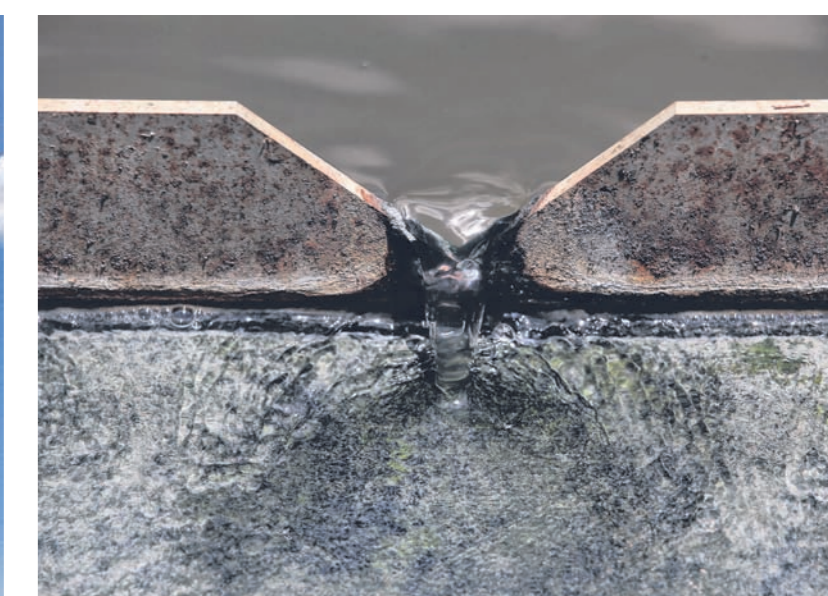


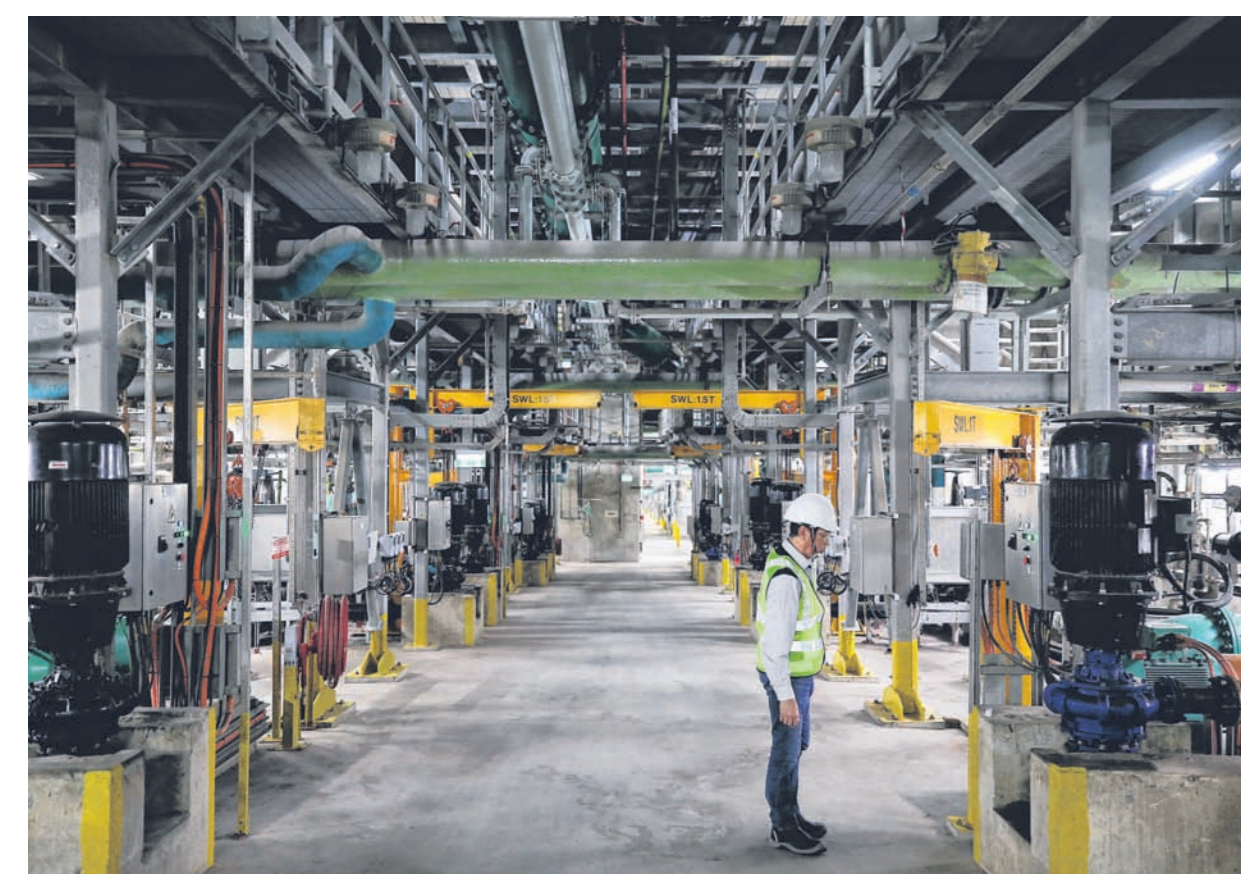
Operating at a depth of 60m underground, the pumps at the Changi WRP have a pump capacity of 4.6 cubic metres per second each, or the equivalent of filling up an Olympic-size swimming pool in nine minutes. ST PHOTOS: KEVIN LIM



