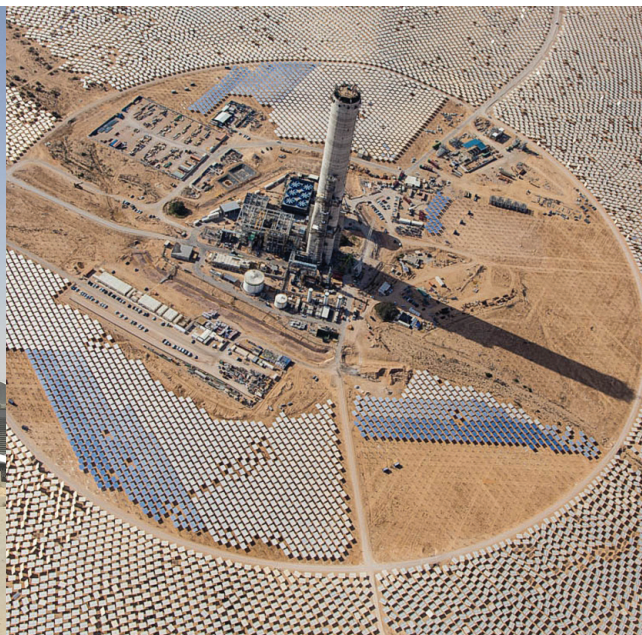
spread across an area of over 3 square kilometers. The mirrors concentrate sunlight 1000-fold onto a boiler mounted atop a 200 meter tower, generating high-temperature steam at high-pressure which is then piped to a turbine-generator at ground level to produce 121 MW of solar electricity for the Israeli power grid.

Challenges

To minimize fresh water usage in the cooling cycle and boiler makeup of the power plant, Fluence designed and supplied a containerized system for treatment of cooling tower blowdown wastewater for reuse and the production of ultra-pure water (UPW).

Brackish blowdown wastewater is continuously discharged on-site and if not reused must be disposed via dedicated evaporation ponds. Therefore re-cycling cooling water through several cycles before discharge to the evaporation ponds can both save valuable fresh water and reduce discharge volumes.

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The Solution

The containerized blowdown water treatment begins with pretreatment via an automatic disc filtration and ultrafiltration train. The water then circulates through first-pass reverse osmosis, and goes on to the demineralization process, which includes second-pass reverse osmosis, gas transfer membranes (GTM), and continuous electrodeionization (CEDI). The Ashalim solar power plant blowdown water reuse system can

take in 40 m³/hr of blowdown effluent, producing 20 m³/hr of makeup water for the cooling system, as well as 10 m³/hr of ultrapure water for use in the steam boiler. For maximum reliability, Fluence designed the system with full duty-standby redundancy (2 x 100%), including a control system. The entire water treatment process is housed inside of modular containers, which requires a minimal footprint and site work.

Results

- Treatment of cooling tower blowdown water for reuse
- Supply of cooling makeup water & boiler feed (demineralized water)
- Guaranteed permeate quality
- Reduction of freshwater consumption by ~50% and effluent discharge by ~80%
- 100% availability & reliability

The Technology

Containerized systems featuring:

- Pretreatment- automatic disc filtration and ultrafiltration
- Reverse osmosis treatment
- Demineralization osmose treatment, GTM and CEDI

