

Case story | TDR

## TDR relies on **efficient** Danfoss APP pumps for **profitability** at **ZLD** wastewater treatment facility



**90%**  
efficiency at all  
operation points



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*China's zero liquid discharge legislation (ZLD) is driving increased use of RO technology to treat industrial wastewater. For although ZLD eliminates contamination from factory effluents into groundwater and waterways, ZLD comes at a high energy cost which RO treatment prior to brine concentration and crystallization reduces substantially. Danfoss APP pumps are increasingly in demand to make such ZLD projects as energy-efficient – and profitable – as possible.*

### **The challenge: Treat 12,000 m<sup>3</sup>/d of biochemical wastewater with zero liquid discharge as efficiently as possible**

Beijing Tiandiren Environ-Tech Company Limited (TDR) won the bid to build a new 12,000 m<sup>3</sup>/day wastewater treatment facility for a bio-pharmaceutical manufacturer in Xin Jiang Province. The end-user, Chuan Ning Biological, had to comply with the Chinese government's tough new zero liquid discharge (ZLD) legislation and required a Build-Operate-Transfer (BOT) RO project which it would later take over after the contract period.

"The Chinese government's ZLD legislation is very ambitious," says Obama Sun, general manager at Beijing C.I.I.T. Environmental Co. Ltd, the Danfoss distributor who supplied the pumps. "It has the

dual benefits of completely eliminating pollution from a production facility's wastewater and of saving water, a very precious natural resource in many parts of China. But ZLD is also very energy intensive, both because brine concentration and crystallization require very high kWh usage per cubic meter of wastewater, and because salinity concentrations in such RO applications can be much higher than those treated in traditional SWRO plants."

### **The solution: A multi-stage wastewater treatment facility powered by three different Danfoss APP pump types**

TDR proposed a multi-stage RO facility treatment using a range of DT membranes as the most efficient solution because of the high salinity of Chuan Ning Biological Company's wastewater. Danfoss APP pumps played a key role:

- The first DTL-RO stage comprised eight parallel trains, each using two APP 43 pumps to provide design pressure of 50 bars.
- The second stage consisted of three parallel trains, each using two APP 30 pumps to provide design pressure of 80 bars.
- The third stage included four parallel trains, each using one APP 26 pump to provide design pressure of 80 bars.

As is the case with TDR's other build-own-transfer (BOT) projects, the Chuan Ning Biological contract was based on wastewater volume: Chuan Ning pays a fixed rate per cubic meter of treated water. This means that TDR's incentive to treat the wastewater as cost-efficiently as possible was high.

"Over the course of the 10-year BOT period, energy costs to power the high-pressure pumps are the most important cost driver," says Sun. "But maintenance costs for so many pumps are also a critical consideration. APP pumps are outstanding OPEX performers in both regards."

### **The results: Energy-efficient zero liquid discharge – and a happy repeat customer**

TDR engineers were familiar with Danfoss APP technology from other wastewater projects.

"TDR has been using APP pumps to treat wastewater for an industrial park in another BOT project in Inner Mongolia for a number of years now," Sun explains. "Based on this experience, both they and we had full confidence that our profitability calculations for this new ZDL project were reliable, and that the project will meet both our customer's and the end user's expectations completely for the duration of the 10-year contract and beyond."



*Danfoss APP pumps operating in different trains at Chuan Ning Biologicals ZLD treatment plant*



*Danfoss APP 21- 43 pump series*

### **About Beijing Tiandiren Environ-Tech Company Limited:**

*With more than 300 employees, Beijing Tiandiren Environ-Tech Company Limited (TDR), specializes in high-concentration wastewater treatment and specialized material separation technologies. With its strong R&D capabilities, rich human resources, and consistent support from capital markets, TDR embraces the values of pragmatism, innovation, integrity and efficiency, and continues to pursue its mission to be the most professional and trustworthy enterprise in the water treatment industry.*

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