Above: Treated used water, or secondary effluent, at Jurong Water Reclamation Plant, is channelled through effluent outfall facilities for discharge to the sea.

Left: Treated used water in the final sedimentation tank at the Jurong plant, which has a total treatment capacity of 57 million gallons per day (mgd) – 36 mgd for domestic used water and 21 mgd for industrial used water.

Unlike the modern and covered facade of Changi WRP, Jurong WRP is the archetype of a conventional water treatment plant that functions above ground. In operation since 1981, it is currently the only facility that treats industrial used water and greasy waste, in addition to domestic used water.



Above: Changi Water Reclamation Plant's principal engineer Edgar Wong in the liquid treatment area, where sludge is pumped to the Solids Building for treatment.

A TALE OF TWO PLANTS

An underground modern water facility versus a conventional plant



Kevin Lim
Executive Photojournalist

Singapore's water reclamation plants run 24 hours a day, 365 days a year. Officers from national water agency PUB are on duty around the clock, making sure the plants continue to operate beyond normal working hours to ensure proper management of used water and water sustainability for Singapore.

The four water reclamation plants – Kranji, Ulu Pandan, Jurong and Changi – serve a population of over five million.

"In Changi Water Reclamation Plant (WRP), you can't see the water treatment tanks, but they are all under the ground we stand on. The liquid treatment processes are all happening below us," said Mr Edgar Wong, 63, principal engineer of the Water Reclamation (Plants) Department at PUB's Changi WRP.

Commissioned in 2008, Changi WRP is one of the largest and most advanced water reclamation facilities in the world with a treatment capacity of 202 million gallons per day, just one-third the size of a conventional plant. Singaperi WRP treats about half of Singapore's used water and produces treated effluent which is either used to manufacture Newater or is discharged into the sea.

The Deep Tunnel Sewerage System (DTSS) Phase 1, completed in 2008 at a cost of \$3.4 billion, comprises Changi WRP, a 48km-long deep sewer tunnel running from Kranji to Changi, two 5km-long deep sea outfall pipes and 60km of link sewers.

"What used to be three plants in Bedok, Seletar and Kim Chuan have been combined into one – Changi WRP. We saved a lot of area and occupy much less space but we can handle more flow and operate at a smaller land footprint," said Mr Wong, who first joined the Sewerage Department in 1980 as a technical officer.

Unlike the modern and covered facade of Changi WRP, Jurong WRP is the archetype of a conventional water treatment plant that functions above ground. In operation since 1981, it is currently the only facility that treats industrial used water and greasy waste, in addition to domestic used water.

"We have to protect public health and ensure our customers get consistent and good supply of industrial water," said Mr Balasubramaniam Jeyanathan, a 41-year-old senior engineer who oversees operations on the ground at Jurong WRP.

Jurong WRP will be phased out by 2025 when the DTSS Phase 2 project, which extends the existing deep tunnel system to collect and treat used water from the western and southern parts of Singapore, is completed. The new Tuas WRP will be completed in phases from 2023 and progressively take over the catchment for both Jurong WRP and Ulu Pandan WRP, freeing up the land for development.

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Right: Mr Wong showing samples of dewatered sludge and dried sludge. Dryers turn dewatered sludge into dried sludge, which is trucked away for incineration.

The mechanical ventilation system in the basement of the liquid treatment module of Changi WRP is used to keep the basement well-ventilated by drawing out air and pushing fresh air into the basement.



The main control room in the Changi plant is the heart of its operations. Here the operators can handle equipment remotely and monitor the treatment process of used water.



Circular sedimentation tanks are a distinctive feature in the landscape of Jurong Water Reclamation Plant. Jurong WRP, in operation since 1981, will be phased out by 2025 when the DTSS Phase 2 project is completed.



The thermal hydrolysis process facility helps to increase solids treatment capacity at the Jurong plant without the need to construct any additional digester. It also reduces digester footprint required for sludge management.



Sludge from the used water treatment process is converted to methane-rich biogas in egg-shaped digesters at the Jurong plant. This biogas, which serves as fuel in gas engines to generate electricity, is used for in-plant power generation.



Senior engineer Balasubramaniam Jeyanathan (left) and engineer Lim Seng Leong observing the treatment process of industrial used water at the aeration unit of the Jurong plant.