

Case story | Yonsan Engineering

## Yonsan Engineering and Danfoss supply **energy efficient SWRO** to multi-island resort complex in the Maldives



### Highlights

- Significant energy & OPEX savings
- Minimal footprint
- Low maintenance

**CROSSROADS Maldives is a groundbreaking resort complex located just 15 minutes by speedboat from Malé. The development consists of two high-end hotels situated on two separate islands and a third island that houses the major plants, staff accommodation, a stunning new marina, and a marine research facility. CROSSROADS is now the Maldives' biggest integrated leisure and entertainment center.**

**Yonsan Engineering was the EPC contractor for the major plants, which include four SWRO trains that supply potable water to all three islands. Danfoss APP pumps and iSave ERDs were selected for their high reliability and energy efficiency.**

The challenge:

Provide **energy efficient, low-maintenance** and **compact SWRO** for a multi-island complex

With no conventional energy source, a location far from the world's refineries, and more than a thousand islands spread over 300 km, the cost of electricity in the Maldives is always an issue. Diesel for generators must first be shipped to the capital, Malé, then on to other islands, resulting in energy prices that fluctuate with world oil prices but average USD 0.25 – 0.30 per Kwh.

"Energy prices in the Maldives are the highest in South Asia and among the highest in the world," says A.K. Bagchi, managing director at Yonsan Engineering in Singapore, which was responsible for CROSSROADS' SWRO, wastewater, and power generation systems. "Accordingly, the energy efficiency of SWRO plants, which provide almost all of the freshwater in the Maldives, is critically important to developers and the government."

But energy efficiency was just one criterion for the new plant. "Space is at a premium on these small resort islands," explains Bagchi. "Keeping the SWRO plant as small as possible releases valuable land for other hotel facilities, and the Danfoss equipment's compact size keeps the plant footprint to the minimum."

Finally, reliability and easy maintenance were also critical. "The CROSSROADS project is located just a quarter of an hour from the capital and Maldives' biggest airport," says Bagchi, "but such proximity is the exception in the Maldives, not the rule. The distance to Malé from Asian and European capitals, in the middle of the Indian Ocean, and on from there to many islands, is so great that flying in maintenance personnel and spare parts quickly becomes a significant cost factor in addition to all other maintenance costs."

#### The solution:

A four-train SWRO plant powered by **Danfoss APP pumps** and **iSave ERDs**

Yonsan Engineering has installed hundreds of SWRO plants throughout the Maldives and was quite familiar with Danfoss's solutions.

"Danfoss APP pumps and iSave ERDs have become the de facto standard in SWRO plants in the Maldives," says Bagchi. "Their combination of energy efficiency, reliability, and small footprint are well suited for the SWRO applications that are typical for the islands."

For the CROSSROADS project, Yonsan's engineers designed a four-train plant. Each 500 m<sup>3</sup>/day train was built around an APP 22 and an iSave 40.

The SWRO plant is located on an island that connects to two others – each with its own high-end resort – via a service bridge. "Each of the three islands requires 100 – 350 m<sup>3</sup> per day," Bagchi explains. "With a total capacity of 2000 m<sup>3</sup>/day split between four trains, the system has plenty of redundancy and flexibility, and will be able to cover CROSSROADS' needs for many years to come."

#### The result:

**Reliable energy efficiency** with room to grow

Commissioned at the end of 2019, the CROSSROADS SWRO plant has run as expected.

"As planned, maintenance is quite low," says Bagchi. "The APP 22s need no maintenance for the first 8000 hours of operation, and they have lived up to their promise. All in all, we are very satisfied with the outcomes from the SWRO plant, which is ready to deliver more freshwater as capacity needs grow, all at the same low OPEX."



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