

SPOTLIGHT

PURSUING A PASSION IN DESALINATION AND WATER REUSE

Holly Churman, Lead Engineer, GHD was awarded the IDA Fellowship Award and an exclusive opportunity to work with PUB, Singapore's National Water Agency



Holly Johnson Churman, a lead water and wastewater engineer at GHD, was the recipient of the 2016–2017 International Desalination Association (IDA) Fellowship Award. The Fellowship provided Churman with a monetary award of USD\$10,000 and an exclusive opportunity to work with PUB, Singapore's National Water Agency. Inaugurated in 2008, the IDA Fellowship is one of the industry's most prestigious awards. It promotes greater interaction and sharing of knowledge, technologies and processes in the desalination and water reuse industry, thus benefitting not only the Fellow and host agency, but also the industry at large.

The Fellowship explored the application of desalination technology to solve complex water issues across industry sectors, an area of interest to both PUB and Churman. Churman worked alongside PUB staff, and gained insights into the organisation's operations, strategies and policies. The specialized training took place over a four-

week period during July and August 2017, and comprised meetings with academia, and site visits ranging from Singapore's NEWater (high-grade reclaimed water) and desalination plants, and petrochemical and semiconductor facilities.

Singapore faces important challenges relating to its future water demand. By 2060, total water demand will double from today's 430 MIGD. Non-domestic water demand will increase from 55% to 70%. According to its long-term water plans, PUB will expand Singapore's capacity of desalinated water and NEWater, to address these challenges. Desalinated water and NEWater will progressively support 30% and 55% of total water demand over the next 40 years, respectively. Industrial water reuse activities will complement this strategy, particularly for refining and petrochemical sectors on Jurong Island, where there are opportunities to reduce water usage.

As desalination and water reuse are key to Singapore's water sustainability, PUB is on the constant lookout for innovative technology to produce water in a cheaper and more effective manner. PUB is researching, developing and implementing strategies (eg. predictive modelling systems, alternative equipment, and new monitoring approaches) to optimize the cost and quality of its water operations. For example, a submerged ceramic membrane filtration system has enabled a refinery to recover wastewater for use in facility processes and cooling towers, reducing sourcing and disposal costs. The robust membranes, coupled with continuous air scouring, has reduced clean-in-place frequencies and intensities, and associated long-term operating costs.

PUB's approach offers valuable lessons for regions where desalination and water reuse can be leveraged to support local municipal and industrial water demands. For example, in the United States, Texas will experience an increase in water demand, as well as a change in demand mix in coming decades. According to the Texas Water Development Board, total water demand is projected to increase by about 13% to nearly 21,000,000 acre-feet (approximately 15,500 MIGD) through 2060. Municipal water demand will increase from 28% to

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37% of total demand, while industrial water demand will decrease from 72% to 63%. The vast volumes of water to be treated, despite the demand mix, combined with the availability of coastal seawater, inland brackish groundwater, and recycling applications, offer opportunities to expand the state's water source portfolio to enable growth across sectors. Given the complexity of water treatment needs within these sectors, such as produced water handling in the oil and gas industry, and ultrapure water generation for the state's expanding microelectronics sector, technology will also play a key role to support expansion.

Churman looks forward to applying lessons learned from the IDA Fellowship Award programme to assist clients in solving complex problems in Texas, where she presently resides, and beyond. "PUB's progressive and rigorous approach to water management has enabled Singapore to overcome truly daunting challenges and prepare for the future," Holly says. "I am grateful to PUB and the IDA for the opportunity to work alongside talented individuals who have taught me important lessons about desalination and water reuse. I look forward to continuing my work in this field in the future."



Churman's visit to a petrochemical complex (top) and a submerged ceramic membrane system treating refinery wastewater on Jurong Island (bottom).